CONSUMER BEHAVIOR IN THE INTERNET ERA

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CONSUMER BEHAVIOR IN THE INTERNET ERA

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The Influencing Mechanism of Interaction Quality of UGC on Consumers' Purchase Intention – An Empirical Analysis

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User-generated content (UGC) refers to online information created and shared by consumers that can influence other users' purchase decisions. Due to the rapid development of new technologies in business, marketers' dependency on UGC is rising. This study aims to explain how the interaction quality of UGC affects its credibility as a source and the usefulness of its information, as well as how it influences consumers' online purchase intention. In addition, we examine the moderating effect of product involvement. We collected data from 272 users of social media in China to conduct empirical research. The SPSS and Amos were used to analyze the data and test the hypotheses. The results reveal that UGC interaction quality is positively related to purchase intention, and this relationship is mediated by perceived usefulness and trust. Further, consumers' product involvement negatively moderates the effect of perceived usefulness and trust on purchase intention. Findings from this study are expected to extend the literature on UGC and give benefits to marketers and online business operators.

Keywords: user-generated content, purchase intention, usefulness, trust, product involvement

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INTRODUCTION

With the emergence of web 2.0, the consumer market began a new round of consumption upgrading, and the structure changed from subsistence to enjoyment and development. Modern consumers get the purchase path through the search engine. They no longer passively accept information from businesses, but actively consult information created by other consumers (pictures, text, and video, etc.) as a reference for purchasing decisions (Thoumrungroje, 2014). User-generated content (UGC), a new network of information creation and organization, was born. UGC generally refers to the text, pictures, video, and other content created by users in any form published on the network. This includes purchase experiences shared by users on a website or app, a manifestation of the empowerment and decentralization of new media (Vickery and Wunsch-Vincent, 2007).

Alongside these changes, many e-commerce platforms are moving away from the traditional model of search and retail, and making use of pull strategies through content marketing to build relationships with customers. Content marketing is a relatively new technique used to create and distribute valuable or relevant content to acquire a defined target with the intention of obtaining profitable customer action (Steimle, 2014). Therefore, brands must recognize the importance of content marketing, understand the factors leading to its success, and the consequences of its application.

Despite increasing attention on content as a modern marketing tool, there are relatively few studies on the impact of UGC on consumers' online purchase intention with an interactivity perspective (Müeller and Christandl, 2019). A key feature of social e-commerce is UGC, the product of interaction between users. For example, users can share shopping information on the platform, and other users can comment and exchange in a two-way flow of information. The networks in social media and positive interaction between users are the real source of content marketing. Therefore, it is crucial to refine the interactivity of UGC and explore its impact on consumers' purchase intention.

This study explores the impact of UGC interaction quality on consumers' purchase intention from the perspective of interaction. According to social cognitive theory, perceived interactivity, as an environmental factor, affects users' behavior through human cognition (Cyr et al., 2009; Lee et al., 2011). To analyze the cognitive human factors, this study refines the mediating variables (perceived usefulness and perceived trust) based on the value theory. At the same time, for the information with the same content expression and dissemination direction, receivers' understanding may differ. Therefore, we should consider the characteristics of information receivers when analyzing the impact of UGC on consumers. Product involvement in the communication effect has helped explain consumer behavior in advertising, promotion stimulation, information search, and processing (Zaichkowsky, 1985; Belvedere and Goodwin, 2017). Therefore, this study introduces consumer product involvement as the moderating variable.

This study contributes to the literature in three ways. First, based on the theory of social cognition, this study views interactivity as a key feature of Web 2.0 technology. It is an entry point to investigate consumers' understanding of UGC interaction, highlighting the limitations of previous studies that only consider information characteristics and the role of individual social factors. We can then provide a basis for the research of perceived interactivity in the context of social media. Second, based on the value theory and the coexistence of media and social media platforms, this study views perceived usefulness and trust as mediating variables. This enriches the theoretical results of UGC behavior research on social media platforms. Third, by studying the impact of UGC on purchase intentions in social e-commerce, this study introduces product involvement as a moderating variable and provides a theoretical basis for social e-commerce to better play the role of UGC.

LITERATURE AND HYPOTHESES

Interaction Quality of UGC and Perceived Usefulness

The development of Web 2.0 technology created many UGC platforms. This made user interaction and the exchange of information possible, thus providing a broad choice for social media marketing (Deng et al., 2015; Felix et al., 2016). UGC is diverse and has strong media properties. To improve interaction quality, community members discard single text discussion and utilize more advanced forms of audio, video, pictures, and other resources (Zhao et al., 2011). Communication between members is more intuitive, the information richer and more reliable, and emotion more straightforward. The interactive quality of UGC emphasizes that the content generation process is also a good source of interpersonal interaction. This process includes not only interaction and feedback between consumers, but also a partnership between consumers and retailers.

Perceived usefulness is defined as the degree to which a person believes that the use of a system would improve one's performance (Davis, 1989; Karahanna and Straub, 1999; Muslim et al., 2014). In this study, perceived usefulness is the overall wealth of usefulness in the message or information shared on social media. The virtual, anonymous, open, and weak group relationship among consumers means we cannot rely on identity recognition and acquaintance introduction to establish perceived usefulness. Only through online interaction can we obtain sufficient product information resources (Wu, 2007). The interaction of UGC effectively delivers information through engaging users' attention, increasing their involvement, and enriching their experiences (Lee et al., 2011). The positive perception of interaction shows users they can update information quickly, in real-time, and actively control information acquisition on the platform (Animesh et al., 2011). Interaction between users is conducive to information collection and transmission, and helps other members gain opportunity benefits or key resources (Felix et al., 2016).

In the Internet environment, consumers can not only view product information, but browse the generated content of others. They can directly interact with others to obtain more comprehensive information and form their own useful perception of the product. Therefore, this study proposes hypothesis 1:

H1: Interaction quality of UGC is positively related to consumers' perceived usefulness of products.

Interaction Quality of UGC and Perceived Trust

High-quality interactivity can be the foundation of trust (Wu and Chang, 2005). This study defines trust as the willingness of consumers to be affected by integrity (honesty and commitment), kindness (caring, thinking for others), and skills (ability to meet requirements) in product recommendation based on UGC publishers. Communication and information exchange are key aspects of interactivity and have a significant influence on trust (Selnes, 1998). In social media, the relationship between users is a weak bond. Through continuous online interaction they can enhance their understanding, and then generate a sense of trust (Blanchard et al., 2011; Wang and Chen, 2012).

Effective interaction of UGC is helpful to find groups with common attributes among members of a virtual community. In groups with the same values or interests, it is easier to establish emotional ties, and ultimately enhance perceived trust (Müeller and Christandl, 2019). In addition, UGC interaction enhances information credibility. Consumers obtain information through

UGC to reduce perceived risk and improve perceived trust (Li et al., 2020). The interactivity of social e-commerce platforms forms the basis of online word-of-mouth communication. Many consumers follow the trend of mass consumption. If consumers see many product comments and more members participate and share information, they will have a positive attitude toward the product or service (Ye et al., 2011). Once consumers frequently participate in UGC, they will continue to increase their understanding of UGC and to reduce the perceived risk, which is conducive to consumers' trust in UGC (Dawes and Nenycz-Thiel, 2014). Therefore, this study proposes hypothesis 2:

H2: Interaction quality of UGC is positively related to consumers' perceived trust of products.

Perceived Usefulness and Purchase Intention

Perceived usefulness may affect online consumers' response to UGC, influence their attitude, and lead to a purchase (Kim and Song, 2010; Muslim et al., 2014; Ventre and Kolbe, 2020). UGC adoption is a process where people use information purposefully (Pitta and Fowler, 2013). Consumers today usually use social media to find product information and customer feedback before a purchase decision as they are more dependent on UGC (Horst et al., 2007; Racherla and Friske, 2012; Dhahak and Huseynov, 2020). Consumers' brand choice and purchase chiefly come from useful information. For UGC, all information that can help consumers make good purchase decisions will have certain use value, especially with unfamiliar product price and channel quality (Featherman and Pavlou, 2002; Racherla and Friske, 2012). It even exceeds demand for product price. This is because previous consumers usually have experience with the products they are planning to buy, which helps potential buyers make purchase decisions. Sharing information can help consumers reduce their perceived risk in decision-making (Horst et al., 2007; Racherla and Friske, 2012; Muslim et al., 2014). Therefore, this study proposes hypothesis 3:

H3: Perceived usefulness is positively related to consumers' purchase intention.

Perceived Trust and Purchase Intention

Trust is a multi-dimensional concept, which includes cognitive, parental, and behavioral dimensions (Lewis and Weigert, 1985). Gefen et al. (2003) state that in the e-commerce environment, the concept of trust has obvious diversity. The existing research regards trust as trusting beliefs (Alba and Hutchinson, 1987; Allsop et al., 2007) and trusting intentions (Anand et al., 1988; Alreck and Settle, 1995). In e-commerce, trust is also seen as honesty. Chu and Lu (2007) define purchase intention as the degree to which consumers would desire to purchase products in the future. In this study, purchase intention refers to the extent to which customers would want to purchase products in the future after exposure to UGC advertising. The influence of trust on purchasing intention has been widely recognized in academia (Yun, 2011; Bulut and Karabulut, 2018). Trust reduces transaction risk for consumers, and plays a key role in interaction between consumers and UGC (Wirtz and Lwin, 2009; Cheng et al., 2019).

On social media, consumers cannot communicate face to face, which improves their perception of risk. Currently, trust is a basis of consumer decision-making to a large extent (Chong, 2013; Zhou et al., 2018). Today's online consumers believe that UGC is more trustworthy than content provided by sellers (Jonas, 2010). From the perspective of economics, consumers' purchase intention is based on the reliability of products and UGC (Ert et al., 2016). Consumers' recommendation can influence product choice through trust (Smith et al., 2005; Bahtar and Muda, 2016). Consumers usually buy a product after reading all the UGC on the platform and being convinced by their content (Horst et al., 2007). The higher the frequency of community interaction, the more detailed and authentic the information, and the more likely consumers are to generate trust, thus improving their purchase intention. The high interaction quality of UGC improves consumers' perception of product reliability, their impression of products or services, improves trust, reduces transaction risk, and enhances purchase intention (Wirtz and Lwin, 2009).

Therefore, this study proposes hypothesis 4:

H4: Perceived trust is positively related to consumers' purchase intention.

The Mediating Role of Perceived Usefulness and Perceived Trust

Social cognitive theory was first put forward by Bandura, an American psychologist, and states that behavior, human, and environmental factors are the determinants of interconnection and interaction (Bandura, 1986). According to social cognitive theory, perceived interactivity, as an environmental factor, will affect users' behavior through human cognitive factors (Cyr et al., 2009; Lee et al., 2011). Social cognitive theory explores the interaction between individual and interactivity. Through UGC interaction, consumers' perceived value of goods or services promote their purchase intentions (Chong, 2013; Zhou et al., 2018). To further analyze the cognitive human factors, this study refines the mediating variables (perceived usefulness and perceived trust) based on the value theory. The value theory helps us understand why and how individuals value things, how much they value, and how perception of these values affects social behavior.

Smet (2009) asserts three more intuitive values in his research on users' participation intention in virtual community. Functional needs are satisfied by the quality and quantity of content received to fulfill their specific needs according to goal orientation. Emotive needs relate to social interaction, personal uses other than contractual agreements, and self-expression through information acquisition and dissemination based on users' trust in others on the platform (Dholakia et al., 2004; Smet, 2009). Contextual needs relate to individual expectations and experiences like entertainment. Because this study mainly explores the mechanism of influencing online consumers' purchase intention from the perspective of interaction, contextual needs are not included in the scope. Therefore, this study

focuses on perceived usefulness and perceived trust as mediating variables. Based on the social cognition theory, many scholars assert that users' perception of interactivity as an environmental factor has an impact on users' cognition (Lee et al., 2011; Bahtar and Muda, 2016). Furthermore, perceived interactivity ultimately affects user loyalty and behavior intention through influencing their cognition and emotions (Cyr et al., 2009). In this study, consumers' perception of UGC interaction quality will affect their behavior intention (purchase intention) by influencing their cognition (perceived usefulness and perceived trust).

User-generated content interaction quality has a positive impact on perceived usefulness (Muslim et al., 2014; Felix et al., 2016). Effective interaction with UGC can attract users' attention, increase participation, and help transmit information. This is conducive to the function of information collection and transmission, can help others obtain opportunity benefits or key resources, and can improve the perception of the usefulness of products or services (Wu, 2007). Furthermore, only when new customers obtain enough information can they estimate and judge the value of products demanded by customers, to stimulate their purchase intention. In addition, high-quality interaction is the foundation of trust (Wu and Chang, 2005). Effective UGC interaction also meets consumers' social needs, which is key to finding virtual communities with common attributes, where it is easier to establish close emotional ties and enhance their sense of trust (Müeller and Christandl, 2019). On social e-commerce platforms, every consumer cannot discuss and communicate face to face. Trust is one of the bases to determine consumers' purchase intention, which affects consumers' choice of products. Therefore, we propose the following hypotheses:

H5: Perceived usefulness plays a mediating role in the relationship between interaction quality of UGC and purchase intention.

H6: Perceived trust plays a mediating role in the relationship between interaction quality of UGC and purchase intention.

The Moderating Role of Product Involvement

Product involvement refers to how consumers feel toward certain products and their personal level of relevant psychological needs, value, and other personal interests (Petty and Cacioppo, 1986). According to this difference, scholars divided consumers into low involvement and high involvement according to their product involvement Zaichkowsky, 1985). Product involvement affects the evaluation and actual purchase of a product by consumers. Product involvement is an important factor for consumer product choice (Belvedere and Goodwin, 2017). When consumers perceive usefulness and trust through UGC interaction, they are involved in the product, and will consider the uncertain consequences of the product, resulting in perceived risk (Rahman, 2017; Habib et al., 2021). The level of product involvement can change consumers' perception of risk, affect concerns about the negative impact of the product, and then affect their purchase intention (Cui and Wu, 2016).

Consumers with high product involvement are more sensitive to the potential risks of shopping. They tend to search for more product information and compare and evaluate alternative brands. The whole decision-making process is more complex. However, consumers with low involvement will spend little time searching for information, and often make purchase decisions based on others' experience (Owusu et al., 2016). For consumers with high product involvement, UGC is only one source of information among many that influence the final purchase decision, whereas high-quality UGC may be the sole source of information for consumers with low involvement (Tsai et al., 2015). Therefore, product involvement plays a key role in the relationship between UGC perception and purchase intention, and has a greater impact on consumers with low product involvement. Compared with high product involvement, consumers with low product involvement can improve their purchasing intention after referring to UGC recommendation. This is because through interaction with UGC, consumers will have a perception of usefulness and trust in products. At this time, low product involvement will reduce consumers' doubts and promote consumers' purchase intention. The effect of perceived usefulness and perceived trust on purchase intention will be improved. Therefore, this study puts forward the following hypotheses:

H7: Consumers' product involvement plays a moderating role in the effect of perceived usefulness on purchase intention, such that the effect is stronger when product involvement is low.

H8: Consumers' product involvement plays a moderating role in the effect of perceived trust on purchase intention, such that the effect is stronger when product involvement is low.

Based on the above analysis, we further propose a moderated mediation model. This means that product involvement moderates the indirect effect of UGC interaction quality on purchase intention *via* perceived usefulness and perceived trust.

H9: Consumers' product involvement plays a moderating role in the indirect effect of interaction quality of UGC on purchase intention *via* perceived usefulness such that the indirect effect is stronger when product involvement is low rather than high.

H10: Consumers' product involvement plays a moderating role in the indirect effect of interaction quality of UGC on purchase intention *via* perceived trust such that the indirect effect is stronger when product involvement is low rather than high.

Figure 1 displays the theoretical model in the present study.

MATERIALS AND METHODS

Sampling Procedure

To enhance the reliability of the research results, this study posted our questionnaires Sojump (http://www.sojump.com), a larg-scale online survey platform in China that is widely used in behavioral and psychological research (Li et al., 2018). SPSS 25.0 and Amos 24.0 were used for data analysis. To be included, a consumer had to have (1) used social media and (2) browsed UGC. We included the two exclusion criteria in the questionnaire at the same time, and used them to eliminate the non-conforming questionnaire when collecting the results.

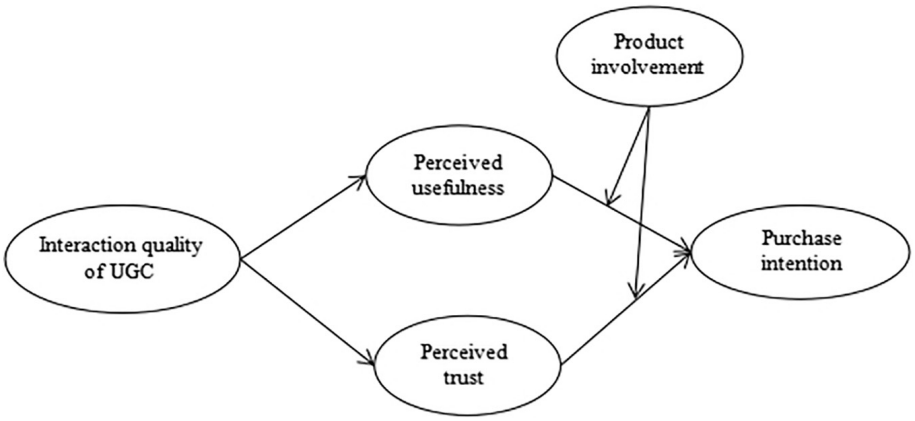


FIGURE 1 | Conceptual model.

TABLE 1 | Constructs, scale items and descriptive statistics.

Variable	Item	Factor loading	AVE	CR	Cronbach's α
Interaction quality	The UGC I browse has a good interaction with me	0.701	0.506	0.752	0.741
	The UGC I browse gives me a sense of communicating product information with others	0.803			
	The UGC I browse can interest me	0.618			
Perceived usefulness	The UGC I browse is easily accessible	0.573	0.554	0.784	0.752
	The UGC I browse adds effectiveness	0.836			
	The UGC I browse adds productivity	0.796			
Perceived trust	I think the UGC's statement is correct	0.661	0.507	0.754	0.745
	I think the UGC's statement is dependable	0.678			
	I think the UGC's statement is honest	0.790			
Purchase intention	After searching and browsing UGC, I have a great possibility to consider buying recommended products	0.690	0.534	0.774	0.770
	I am willing to buy products recommended in UGC	0.774			
	I'll recommend to others the products recommended in the UGC	0.726			
Product involvement	I think it's important for me to use this product	0.762	0.547	0.783	0.783
	I think the use of this product is closely related to my life	0.698			
	I think it's very meaningful for me to use this product	0.757			

Before completing the questionnaire we asked participants to recall their most recent time they browsed UGC on social media to buy a product. In addition, we gave the concept of UGC and corresponding examples at the beginning of the questionnaire to ensure the quality and accuracy of the results. We obtained 280 questionnaires, and after removing those with invalid answers were left with 272 copies of effective questionnaires. The sample size meets Hair et al. (1998) recommendation. Therefore, the recovery rate was 97.14%.

The gender ratio of the sample was relatively balanced, with 57.7% males and 42.3% females. The majority had a bachelor's degree or above, accounting for 70%. These had a good understanding of the questionnaire and were usually able to make better decisions to ensure the accuracy of the data (Hassanein and Head, 2007). Most were aged 19–30 years, accounting for 77.6%, which is also the age range of China Mobile Internet users. From the perspective of average monthly income, the overall distribution was relatively even; 62.9% had an income over 4000 RMB, which is basically consistent with the respondents' occupation and living conditions. We can see from the sample that it is representative, which shows that the results of this study have a practical significance.

Measures

We measured the variables in this study using established scales adapted to the context of the study. Each questionnaire item corresponding to the constructs was measured using a five-point Likert scale, anchored on "1-strongly disagree" and "5-strongly agree." The three-item measurement of perceived interaction quality was based on the work of Ohanian (1970). The perceived usefulness of UGC was measured with three items on a five-point interval scale, previously used by Gruen et al. (2006). The three-item measurement of perceived trust was based on the work of Kim et al. (2008). Referring to the measurement scale of Misra and Beatty (1990), this study used five items to measure purchase intention. The measurement of product involvement was mainly based on the research of Zaichkowsky (1985). See **Table 1** for specific items.

TABLE 2 | Descriptive statistics correlation coefficients and discriminant validity model.

Variable	1	2	3	4	5
1 Interaction quality	0.711	0.664**	0.616**	0.643**	0.623**
2 Perceived usefulness	0.664**	0.744	0.619**	0.598**	0.520**
3 Purchase intention	0.616**	0.619**	0.731	0.655**	0.590**
4 Perceived trust	0.643**	0.598**	0.655**	0.712	0.574**
5 Product involvement	0.623**	0.520**	0.590**	0.574**	0.740
Mean	1.993	1.864	2.056	1.974	2.028
SD	0.687	0.597	0.726	0.641	0.676

N = 272.
**p < 0.05, **p < 0.01, and ***p < 0.001.*
The value on the diagonal represents the square root of the AVE value.

Control Variables

We chose respondent gender, age, education, career, income, and purchase frequency as control variables. Age and gender have been proven to make a difference to consumer trust toward the seller (Chen et al., 2014). Mittal and Kamakura (2001) pointed out that age and gender are factors that affect consumer satisfaction and loyalty, which then affects consumer trust. In addition, purchase frequency has been proven to play an important role in online shopping behavior (O'Cass and Fenech, 2003), because consumers can develop knowledge and skills through the Internet (O'Cass and Carlson, 2012).

RESULTS

Reliability and Validity

To ensure construct validity for each indicator, we conducted principal component factor analysis followed by calculation of average variance (AVE) and CR to assess the convergent validity of the measurement model. **Table 1** presents the results. Data shows the outer loading value of convergent validity of each indicator exceeded the accepted value of 0.5 (Hair et al., 2013). The AVE value of all constructs exceeded the 0.5 recommended by Fornell and Larcker (1981), indicating that the scale had good convergence validity. All items had a composite reliability value above the benchmark of 0.60, indicating that the measurement model had good internal consistency. The results show that the construct of this study has adequate convergence validity. Furthermore, we also examined discriminant validity using the value of square roots of AVE, as shown in **Table 2**. The square root of AVE values of all latent variables was greater than the correlation coefficient with other latent variables, indicating that the discriminant validity of the scale was good (Barclay et al., 1995). The reliability of the measurement items was measured with Cronbach's Alpha coefficient, and for all factors the values were greater than 0.7 and accepted based on George and Mallery's (2003) criterion. These results provide a basis for the further demonstration of the hypotheses.

Hypothesis Testing

We used Amos 24.0 to construct a structural equation model to test path coefficients and the hypotheses. **Table 3** shows the fitting degree between the model and the actual data. According to the existing thresholds (Fornell and Larcker, 1981; Marsh et al., 1988; Kline, 2011), the theoretical model exhibited adequate fit to the empirical data.

According to the test results of each standardized path coefficient in the model (**Figure 2**), we see that the interaction quality has a significant positive impact on perceived usefulness and perceived trust ($\beta = 0.811$, $p < 0.001$; $\beta = 0.874$, $p < 0.001$). This adequately supports Hypothesis 1 and Hypothesis 2. Meanwhile, perceived usefulness and perceived trust also have a significant positive impact on purchase intention ($\beta = 0.275$, $p < 0.05$; $\beta = 0.651$, $p < 0.01$), which verifies Hypothesis 3 and Hypothesis 4.

To examine such a mediation effect, we adopted the bootstrap method proposed by Hayes (2013). **Table 4** shows the test results. LLCI and ULCI refer to lower level and upper level confidence interval, respectively. The results show that the mediating effect of perceived usefulness and perceived trust on the relationship between interaction quality and purchase intention was significant. The 95% CI did not contain 0, indicating that the mediating effect was significant. This supports Hypothesis 5 and Hypothesis 6.

To further test our moderating effect, we conducted a series of hierarchical regression analyses using SPSS 25.0 (Hox, 2010). Due to the need to verify the interaction between independent and moderating variables, to reduce the multicollinearity between variables in the regression equation, this study first centralized all variables and constructed the interaction term between them (Aiken and West, 1991). **Table 5** shows the regression results. In model 4, the interaction items of perceived usefulness and product involvement had significant negative effects on consumers' purchase intention ($\beta = -0.095$, $p < 0.05$). In model 7, the interaction items of perceived trust and product involvement had a significant negative influence on consumers' purchasing intention ($\beta = -0.160$, $p < 0.001$). We examined the interaction effects at different levels of perceived usefulness (the mean of perceive usefulness $\pm$ 1 SD) and perceived trust (the mean of perceive trust $\pm$ 1 SD) for testing the moderation effect clearly (Aiken and West, 1991) with 95% confidence intervals and 1,000-fold bootstrap replicates for confidence intervals (**Figures 3**, **4**). The results indicated that the relationship between perceived usefulness and purchase intention is stronger when product involvement is low ($\beta = 0.634$, $p < 0.001$) rather than high ($\beta = 0.390$, $p < 0.001$; **Figure 3**). Thus, the data supports Hypothesis 7. Furthermore, the relationship between perceived trust and purchase intention is stronger when product involvement is low ($\beta = 0.720$, $p < 0.001$) rather than high ($\beta = 0.366$, $p < 0.001$; **Figure 4**). Thus, Hypothesis 8 was supported.

Based on Hayes' (2013) method, the last step to test the moderated mediation model is demonstrating why this mediating effect will be strengthened, weakened, or changed when the level of moderating variable is higher or lower. Thus, we designed high, medium, and low levels of product involvement (**Tables 6**, **7**). There was a positive effect of interaction quality on purchase intention through perceived usefulness and perceived trust. However, the size was different when across levels of product

TABLE 3 | Comparison of the theoretical model fit index results with the evaluation standard.

	χ2/df	RMSEA	GFI	AGFI	IFI	TLI	CFI	NFI
Evaluation Standard	<3	<0.080	>0.900	>0.800	>0.900	>0.900	>0.900	>0.900
Values in this study	2.241	0.068	0.922	0.883	0.946	0.929	0.946	0.907

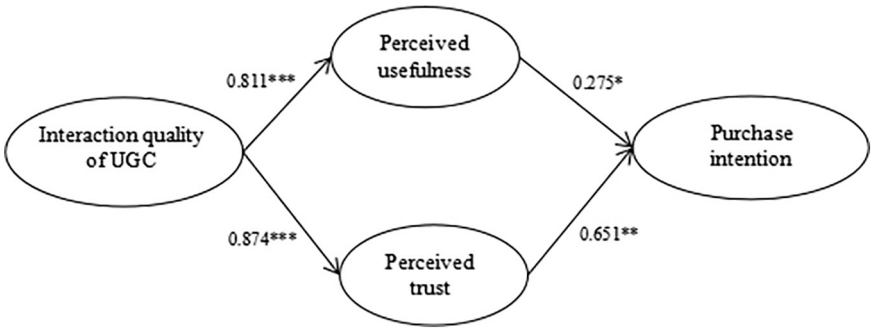


FIGURE 2 | Path coefficients of the hypothesized model.

TABLE 4 | Mediating effect test.

Effect	Estimated Value	*P*	Standard Error	LLCI	ULCI
Interaction quality → Perceived usefulness→ Purchase intention	0.269	0.035	0.133	0.072	0.502
Interaction quality→ Perceived trust→ Purchase intention	0.686	0.000	0.160	0.473	1.002

TABLE 5 | Results of the moderated regression analyses.

Variables	Purchase intention						
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Age	−0.040	−0.041	−0.055	−0.052	−0.025	−0.041	−0.036
Gender	0.011	−0.029	−0.012	−0.011	−0.012	−0.001	0.010
Education	0.107	0.062	0.047	0.038	0.084	0.066	0.047
Occupation	0.004	−0.045	−0.045	−0.041	−0.016	−0.022	−0.023
Income	−0.044	0.004	0.029	0.024	−0.012	0.012	−0.001
Purchase frequency	−0.332***	−0.172***	−0.114*	−0.117*	−0.164***	−0.119*	−0.106*
Perceived usefulness		0.573***	0.412***	0.401***			
Perceived trust					0.608***	0.453***	0.455***
Product involvement			0.344***	0.348***		0.295***	0.322***
Perceived usefulness × Product involvement				−0.095*			
Perceived trust × Product involvement							−0.160***
R^2	0.121	0.416	0.498	0.507	0.458	0.514	0.538
ΔR^2	0.121***	0.296***	0.082***	0.009*	0.338***	0.055***	0.024***
F	6.056	133.805	43.066	4.713	164.737	29.934	13.740

N = 272.
**p < 0.05, **p < 0.01, and ***p < 0.001.*
Perceived usefulness, perceived trust, product involvement and the interactions were centered prior to analysis.

involvement. **Table 6** shows the conditional indirect effect of interaction quality on purchase intention through perceived usefulness was strong when the moderating variable subtracts one SD to the mean of product involvement [β = 0.28, 95% CI: (0.16, 0.41)]. The indirect effect was weak when the moderating variable adds one SD from the mean of product involvement [β = 0.17, 95% CI: (0.06, 0.28)]. Thus, Hypothesis 9 was supported. **Table 7** shows the conditional indirect effect of interaction quality on purchase intention through perceived trust was strong when the moderating variable subtracts one SD to the mean of product involvement [β = 0.36, 95% CI: (0.26, 0.49)], while the indirect effect was weak when the moderating variable adds one SD from the mean of product involvement [β = 0.15, 95% CI: (0.05, 0.26)]. Thus, Hypothesis 10 was supported.

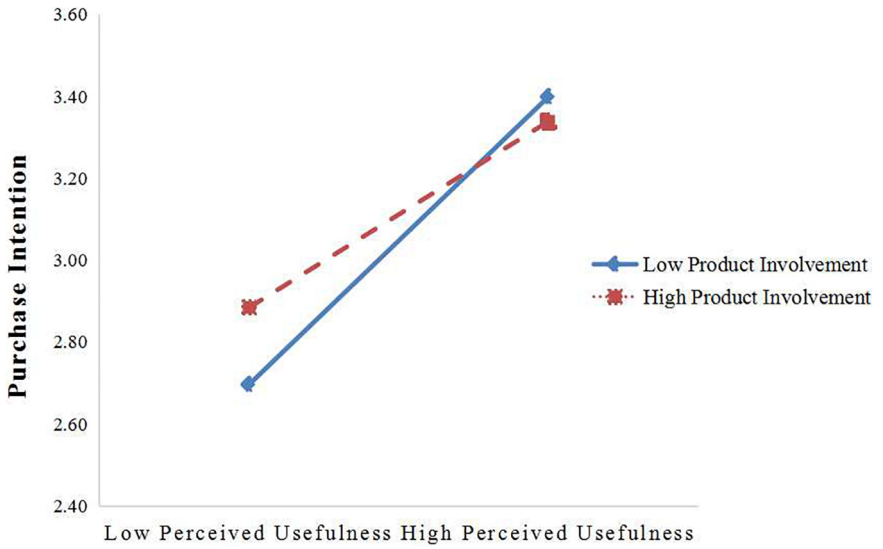


FIGURE 3 | Interaction of perceived usefulness and product involvement on purchase intention.

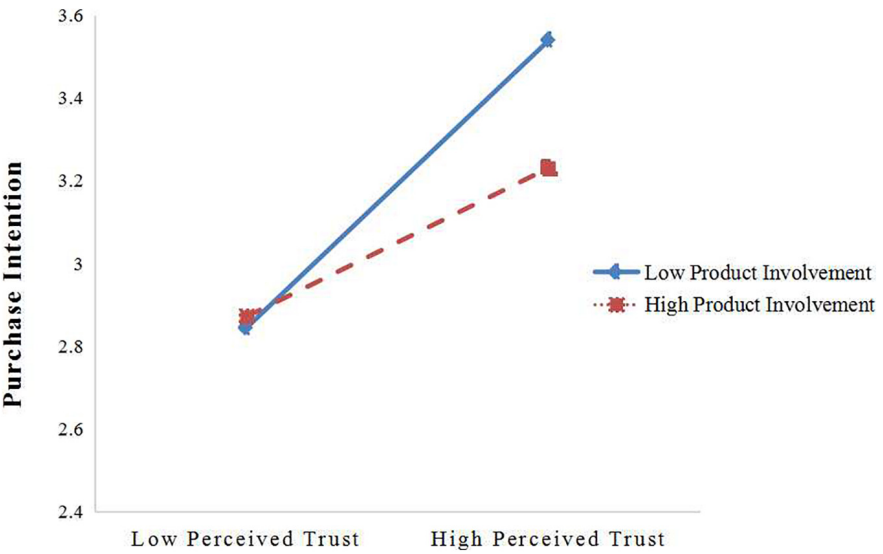


FIGURE 4 | Interaction of perceived trust and product involvement on purchase intention.

DISCUSSION

Social media has profoundly changed our communication mode and affected our purchase decisions. Even if advertisers invest more into communicating through online social networks (Chi, 2011), today's consumers are more dependent on UGC than on product advertising (Mir and Rehman, 2013). With this view in mind, based on social cognition theory and value theory, this study proposes a research model for the impact of UGC's interaction quality on consumers' purchase intention. Our findings confirmed that UGC interaction quality is a critical factor in predicting consumers' purchase intention. Specifically, our results consistently showed that UGC interaction quality had a direct relationship with consumers' purchase intention. Both perceived usefulness and perceived trust mediate the relationship between interaction quality and purchase intention. Further, for consumers with low-level product involvement, the relationship between perceived usefulness and purchase intention is stronger as compared to high-level product involvement, as does product involvement between perceived trust and purchase intention.

Theoretical Implication

Our research contributes to the literature in the following ways. First, based on the theory of social cognition, this study views interactivity as a key feature of Web 2.0 technology. It can help empirically analyze consumers' cognition of UGC interaction,

TABLE 6 | Conditional indirect effects of interaction quality on purchase intention *via* perceived usefulness at levels of product involvement.

	Effect	SE	Boot LLCI	Boot ULCI
Low product involvement, IQ-PU-PI	0.28	0.06	0.16	0.41
Medium product involvement, IQ-PU-PI	0.23	0.05	0.14	0.33
High product involvement, IQ-PU-PI	0.17	0.06	0.06	0.28

N = 272.
IQ, Interaction Quality; PU, Perceived Usefulness; PI, Purchase Intention.

TABLE 7 | Conditional indirect effects of interaction quality on purchase intention *via* perceived trust at levels of product involvement.

	Effect	SE	Boot LLCI	Boot ULCI
Low product involvement, IQ-PT-PI	0.36	0.06	0.26	0.49
Medium product involvement, IQ-PT-PI	0.26	0.05	0.17	0.35
High product involvement, IQ-PT-PI	0.15	0.05	0.05	0.26

N = 272.
IQ, Interaction Quality; PT, Perceived Trust; PI, Purchase Intention.

addressing the limitations of previous studies that only consider the information characteristics and the role of users' social factors. It further expands the scope of antecedents affecting purchase intention, and then provides an important theoretical reference for future research in the field of UGC.

Second, to better understand how purchase intention is influenced by UGC's interaction quality, this study views perceived usefulness and perceived trust as mediating variables based on the value theory and the coexistence of media and social media platforms. This further enriches the theoretical results of UGC behavior research on social media platforms.

Third, for information with the same content expression and dissemination direction, receivers' understanding may differ. By studying the impact of UGC on consumers' purchase intention in the context of social e-commerce, this study takes the characteristics of UGC information receivers into account. It introduces product involvement as a moderating variable, which provides more theoretical basis for social e-commerce to better play the role of UGC.

Practical Implications

The current research also offers practical implications. Given the popularity of content marketing, product information created by consumers on social networks has a great impact on companies and brands. Consumer empowerment has therefore affected brand management beyond what can be controlled by companies (Arnhold, 2010). Thus, it will be useful for them to identify how UGC affects purchase intention, and this thought created the starting point of this study. Our conclusions suggest that both multi-channel retailers and other businesses cannot afford to ignore UGC as a marketing tool.

First, our research shows that UGC interaction quality is important to promote consumers' purchase intention. Therefore, marketers should appreciate the importance of UGC, good interaction between UGC and consumers, and be committed to creating a positive experience for them. UGC can therefore be used by companies for brand-consumer interaction, which can help with customer acquisition and retention (Burmann, 2010). UGC publishers can remove single text discussion and improve interaction by using more advanced forms of audio, video, pictures, and other resources. Communication between members will be more intuitive, information will be richer and more reliable, and emotion will be more straightforward. In addition, members are encouraged to interact more frequently by means of membership levels and bonus points. This will transform weak online links into strong ones and further strengthen the marketing value of UGC platforms.

Second, to improve consumer perception of UGC and form purchase intentions, perceived usefulness and perceived trust may play a role. Based on the social cognitive theory, this study concludes that UGC interaction quality will affect consumers' purchase intention through perceived usefulness and perceived trust. High quality interaction shows consumers that they can quickly update information, get real-time information, and actively control information acquisition on the platform (Bao et al., 2016). These features significantly improve users' perception of usefulness. At the same time, the interactive atmosphere of social e-commerce platforms is the basis of online word-of-mouth communication. Consumers can obtain information through others' recommendation, to reduce perceived risk and improve perceived trust. As a basis of consumer decision-making, usefulness and trust will further improve consumers' purchase intention. Therefore, marketers should pay attention to consumers' perception of usefulness and trust while improving interaction. In UGC interaction, more detailed information of products or services are available to give consumers the feeling of active control. This can increase the contact between consumers and UGC publishers and make them feel more closely connected. Meanwhile, two-way communication and synchronous interaction can make consumers feel that UGC publishers are approachable and willing to listen to the voice of buyers (Yoon et al., 2008). Through proper interaction, UGC publishers can demonstrate their knowledge to consumers, thereby demonstrating their ability to provide satisfactory products.

Finally, this study shows that consumers' product involvement plays a moderating role in the indirect effect of UGC interaction quality on purchase intention *via* perceived usefulness. The indirect effect is stronger when product involvement is low rather than high, and product involvement indirectly affects UGC interaction quality on purchase intention *via* perceived trust. Therefore, we should adopt different marketing methods for products with different involvement levels. When consumers' product involvement is low, perceived usefulness and perceived trust have a strong impact on consumers' purchase intention. Therefore, enterprises operating low involvement products should actively use UGC's interactivity for content marketing, which can stimulate consumers' purchase intention. For products with high participation, consumers' perceived risk is strong, and there are many factors to consider in making purchase decisions. Marketers need to take some measures to improve consumers' purchase intention. They can establish their own interactive forums on social media, fully present and explain

product information and value, and appropriately invite third-party professionals or professional UGC publishers to conduct a comprehensive evaluation of products, to reduce consumers' perceived risk and improve consumers' purchase intention.

Limitation and Future Research

We focused on solving possible theoretical and methodological problems. However, there are still some limitations.

First, based on the survey, this cross-sectional data cannot adequately test the actual relationship between variables, and it is also difficult to show the dynamic impact between variables. Research on actual consumer behavior in UGC is rare. Future follow-up research could be more longitudinal and improve the relationship between variables. In addition, qualitative research on UGC is welcome, because this can reveal realistic behaviors related to consumer cognition and behavior.

Second, our sample only covers a specific user group in China. Whether the findings can be applied to other environments should be studied further. Future studies could use cross-cultural approaches to study the impact mechanism between these variables.

Third, the value perception of platform technology also plays an important role in promoting user behavior (Chen and Yen, 2005; Park and Chung, 2011). In this study, we did not consider whether the gradually rich level authentication mechanism and identity token as an external reward will positively affect the UGC in some social media. Later studies should consider these factors in the model to expand the scope and depth of UGC research.

In conclusion, UGC seems to be recognized as the most important driver in the future of the market (Thoumrungroje, 2014). Given the strong influence of interaction characteristic of social media, it is significant that scholars and managers develop a better understanding of how UGC interaction quality influences consumers' cognition and behavior. We hope that the impact of UGC on consumers' cognition and behavior is still a fruitful research topic.

DATA AVAILABILITY STATEMENT

The datasets generated for this study are available on request to the corresponding author.

AUTHOR CONTRIBUTIONS

RG and JC contributed to conception and design of the study. JC performed the statistical analysis. RG wrote the first draft of the manuscript. Both authors contributed to manuscript revision, read, and approved the submitted version.

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Influencing Factors of the Continuous Usage Intention of Consumers of Online Food Delivery Platform Based on an Information System Success Model

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Online food delivery (OFD) has gradually become a development trend in the catering industry. However, the homogenization of the principal OFD platforms is becoming increasingly obvious, and there is an urgent need to explore the continuous usage intentions of consumers of the OFD platform. Unlike previous studies, this study employs DeLone and McLean's information system (IS) success model as the theoretical framework and constructs the influencing factors model of the continued usage intentions of users of the OFD platform from three aspects, namely, service, system, and information quality. Participants (N = 361) completed a questionnaire assessing their continuous usage intentions of the OFD platform, and the results were analyzed using a structural equation model (SEM). Service worker, platform quality, and content consistency have significant positive effects on the trust in the platform and satisfaction of consumers. Both the trust in the platform and satisfaction of consumers have a positive impact on their continuous usage intentions. We also explored the mediating effect of the trust in the platform and satisfaction of consumers. This study adds to the academic literature and practical implications for the continuous usage intention of consumers. This study discusses the influencing factors and formation mechanism of the continuous usage intention of consumers and proposes a model of the continuous usage intention of consumers of OFD platforms. Moreover, OFD platforms can make differentiation strategies more targeted and eliminate the dilemma of homogenization competition of OFD platforms.

Keywords: online food delivery, continuous usage intention, e-commerce, IS success model, influencing factors

INTRODUCTION

An online food delivery (OFD) platform provides an interconnecting online marketplace for restaurants, deliverers, and consumers who want their food delivered to their doorstep. Specifically, OFD apps allow customers to browse food at their favorite restaurants easily and then to quickly obtain the restaurant food they want through a delivery person. According to a survey by Statista,

revenue in the OFD industry is expected to grow 9.9% annually from 2019 to 2023, with a market size of US$53.786 billion[1]. Grubhub, Deliveroo, and Uber Eats are just a few examples of these OFD platforms, a business model that is rapidly catching around the world.

Despite the rapid boom in the OFD industry, the competition between platforms for customers is becoming more intense because fewer customers are loyal to a single OFD platform. For example, in the first quarter of 2019, 62% of the customers of Grubhub did not use other OFD platform services, while it fell to 44% 2 years later[2]. The main reason is due to the trend toward homogeneity among OFD platforms. In other words, there is almost no difference in the features of the same product on different platforms. Taking the OFD market in China as an example, as reported by iResearch, a well-known marketing survey company, the main problems the OFD platforms facing at the present stage are tight profit space, difficulty in controlling customer audits, unclear market positioning, and serious homogenized competition[3]. In addition to the homogenization of price among OFD platforms, there is also obvious homogenization in market positioning, customer quality, delivery rider service, and other aspects. To break this deadlock, it is necessary to take the continuous usage intention of users of the OFD platform as the starting point and to analyze the different motivations and strengths of consumers in using the OFD platform. This study aims to help OFD platforms optimize platform operation in a targeted way and stand out from the homogenized competitive market.

Intention to continue using mobile apps is an important theoretical issue, as previous research has shown that the continued usage of mobile apps of consumers is lower than the expectations of developers (Lee and Kim, 2019). To improve continuous use or mobile shopping behavior, hedonistic-related factors, entertainment satisfaction, and mobile app atmosphere are generally considered to be critical influencing factors (Lee and Kim, 2019). However, online shopping for food is different from shopping for other things online (Liu and Lin, 2020). For the OFD system, unlike ordinary mobile applications, it integrates different online and offline entities such as information systems (IS), restaurants or merchants, delivery persons, and customers; therefore, it is difficult to understand the continued usage intention of consumers only from the perspective of IS. From the perspective of consumer psychology, the behavior of users of the OFD platform is affected not only by the quality of the IS itself but also by the service quality of the platform sellers and delivery people. It is precisely the influence of these comprehensive factors that shape the behavior of users of the OFD platforms, which is different from traditional IS. We believe that, in OFD systems, it is essential to understand the factors that influence the willingness of consumers to continue using and how they operate. In fact, previous studies have revealed that only a small percentage of online customers return to the original platform to make a purchase (Gupta and Kim, 2007; Qureshi et al., 2009). This study adopts DeLone and McLean's IS success model (D&M model) as our theoretical framework (DeLone and McLean, 1992).

On the theoretical basis of DeLone and McLean (1992), several issues related to the continuous use of IS have been explored, often referred to as the model of IS success. It identified six categories that explain the success of IS, namely, system quality, information quality, usage, user satisfaction, personal impact, and organizational impact. The D&M model has been proven to be a relatively mature theoretical model and has been widely used to predict the behavior of individuals in a variety of environments (Hsu et al., 2014; Tam and Oliveira, 2016; Aldholay et al., 2018; Lee et al., 2020; Mustafa et al., 2020; Shim and Jo, 2020). Moreover, DeLone and McLean (2004) argue that the D&M model can measure the degree of success of e-commerce. On online shopping sites, the fundamental role of information technology in facilitating transactions and communicating information to decision-makers has not changed. It is, therefore, reasonable to expect that, in the OFD system, the quality perception and satisfaction with the platform will affect the continued purchase intention of customers. However, few studies have examined what may affect the intention to continue buying in an e-commerce environment from the perspective of the D&M model. In addition, the standard business model for any OFD system can consider the four main actors of the platform, namely, the platform, restaurant or merchant, deliverer, and customer. This means that the perceptions and behaviors of customers may be influenced by their dual roles as platform users and buyers (Kim et al., 2004). That is, the continuous usage intention of consumers will be affected not only by the characteristics of the platform but also by the perception of the seller (Verhagen et al., 2006). In particular, the service attitude and efficiency of the delivery person are also critical factors. In this sense, previous literature using the D&M model to examine the influence of IS or the characteristics of e-commerce sites is limited in explaining consumer behavior of the OFD platform. To fill this gap, this study adopts the D&M model to test the predictors of the intention of consumers to continue using from the perspective of three aspects, namely, platform, restaurant or merchant, and delivery person. More precisely, the application of the OFD platform incorporates three specific components, namely, platform quality, content consistency, and service workers. Each factor indicates one facet of the D&M model related to IS or platform, that is, system quality, information quality, and service quality, respectively.

In general, this study investigates the antecedents and mediating mechanisms of the willingness of consumers to continue using OFD platforms by integrating the perspective of the D&M model and the unique characteristics of OFD platforms. Specifically, this study aims to answer the research questions as follows: (1) *Do quality perception (i.e., system, service, and information quality) and platform satisfaction (platform satisfaction and seller satisfaction) affect the willingness of consumers to continue using it?* (2) *Does trust in the platform*

[1]Available at https://www.fatbit.com/fab/depth-feature-analysis-create-successful-online-food-delivery-platform/ (accessed May 23, 2021).

[2]Available at https://secondmeasure.com/datapoints/food-delivery-services-grubhub-uber-eats-doordash-postmates/ (accessed June 23, 2021).

[3]Available at http://report.iresearch.cn/report_pdf.aspx?id=2615 (accessed May 24, 2021, in Chinese).

affect the satisfaction and the willingness of consumers to continue using it? (3) *What are the prerequisites for trusting the platform?* The findings may help scholars and practitioners gain insight into how to reposition the platform to stimulate the continued adoption of OFD platforms.

THEORETICAL MODEL AND HYPOTHESIS DEVELOPMENT

Theoretical Model

Under the framework of the D&M model, the application of the OFD platform incorporates three specific components, namely, platform quality, content consistency, and service workers. Each factor indicates one facet of the D&M model related to IS or platform, that is, system quality, information quality, and service quality, respectively. This study examines the linkage between each facet of the platform and the continuance usage intention of consumers in OFD marketplaces and the mediating role of the trust in the platform and satisfaction of consumers. The conceptual model used in this study is presented in **Figure 1**.

Hypothesis Development

Service Workers and Platform Trust

From the perspective of the D&M model, the counterpart to the service quality is the service workers. The critical role of service workers in providing quality service has been documented in the literature (Lee et al., 2019; Hong et al., 2020). In fact, the behavior of service workers greatly affects the perception of service of the customer. Furthermore, Nguyen (2006) found that service workers had a significant positive impact on corporate image. As an important part of the services provided by the OFD platform, service workers will undoubtedly have an important impact on the perceptions of consumers of platform quality. In an investigation of the impact of service quality, trust, and perceived value on customer loyalty, Rasheed and Abadi (2014) identified a significant positive correlation between service quality and trust. Moreover, Zehir et al. (2011) demonstrated that brand communication and service quality have a significant positive impact on brand trust. Therefore, service quality is conducive to promoting the trust of customers in the platform, and for OFD platforms, while service workers are closely related to service quality. This study, therefore, proposes the hypothesis as follows:

H1: Service workers have a significant positive impact on platform trust.

Platform Quality, Content Consistency, and Platform Trust

The other two dimensions of the D&M model, i.e., system quality and information quality, correspond to platform quality and content consistency, respectively. In online food ordering, since customers can only notice the limited information provided by the platforms, they cannot taste the food; thus, they cannot accurately judge the foods before they purchase them, which results in information uncertainty (Dong et al., 2021). To explore the impact of the perception of consumers of product quality, Wells et al. (2011) found that the quality of platforms will affect the perception of consumers of product quality; the higher the degree of information asymmetry, the greater the impact. Yoo and Donthu (2015) demonstrated that only high-quality shopping websites can attract consumers. It can be noted that a high-quality platform can enhance the purchase intention of consumers and gain their trust in the platform. In contrast, McKnight et al. (2017) examined the relationship between data quality and trust in business-to-business data exchange through the two-factor theory and the trust theory. Their results revealed that the information quality had a more significant positive impact on the trust of consumers. Similarly, if the foods received by customers are basically consistent with the content described by the platform, the OFD platform itself can provide a better image, which in turn enhances the trust of consumers. Therefore, this study proposes the hypotheses as follows:

H2: Platform quality has a significant positive impact on platform trust.

H3: Content consistency has a significant positive impact on platform trust.

Service Workers, Platform Quality, Content Consistency, and Satisfaction

With the rapid development of information technology, although OFD platforms can provide a variety of services, the diverse needs of customers cannot necessarily be met. Therefore, the type of quality the platform needs to provide to satisfy consumers is a problem. The antecedent investigation of the impact on consumer satisfaction has attracted the attention of researchers. In exploring mobile shopping applications on online-to-offline (O2O) platforms, Kim et al. (2021) found that good information quality and service quality had a positive impact on the perceptions of consumers of privacy, satisfaction, and loyalty. In a survey of satisfaction and the willingness of users to continue using chat robots, Ashfaqa et al. (2020) also found that such quality had a positive impact on consumer satisfaction. In the discussion about the influence of platform quality factors on user loyalty and continuous usage intention, Kim (2021) found that the impact of user interface on customers was also significant. In an investigation on online banking and how to satisfy customers to maintain competitiveness, Li et al. (2021) determined that security and service quality were the essential factors affecting customer satisfaction.

Service workers are in direct contact with consumers, which has an important impact on service quality. Platform quality plays a key role in the operation of the O2O system. When consumers order on the OFD platform, they mainly confirm through online information. If the information is inconsistent, it will cause consumer dissatisfaction. Although the impact of different fields on user satisfaction is different, according to the D&M model combined with the characteristics of OFD platforms, the antecedents of customer satisfaction can be assigned to service workers, platform quality, and content

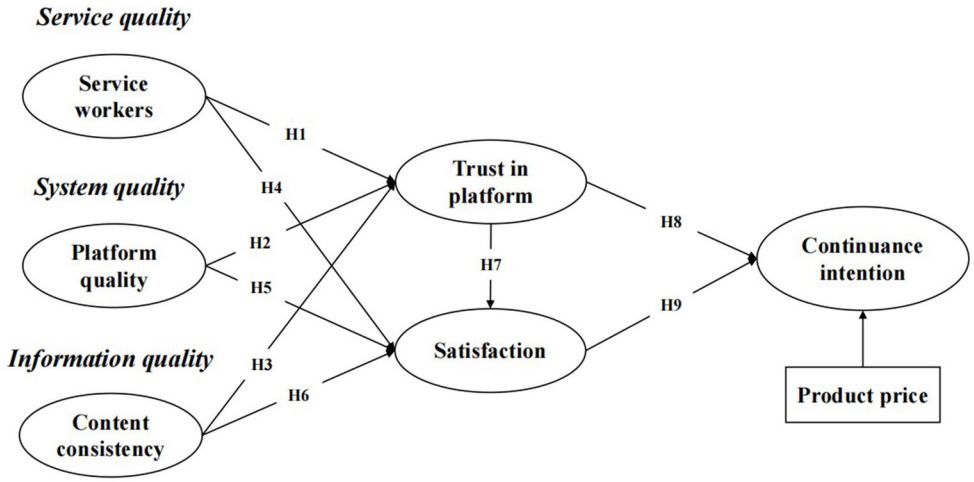


FIGURE 1 | Research model.

consistency (Ashfaqa et al., 2020; Kim et al., 2021). Under the mode of online and offline integration, consumers need to place orders online on the platform, which requires that the platform provides a fully functional and concise interface to facilitate users to operate on the platform. If the interface is too complicated, the effect of consumers will be greatly discounted. Moreover, customers also need to have direct contact with service workers offline. Communicating with a service worker with a good attitude will also make the shopping experience of the customer more pleasant. More importantly, whether the food is delivered on time and whether it is consistent with the description on the platform will directly affect consumer satisfaction. If the information provided by the platform is too different from what consumers really notice, they will have a great sense of gap, which is likely to lead to dissatisfaction. Therefore, the OFD platform needs to provide high-quality service workers, platform quality, and consistent content to improve consumer satisfaction. Thus, this study proposes the hypotheses as follows:

H4: Service workers have a significant positive impact on platform satisfaction.
H5: Platform quality has a significant positive impact on platform satisfaction.
H6: Content consistency has a significant positive impact on platform satisfaction.

Platform Trust, Satisfaction, and Continuance Intention

Derived from social psychology, trust has been conceptualized as the belief that the other person will act in accordance with appropriate behaviors such as generosity, integrity, and competence (Zhou, 2011). Zhang (2020) demonstrated that community trust has a significant positive effect on life satisfaction. Li et al. (2019) determined that the perceived usefulness of WeChat and the intensity of use had a mediating effect on the positive impact of institutional trust and life satisfaction, respectively. From trust to satisfaction is also a selective way to explain the trust mechanism in the consumer–seller relationship (Jung et al., 2020; Jeon et al., 2021). Chen and Chou (2012) and Javed and Wu (2020) argued that the greater the trust of the consumer, the greater their satisfaction with a transaction; in turn, their intentions to purchase or repurchase online will be enhanced. Similarly, from the perspective of OFD platforms, the more the customers trust the platform, the more satisfied they will be with it.

Many scholars have been concerned about the impact of the trust and satisfaction of customers on the willingness to continue using the platform. Kim et al. (2011) found that the continuance intention of consumers was realized by adjusting satisfaction and trust through three quality indicators, namely, service, system, and information quality. From the perspective of OFD platforms, trust and satisfaction with the platform have a direct impact on the continuous purchase intention of customers. Whether customers can trust and be satisfied with the platform becomes particularly important. Li and Fang (2019) explored the continuous usage intention of antecedents for brand application and found that brand attachment and satisfaction had a positive impact. In an antecedent survey of trust and continuous usage intention of mobile payment platforms, Shao et al. (2019) also identified a positive correlation between customer trust and continuous use. Only by gaining the trust of customers and by improving customer satisfaction, the OFD platforms can retain customers and improve their willingness for continuous usage. Based on the earlier analysis, this study formulates the hypotheses as follows:

H7: Platform trust has a significant positive impact on platform satisfaction.
H8: Platform trust has a significant positive impact on continuance intention.
H9: Satisfaction has a significant positive impact on continuance intention.

RESEARCH METHODOLOGY

Instrument

To ensure the causal relationship between antecedents and satisfaction, a pretest was conducted with participants drawn from the population for the main study. A total of 120 students (48% female) participated in return for course credit in a regular classroom setting. The results revealed that the trust in the platform and satisfaction of consumers with the merchant influence the continued usage of the platform app. To ensure content validity, the items used to measure the constructs were adapted from the existing literature and modified to fit the study context. The measurement items for service workers, platform quality, and information quality were adapted from the study by Shin et al. (2013). Trust in the platform was measured using four items adapted from the study by Pennington et al. (2003). Platform satisfaction was measured using four items adapted from the study by Chiu et al. (2012). Finally, continuance intention was measured by adapting three items from the study by Khalifa and Liu (2007).

As the original items were in English, we conducted a back translation to ensure translation validity. First, a researcher—whose native language is Chinese—translated the source items from English to Chinese. Then, another researcher independently translated these items back into English. Subsequently, the two researchers compared the two English versions and jointly revised the first Chinese version of the items. Based on their feedback, minor modifications were made to improve the comprehensiveness and user-friendliness of the measurement items. A pretest of the survey instrument was conducted to conceptually validate the instrument. The final survey questionnaire is presented in **Appendix A**. All items were measured on a 5-point Likert scale, ranging from 1 (not agree at all) to 5 (absolutely agree).

Data Collection

The subjects for the study were the customers of the Meituan platform in China, who were members of the Meituan site or app of the firm. Meituan was selected for the reasons as follows: Meituan was launched in November 2013. With its market development experience and capital support, it has now covered major cities across the country and has become a giant in the OFD market. This study published a questionnaire on Sojump, which is the largest online survey platform in China, and invited users with the Meituan takeaway purchase experience to participate. The subjects were asked to answer questions based on their purchase experiences.

The data collection was conducted on March 2021. Users with Meituan OFD purchase experience were invited to participate. Participants were informed that their participation would assist in improving the OFD platform quality and that they would obtain a better customer experience as a result. The demographic characteristics of the final sample are summarized in **Table 1**. A total of 400 respondents were surveyed over a 4-week period. Finally, 361 responses were used for subsequent analyses after 39 incomplete and invalid responses were excluded. The participants were relatively balanced in gender distribution, and the majority (79.2%) were between 16 and 35 years of age. Furthermore, 73.1% of the respondents had an undergraduate or higher education, and 60.6% were students.

TABLE 1 | Demographics of the survey respondents ($N = 361$).

Demographics	Category	Frequency	%
Gender	Male	153	46.8
	Female	174	53.2
Age	≤16	5	1.5
	16–25	115	35.2
	26–35	144	44.0
	36–45	44	13.5
	46–55	6	1.8
	≥56	13	4.0
Education	High school or below	44	13.5
	College student	239	73.1
	Graduate school or above	44	13.4
Occupation	Student	198	60.6
	Enterprise staff	48	14.7
	Public officials	63	19.3
	Unemployed	12	3.7
	Others	6	1.8

DATA ANALYSIS AND RESULTS

Reliability and Validity

Construct reliability and validity were further examined through the confirmatory factor analysis (CFA). As shown in **Table 2**, the Cronbach's α and composite reliability (CR) values for each construct ranged from 0.840 to 0.939, both of which were above the suggested threshold of 0.7 (Straub et al., 2004) and exhibited a satisfactory level of reliability. For construct validity, both convergent and discriminant validity were examined. The convergent validity was confirmed by examining the average variance extracted (AVE) and indicator loadings. As shown in **Table 2**, all the AVE-values were higher than the recommended level of 0.5 (Fornell and Larcker, 1981). The standard loadings of all items were above the desired threshold of 0.7 and significant at 0.001. This indicates good convergent validity (Chin et al., 1997).

Discriminant validity was evaluated by comparing the square root of AVE and the correlation value. The discriminant validity was assessed by comparing the square root of AVE for each construct with the correlations between that construct and other constructs (Fornell and Larcker, 1981). As shown in **Table 3**, the square roots of the AVEs (i.e., diagonal elements) were larger than the inter-construct correlations depicted in the off-diagonal entries, thus suggesting the discriminant validity that was adequate.

As the data were self-reported from a single source, we performed two statistical analyses to assess the common method bias. First, we analyzed the data using the Harman's single

TABLE 2 | Results of confirmatory factor analysis.

Construct	Indicator	Standard loading[a]	Cronbach's α	CR	AVE
Service workers	SEW1	0.870	0.840	0.841	0.640
	SEW 2	0.737			
	SEW 3	0.787			
Platform quality	PLQ1	0.915	0.932	0.933	0.777
	PLQ 2	0.924			
	PLQ 3	0.793			
	PLQ 4	0.888			
Content consistency	COC1	0.824	0.846	0.847	0.649
	COC 2	0.760			
	COC 3	0.830			
Trust in platform	TRP1	0.823	0.915	0.915	0.729
	TRP 2	0.875			
	TRP 3	0.894			
	TRP 4	0.823			
Satisfaction	SAT1	0.849	0.936	0.936	0.785
	SAT 2	0.888			
	SAT 3	0.892			
	SAT 4	0.914			
Continuance intention	COI1	0.914	0.939	0.939	0.837
	COI 2	0.920			
	COI 3	0.911			

$\chi^2 = 1.541$, CFI = 0.982, TLI = 0.978, GFI = 0.927, SRMR = 0.036, RMSEA = 0.041.
[a]All standard loadings were significant at $p < 0.001$.

TABLE 3 | Results of discriminant validity testing.

	Mean	S.D.	SEW	PLQ	COC	TRP	SAT	COI
SEW	2.700	1.264	***0.800***					
PLQ	3.335	1.204	0.237	***0.881***				
COC	3.273	1.259	0.212	0.075	***0.806***			
TRP	2.483	1.238	0.460	0.204	0.264	***0.854***		
SAT	2.530	1.187	0.320	0.206	0.359	0.388	***0.886***	
COI	2.773	1.099	0.566	0.246	0.256	0.439	0.292	***0.915***

SEW, service workers; PLQ, platform quality; COC, content consistency; TRP, trust in platform; SAT, platform satisfaction; COI, continuance intention. Diagonal bold italic entries are the square root of AVE; all others are correlations coefficients.

factor test. We extracted six factors, and the variance explained by the most significant factor was only 32.984%. The results revealed that no single factor dominated the total variance, indicating a lack of common method bias. Second, we assessed the common method factor according to the steps suggested by Liang et al. (2007). The results demonstrated that the loadings of the principal variables were all significant at the $p < 0.001$ level, whereas none of the common method factor loadings were significant. These results further indicate that the common method bias is unlikely to be a concern in this study. In addition, a multicollinearity test was conducted to examine the correlations between independent variables. A variance inflation factor (VIF) value above 10 indicates a multicollinearity problem. As shown in **Table 4**, the VIF values for the variables were all below 10, indicating the absence of multicollinearity.

Hypothesis Testing

Figure 2 indicates that the nine hypothesized relationships are supported. Regarding service workers, both platform quality and content consistency had positive influences on trust in the platform. Additionally, service workers, platform quality, and content consistency had positive influences on platform satisfaction, thus supporting H1, H2, H3, H4, H5, and H6. Trust in the platform had a positive influence on platform satisfaction, thus supporting H7. In addition, trust and platform satisfaction had significant positive effects on continuance intention, thereby supporting H8 and H9. Among the three antecedents, service workers are found to have the greatest impact on trust in the platform ($\beta = 0.438$, $p < 0.001$), followed by content consistency ($\beta = 0.190$, $p < 0.01$), and the influence of platform quality is the least ($\beta = 0.119$, $p < 0.05$). Among the three antecedent factors

TABLE 4 | Results of multicollinearity analysis.

Model	Unstandardized coefficient		Standardized coefficient	*t*	Significance	Multicollinearity statistics	
	B	Standard error	β			Tolerance	VIF
1(con.)[a]	0.619	0.212		2.919	0.004		
SEW	0.362	0.047	0.385	7.689	0.000	0.825	1.212
PLQ	0.106	0.044	0.112	2.376	0.018	0.934	1.070
COC	0.098	0.044	0.104	2.228	0.027	0.939	1.065
TRP	0.202	0.047	0.215	4.259	0.000	0.810	1.234
SAT	0.107	0.045	0.113	2.398	0.017	0.935	1.070

[a]*Dependent variable: continuance intention; SEW, service workers; PLQ, platform quality; COC, content consistency; TRP, trust in platform; SAT, platform satisfaction.*

of satisfaction, content consistency has the greatest impact on satisfaction ($\beta = 0.278$, $p < 0.001$), followed by service workers ($\beta = 0.150$, $p < 0.05$), and the influence of platform quality is the least ($\beta = 0.118$, $p < 0.05$) (**Table 5**).

Then, to provide a more robust test of our results, control variables were included as direct antecedents of latent variables. According to the results of this study, the price of the product has no significant effect on the latent variables ($\beta = 0.370$, $p > 0.5$). In future research, we will take the price of the product as an independent variable to explore its impact on the continuance intention of customers (**Figure 2**).

Then, we examined trust in the platform and satisfaction mediation effects using the bootstrapping approach provided by Preacher and Hayes (2008). The use and test of the mediating effect is the main trend in management studies. In structural equation modeling (SEM), the conceptual model is a multiple mediator model, and there are two mediating variables (i.e., trust in the platform and platform satisfaction). As shown in **Table 6**, the indirect effect of trust in the platform and platform satisfaction on the relationship among characteristics of service workers, platform quality, content consistency, and continuance intention is significant with a 95% bootstrap CI, excluding zero. This finding suggests that trust in the platform and platform satisfaction mediate the effect of service workers, platform quality, and content consistency on the continuance intention of consumers.

DISCUSSIONS AND IMPLICATIONS

Discussion of Findings

This study yielded interesting findings. The results indicate that the quality of the OFD significantly influences the trust of consumers in the platform, their platform satisfaction, and their continuance intention in the future. First, regarding platform quality, service workers, platform quality, and content consistency were found to have significant impacts on the aforementioned factors. Moreover, service workers were found to have a stronger effect on trust in the platform ($\beta = 0.438$, $p < 0.001$), and content consistency has stronger effect on satisfaction ($\beta = 0.278$, $p < 0.001$). These findings are consistent with those of previous studies (Chiu et al., 2012; Tsao, 2013), indicating that platform quality significantly impacts trust in the platform and satisfaction.

Second, trust in the platform has a significant impact on satisfaction. Regarding the effects of trust and satisfaction on continuance intention, our results indicate that these factors can predict continuance intention and that trust in the platform ($\beta = 0.370$, $p < 0.001$) plays a greater role in determining continuance intention than platform satisfaction ($\beta = 0.133$, $p < 0.05$). This suggests that trust in a platform can induce a continuance intention of the consumer. Our findings extend those of previous studies (Eugene and Claes, 2000; Johnson et al., 2001), suggesting that satisfaction has a greater effect on continuance intention.

Finally, this study confirms the mediating effect of trust in the platform and satisfaction on platform quality and continuance intention. Our results confirm the mediating effect of satisfaction on trust in the platform and the continuance intention of consumers. The hypothesis is verified in line with the literature, highlighting the mediating effect of trust in the platform and satisfaction on platform quality and continuance intention (Izquierdo-Yusta et al., 2011; Legrand, 2013).

Theoretical Contributions

Our research helps better understand the influencing factors of the emerging OFD platforms on the continuance usage intentions of consumers through the D&M IS success model. Using the D&M model, many studies have explored the influences of IS quality and satisfaction with IS on the continued usage of consumers in various contexts (Kulkarni et al., 2006; Wu and Wang, 2006; Lin, 2008; Teo et al., 2009). These studies documented that IS qualities have positive effects on the continued usage behavior and behavioral intention of consumers. However, research using the D&M model to examine the antecedents of continuance usage intention in the OFD platform is still scant. Similar to IS qualities that are considered as the key predictors of IS success, the qualities of the OFD platform also largely decide its success by maintaining the continuance usage intention of consumers.

Based on the D&M model, we identified three elements of the OFD platform quality, namely, platform quality, content consistency, and service workers. Each factor indicates one facet of IS quality, that is, system, information, and service quality, respectively. The findings indicate that service worker, platform quality, and content consistency have significant

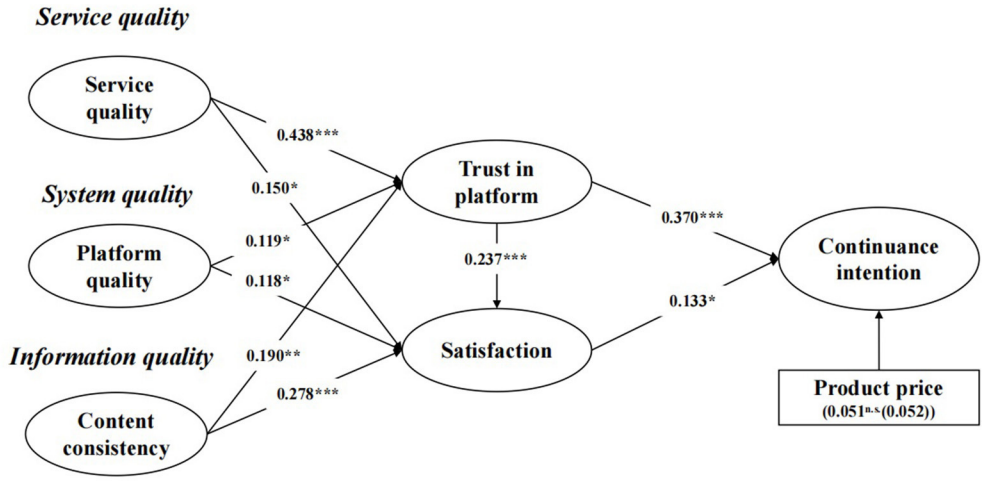


FIGURE 2 | Results of the research model. *$p < 0.05$, **$p < 0.01$, and ***$p < 0.001$. n.s., not significance.

TABLE 5 | Hypotheses test.

Hypothesis path	Path coefficient	SE	*t*-Value	*p*-Value	Results
H1: Service workers → Trust in platform	0.438	0.066	6.621	***	Supported
H2: Platform quality → Trust in platform	0.119	0.056	2.127	0.033*	Supported
H3: Content consistency → Trust in platform	0.190	0.059	3.195	0.001**	Supported
H4: Service workers → Satisfaction	0.150	0.069	2.155	0.031*	Supported
H5: Platform quality → Satisfaction	0.118	0.057	2.087	0.037*	Supported
H6: Content consistency → Satisfaction	0.278	0.062	4.475	***	Supported
H7: Trust in platform → Satisfaction	0.237	0.066	3.572	***	Supported
H8: Trust in platform → Continuance intention	0.370	0.058	6.478	***	Supported
H9: Satisfaction → Continuance intention	0.133	0.054	2.445	0.014*	Supported

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

positive effects on the trust in the platform and satisfaction of consumers. These have a positive impact on their continuous usage intentions. We also explored the mediating effect of the trust in the platform and satisfaction of consumers. This study adds to the academic literature on the continuous usage intention of consumers regarding e-commerce platform applications. Our study also offers a new lens to evaluate when and how the OFD platforms can improve consumer loyalty, distinguishing our study from the existing IS or software management literature.

Managerial Implications

This study offers useful managerial implications from two aspects. First, with the basic completion of the OFD market, user sharpening and perfect operations will become the focus of OFD platforms in the near future. How to retain and revitalize old users is a key to future competitiveness. Service workers, platform quality, and content consistency were found to have a significant positive impact on both the trust in the platform and platform satisfaction of users, which in turn affects the willingness of users to continue using it. Online food delivery platforms provide key factors affecting user stickiness to help OFD platforms improve their operations. In terms of specific operations, OFD platforms can enhance user insights, mine user needs, and strive to improve the quality of operations in terms of services, systems, and information through user interviews, browsing data analysis of the user, and text analysis of evaluation content of the

TABLE 6 | Results of mediating effect analysis.

IV	M	DV	IV → M	IV → DV	M → DV	Indirect effect	CIs	Mediation
SEW	TRP	COI	0.438*** (0.066)	0.423*** (0.062)	0.370*** (0.058)	0.192** (0.039)	[0.120, 0.274]	Yes
PLQ			0.119* (0.056)	0.106* (0.049)		0.052* (0.026)	[0.001, 0.105]	Yes
COC			0.190** (0.059)	0.111* (0.055)		0.083** (0.029)	[0.034, 0.151]	Yes
SEW	SAT		0.150* (0.069)	0.423*** (0.062)	0.133* (0.054)	0.073** (0.026)	[0.030, 0.127]	Yes
PLQ			0.118* (0.057)	0.106* (0.049)		0.042* (0.019)	[0.009, 0.082]	Yes
COC			0.278*** (0.062)	0.111* (0.055)		0.092** (0.026)	[0.049, 0.155]	Yes
TRP	SAT		0.237*** (0.066)	0.370*** (0.058)	0.133*(0.054)	0.052** (0.023)	[0.012, 0.105]	Yes

95% Bootstrap CIs for the indirect effect.

IV, independent variable; M, mediator variable; DV, dependent variable; SEW, service workers; PLQ, platform quality; COC, content consistency; TRP, trust in platform; SAT, satisfaction; COI, continuance intention. IV → DV is significant (M not included in the model); IV → M is significant; M → DV is significant (or the meaningful reduction in effect) of the relationships between the initial IV and DV in the presence of mediator.

*Significance at *p < 0.05, **p < 0.01, and ***p < 0.001; SEs in brackets.*

user. According to the results of this study, to enhance the trust of customers in the platform, platform enterprises should pay attention to the service quality of service workers. In addition, to improve customer satisfaction with the platform, they should ensure the consistency of platform and product information.

Second, compared with platform satisfaction, trust in the platform has a greater impact on the continuance intention of users, and it also has a significant positive impact on platform satisfaction. Therefore, trust in the platform should be another key point to which the OFD platform should continue to pay attention to and improve. Trust in the platform and satisfaction can be improved in the following ways: (1) The app is designed based on users rather than products or categories. It can be sorted according to distance, price, praise, sales volume, and so on, which is convenient for users to search and select. (2) User evaluation and rewards for printing pictures are introduced to improve the quality of information and update it in time for the reference of users. (3) Based on user insights, it provides functions such as merchant comparison, reminding orders, canceling orders, and refunding to improve platform service capabilities.

Limitations and Future Research

Based on the IS success model, this study constructs a continuance intention model of the OFD platform and tests it by collecting user data from the Meituan platform. The results indicate that the constructed model is highly competent in explaining the problem. However, this research still has the following limitations. First, the Meituan platform is selected as the representative platform, and other OFD platforms may have certain differences. Second, this study does not consider the impact of price concessions on the continuance intentions of users of the OFD platform. In future research, user habits, price discounts, and so on can be considered as moderating variables to compare different OFD platforms.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the School of Business, Changshu Institute of Technology. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

JW designed the study and drafted the initial manuscript. XS and XH collected the data, performed the statistical analysis, and drafted the initial manuscript. YL contributed to the revised manuscript. All authors discussed the results and contributed to the final manuscript.

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APPENDIX

Appendix A | Questionnaire items.

Construct	Item	Source
Service workers	SEQ1: I think the appearance of the food delivery person or rider is important	Shin et al., 2013
	SEQ2 I think the ability of a food delivery person or a rider is important	
	SEQ3: I think the professionalism of the food delivery person or rider is important	
Platform quality	SYQ1: I think the Meituan platform is of high quality	Shin et al., 2013
	SYQ2: I think the Meituan platform may be of high quality	
	SYQ3: I think the quality of the Meituan platform must be very good	
	SYQ4: I think the quality of the Meituan platform seems to be poor	
Content consistency	INQ1: I received the same response through online and offline channels	Shin et al., 2013
	INQ2: No matter online or offline, I can always receive the information sent to me by the merchant or platform	
	INQ3: Information is consistent between online and offline channels	
Trust in platform	PLT1: I think Meituan is trustworthy	Pennington et al., 2003
	PLT2: I think Meituan wants to be called a platform for keeping promises	
	PLT3: Meituan's behavior meets my expectations	
	PLT4: I believe that Meituan takes my best interests in mind	
Satisfaction	PLS1: Satisfaction after using Meituan is higher than other O2O platforms	Chiu et al., 2012
	PLS2: The overall satisfaction after using Meituan is very high	
	PLS3: Purchasing through Meituan is more economical than other O2O platforms	
	PLS4: I am very happy to be able to compare various products through Meituan	
Continuance intention	CUI1: I plan to continue using Meituan instead of discontinuing it	Khalifa and Liu, 2007
	CUI2: I want to continue to use Meituan instead of any other alternative platforms	
	CUI3: If possible, I want to stop using Meituan	

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Does Product Semantics Matter in Stimulating Impulse Buying Behavior for Internet Products?

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Design-driven innovation has become the source of the third-dimensional innovation driving force behind technology and outside the market, aiming to explore breakthrough innovation in product semantics for Internet products. This research tries to define the concept of product semantics and construct a consumer purchase decision model for Internet products with product semantic perception as the antecedent variable. In addition, how product semantics could stimulate consumers' expected regret and impulse purchase for Internet products is explained. The research finds that product semantic perception significantly affects consumers' expected inaction regret, which promotes their impulse purchase intention for Internet products; and expected inaction regret partially mediates between product semantic perception and impulse purchase intention. Self-control ability of consumers negatively moderates the relationship between their expected inaction regret and impulsive purchase intention for Internet products. Thus, the "non-use function" design of product semantics can effectively meet and lead the spiritual and cultural needs in hedonistic Internet shopping for consumers.

Keywords: design-led innovation, product semantic, internet product, anticipated regret, impulse buying

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INTRODUCTION

With the popularization of the Internet and other communication technologies, e-commerce has gained great popularity in China. According to a report by the Ministry of Commerce of China, China has become the world's largest e-commerce market, with its total revenue reaching 29.16 billion yuan in 2017 (ECCA, 2018). Over the past decade, it is notable that the online promotional activities launched by online platforms have led to shopping carnivals for Chinese consumers and further for the consumers worldwide, such as Taobao's annual "Double Eleven" festival. And not surprisingly, part of the explosion in sales at the yearly shopping festival comes from provisional impulse buying (Zhang et al., 2020). According to Danish Habib and Qayyum (2018), impulse buying for Internet products is common in online shopping through websites and social media platforms. It is claimed that more than 50% of all online purchases are made on impulse (Zheng et al., 2019; Wu et al., 2020). On the one hand, online businesses make every effort to develop promotion programs to induce consumers to purchase happily; on the other hand, consumers often struggle between regretful purchases and impulsive consumption, especially for Internet products which consumers could not physically touch immediately.

The research on impulse buying has aroused the attention of the academia and existing research mainly explores the related factors of the antecedent variables from the aspects of scenario and product. A variety of factors have been identified as predictors of impulse buying, including psychological factors (Rook and Gardner, 1993; Beatty and Ferrell, 1998; Amos et al., 2014; Bandyopadhyay, 2016), lack of control (Youn and Faber, 2000; Parboteeah et al., 2009; Amos et al., 2014), personality traits (Verplanken and Herabadi, 2001; Chan et al., 2017; Satyavani and Chalam, 2018), and demographic characteristics such as age (Wood, 1998), and gender (Dittmar et al., 1996; Silvera et al., 2008). It is widely believed that women are more likely to impulse buy than men as they are more likely to emphasize the emotional aspects of impulse buying. Moreover, it is also argued that besides pleasurable mood like excitement which could encourage impulse buying, consumers under negative mood states like sadness, were also likely to conduct impulse buying in order to improve their mood (Verplanken et al., 2005; Silvera et al., 2008).

Beyond these factors, other researchers have also found that the retailer environment, product mix design, and promotion design could also induce impulse buying (Zhou and Wong, 2004; Kacen et al., 2012; Mohan et al., 2013). However, little research has investigated how the culture and symbolism of the product influence impulse buying. With the increase of the degree of product homogenization, non-functional requirements are increasingly becoming the focus of customer attention. The online market is accelerating the shift of our society from a production-centered one to a consumption-centered postmodern society, which constitutes a cultural consumer society dominated and controlled by symbols such as patterns, images, and information. For example, when Kumar et al. (2015) studied brand preferences, they found that the cultural attributes of products can create emotional value for customers, thereby enhancing the brand's sense of dependence and loyalty; the reason is that product semantics create economic, functional, social, and emotional values for customers to meet consumer demand and lead consumer trends. Based on the theory of impulsive buying, this study explores the induction mechanism of product semantics to stimulate impulse purchases for Internet products on the basis of the cultural consumption needs of customers in postmodern society. It also collects primary data to test the relevant hypotheses through experimental research.

The contribution of this research could lie in two aspects. Firstly, the research on the impact of product semantics on online purchasing behaviors is helpful to reveal the mechanism of product semantics inducing anticipatory inaction regrets and impulse purchases, as well as enrich the purchasing decision theory. Secondly, it contributes to explore the relationship between product semantic symbol temptation and consumer impulse purchases, which has practical significance for promoting design-driven innovation.

LITERATURE REVIEW

Theoretical Basis

Impulse Buying Theory

Impulse buying is traditionally described as unplanned, compelling, and hedonically complex purchasing behavior (Stern, 1962). When exposed to provocative stimuli, consumers experience a sudden, strong, and persistent urge to purchase a specific item and they tend to make quick decisions with little or no attention paid to evaluating the item or to the consequences of such a purchase decision (Rook, 1987). Therefore, impulse buyers are apt to be unreflective in their thinking and emotionally attracted to an item, and their desires of immediate gratification frequently lead to dissatisfaction or regret after the purchase.

Products are the things that rely on their attributes to meet consumers' needs, thus the foundation for Basic Paradigm for Analyzing the Value of Commodities Based on Two Attributes of "Commodity-Goods" was established (Guo, 2014). In terms of the characteristics, product use functions are the basic requirements of consumers for purchasing goods, and product performance must be improved to avoid product quality loss (Pedersen and Howard, 2016). Thus, regret after impulse buying may be relieved. In addition to product characteristics, Flaherty and Mowen (2010) believed that consumption context is an important factor in purchasing behavior, that is, the specific transient background factors of consuming activities affect immediate purchasing decisions. Therefore, the two major aspects of product characteristics and consumption context have become the key influencing factors of consumer behavior, which also provide the basis for the "stimulus– organism-response" theory proposed by neo-behavioral psychology (Animesh, 2011). Besides product characteristics and situational factors, customers' perceptions and emotions of products are also stimulated and influenced by the consumption situation, which in turn induces impulse purchases. Recent years have seen attention aroused among scholars to the relationship between mixed marketing and impulse purchases. Previous research studies on impulse buying behaviors from the perspectives of product scarcity (Li et al., 2018), price discounts (Xu and Huang, 2014), combined promotions (Huang et al., 2018), terminal displays (Bai and Chen, 2016), community atmosphere (Chen et al., 2018), product knowledge level (Mohan et al., 2013), time pressure (Hao and Zeng, 2017), and so on, are thereby enriching the theory of impulse buying in the context of marketing stimulation. Though the psychological, environmental, situational, and mixed marketing factors have been discussed to induce impulse buying, the relationship between the product, such as culture expression, and semantic symbol temptation has not been established.

Mental Accounts Theory

Mental accounts theory is closely related to induced impulse buying. It is believed that people usually have two accounts, one is an economic account, and the other is a mental account. The economic account demonstrates that if a consumer categorizes a purchase as essential, they will define what they believe is a reasonable budget for a given category and within a given timeframe by considering their financial situation; while the mental account is for people who unconsciously assign resources to different accounts for management (Thaler, 1980). Furthermore, it is pointed out that the process of psychological operations under mental accounts is not the pursuit of maximizing the utility of rational cognition, but the maximization of emotional satisfaction, and there is a consumer experience under hedonism. Therefore, mental accounts often

make consumers violate some simple economic principles when making decisions, and then make many irrational decisions or impulse purchases. Through the experimental research conducted by Seta et al. (2014), they found that the use of emotional care is the same as the use of money, which can also effectively adjust the consumer's evaluation and valuation of goods; so that the merchants can adjust the consumer's mental account perception rather than their economic account through spirit and culture. Liao (2014) summarized the studies of mental account theory and found that customers often violate simple algorithms and participate in irrational consumption due to bundling, price conversion, credit card payments, online shopping, expected losses, and so on, thus inducing impulse buying.

Impulse Buying for Internet Products

Impulse buying is generally thought of as a consumer behavior that is triggered by a sudden, powerful, and persistent impulse to purchase goods immediately (Rook and Fisher, 1995). The Internet has already been an integral part of daily life where customers can freely find information about products or services. Compared with traditional shopping, online shopping is more likely to lead to impulse buying. In particular, the feasibility of social media is a new approach that greatly facilitates marketing efforts and may play a key role in influencing consumer purchasing decisions, such as impulse buying (Alalwan et al., 2017; Kapoor et al., 2018). However, due to the complexity of the specific purchasing process, impulse buying for Internet products is still not well-understood, taking into account various viewpoints such as psychology and risk. Previous studies have proposed some analytical methods to find critical factors from social media-related information (Shiau et al., 2017; Stieglitz et al., 2018). It is believed that online impulsive buyers have higher emotional states and are more likely to bring about a spontaneous buying experience, and their shopping list is also not clear in advance (Fu et al., 2018). Thus, understanding why impulsive consumers purchase Internet products is especially important for online business purposes.

Research Framework

Since impulse buying is profitable, online shopping businesses are committed to making consumers produce a higher perceived value of product semantics. The temptation symbol of "non-use functions" is used to stimulate consumers' impulse purchases. In addition, a higher product semantic perception is associated with the higher possibility of regret for losing the joy or excitement to buy the specific item, i.e., expected inaction regret.

Early research has addressed consumers' loss aversion which is prompting consumers to evaluate expected benefits and expected risks before buying. According to Janis and Mann (1977), the "loss" caused by the hypothetical benefits and risks before the purchase behavior of consumers was referred to as expected regret, that is, the "loss perception" generated by the results that consumers expected to give up before the purchase decision were better than the results they chose. Later on, Kanheman and Tversky (1982) further divided expected regret into expected action regret and expected inaction regret. The former refers to regret caused by consumers' expected purchase, while the latter refers to the regret felt by consumers when they give up the purchase. Both Camille et al. (2004) and Sandberg et al. (2016) argued that expected inaction regret is different from experience regret and it refers to the substantial "loss" perception and anxiety after the consumption experience. As previous literature has explored the relationship between expected action regret after purchase and impulse buying (Chang and Tseng, 2014; Lucas and Koff, 2014), this study focuses on the mechanism of impact on impulse purchases based on online consumer anticipatory inaction.

Marketing stimulus regulates the customer's mental account, and then induces customers to make online impulsive decisions for products. At the same time, the loss aversion caused by such impulse buying requires customers to take necessary self-control to reduce expected inaction and regret. There are three definitions of self-control: the first is the intuitive definition of the decision-maker's ability to resist temptation; the second is the axiomatic definition of exerting preference relation on the alternative set; the third is the definition of displaying preference (Jiang and Qu, 2016). Sharma et al. (2014) found that consumer impulse can be divided into three dimensions: cognitive flippancy, emotional indulgence, and lack of self-control behavior; self-indulgence and lack of self-control have no positive relationship with independent self-concept for consumers. Self-control can regulate impulsive behavior decision-making, but self-control is a kind of limited resource. Once used, the resources that individuals rely on for other self-control aspects will be reduced, which makes it difficult to reach the established performance standard of self-control and leads to the failure of regulating the individual's subsequent tasks (Dong and Ni, 2017). Studies have shown that self-control and long-term value orientation can help restrain consumption and increase willingness to thrift, but this effect is relatively obvious in the short term, while the long-term effect is not significant. Moreover, this effect is also regulated by the individual's material basis (Nepomuceno and Laroche, 2017). Self-control theory can explain why customers may not be able to resist the temptation of the marketing stimulus after they regret it and then make impulse purchases for the Internet product again.

Thus, this paper attempts to explore purchasing behavior from a new perspective of product semantics, it is because the reality of hedonic shopping is emotional and cultural based on product semantics. On the one hand, the product design team carefully explains the "fashion," "cute," "safe," "warm," "elegant," "simple," and other semantic attributes, merchants strive to enlarge semantic symbols through the atmosphere of the store, product landscaping, etc. in order to stimulate consumers' desire to buy; on the other hand, consumers will comprehensively evaluate the purchase risk before buying, and rationally choose the purchase decision with the least possibility of regret. However, they often "buy unnecessary products," thus forming an interesting game of "temptation" and "regret." Based on the discussion above, the conceptual model of this study can be built as shown in **Figure 1**.

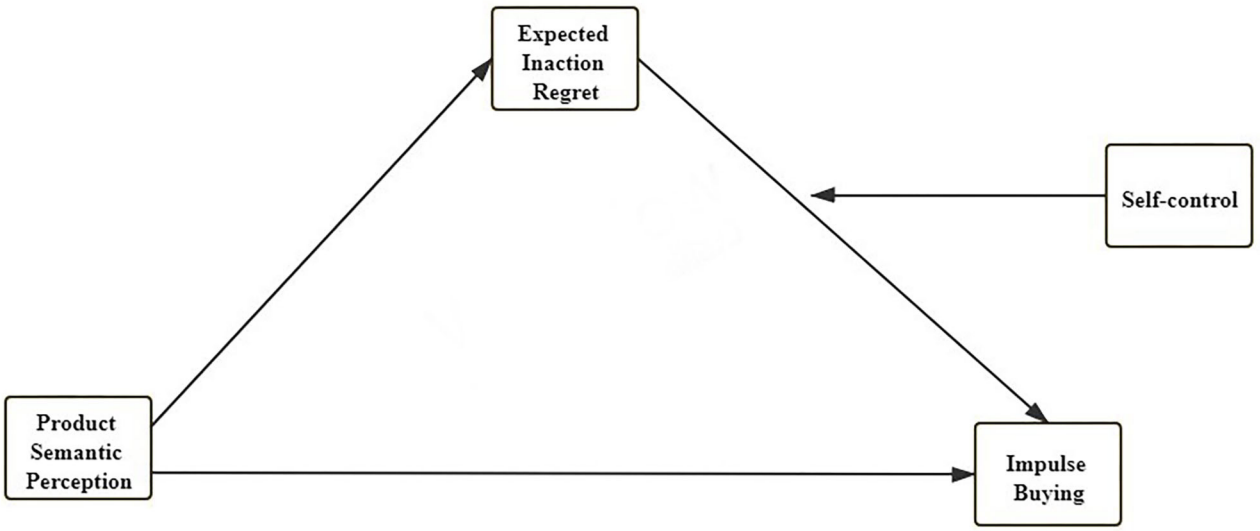


FIGURE 1 | Conceptual model.

RESEARCH HYPOTHESES

Product Semantic Perception and Online Impulse Purchase Intention

According to Verganti (2003), product semantics can be understood as "a set of symbols, symbols and images that can express emotions and symbolic values." It is believed that product semantics could be defined as meaning, that is, consumers' interpretation of Internet product symbols, which determines the cultural, emotional, and symbolic attributes of products (Chen and Chen, 2016). Product semantics are different from product attributes and the latter refers to "features that enable consumers to meet certain needs through purchase." It mainly includes observably functional characteristics such as specifications and prices, and features composed of product performance and technical characteristics. It is argued that many retailers are trying their best for ways to "fine-tune" their product characteristics while maintaining variety and differentiation (Progressive Grocer, 2011). Kacen et al. (2012) further pointed out that hedonic, ready-to-use, low-priced, and specially displayed products are those with a higher likelihood of being bought on impulse. Thus, these findings can help retailers to make strategic decisions about which products to put away or remove from store shelves in order to increase sales. However, research investigating the link between product semantic perception and impulse buying remain scant in the literature.

The connotative meaning of product semantic perception emphasizes the spiritual and cultural attributes of the product that can be perceived by consumers (Alwi et al., 2014). Product semantics are the emotional and value propositions such as "fashion," "cute," "safe," "warm," "elegant," "simple," and so on which can help identify different products. Combined with the theory of product hierarchy, this study defines product semantics as a combination of symbols attached to the core product to meet the psychological needs of online consumers such as culture, emotions, and symbolic meaning.

Scholars from different fields have given different explanations on the mechanism of the influence of product semantics on purchasing decisions. Under the influence of consumerism, consumers' attitude of "indirect utility" had a profound impact on consumption behavior, and symbols became the manifestation of personality. The symbolic value of products was often regarded as the main value of products. In fact, due to the changes of the internal and external environment, online consumers purchase Internet products not only to meet functional needs, but also tend to seek the cultural, emotional and symbolic meanings contained in the products themselves, which determines that product semantics help to upgrade the cultural consumption of products (Li et al., 2018). Thus, it is highly possible that product semantics perception of the consumers lead to impulse buying.

Other scholars have interpreted it from the perspective of engineering psychology, and verified that the implicit attributes of products such as hedonism, beauty, and culture can effectively evoke consumers' emotions, and then influence purchase decisions (Chattaraman et al., 2016). It can be seen that non-functional requirements have become an important influencing factor for customers' purchasing decisions in a post-modern society centered on consumption. Compared to practical shopping which aims to obtain the direct utility of products and services, online shopping which pursues for more hedonism is mainly concerned with spiritual and cultural needs such as satisfaction, excitement, and escape in the shopping process, that is, the indirect utility attached to product symbols (Gao and Shen, 2016).

As well as combined with the connotation of the mental account discussed in the previous section, it can be seen that the semantic perception of the product changes the consumers' mental account, which in turn stimulates irrational impulse consumption of Internet products in pursuit of emotional satisfaction. Thus, the hypothesis is proposed accordingly:

H1: Product semantic perception positively affects online impulse purchase intention.

Product Semantic Perception and Expected Inaction Regret

Given that the functional homogenization of product is growing, the semantic design of the product which is based on the cultural, emotional, and symbolic meaning attached to the Internet product is more and more appreciated by online businesses. According to Buttner et al. (2014), non-functional needs such as pleasure, entertainment, social interaction, killing time, and self-satisfaction in the shopping process are increasingly sought after by online consumers, so the aesthetic design and semantic cultural design of products are increasingly highlighted.

When the value of product semantic perception is higher, online consumers will have a higher sense of belonging, identity, and efficacy, which will result in a higher sense of psychological ownership. Yeung (2012) believed that psychological ownership will cause deviation in product evaluation. Once people have psychological ownership of something, on the one hand, they will improve the perceived value and emotional attachment of possession; on the other hand, they will increase their sensitivity and pain of losing possession. In addition, Jussila et al. (2015) emphasized that consumers will seek a match between their own value and the product culture when purchasing, which improves the individual's perception of psychological ownership and positively affects customer satisfaction, loyalty, and willingness to pay significantly. Therefore, product semantic perception aroused by well-designed semantic attributes determines the spiritual and cultural needs of hedonic purchasing for Internet products, which affects the psychological account of consumers, and causes consumers to regret not taking expected actions: "if they don't buy, they may have expected losses." The higher the semantic perceived value of the product, the stronger the anxiety of "buy now or regret later" of online consumers. Hence, the following hypothesis is proposed:

H2: Product semantic perception value positively affects expected inaction regrets.

Expected Inaction Regrets and Impulse Buying for Internet Products

The current research on expected regret and purchase behavior has not carried out further subdivided research on expected regret. Expected inaction regrets are the same as expected regrets and both of them are subjective imaginations made by online consumers based on expected loss aversion, regret aversion, or uncertainty aversion, with the purpose of minimizing regret decisions with expected future results (Luce, 1998). Expected inaction regret is related to Roses's (1994) counterfactual thinking theory, which infers how the opposite situation may affect the current results by imagining the opposite situation, that is, what would the possible consequences of failing to do so be. In order to reduce the possible losses caused by expected inaction regret, online consumers need to take counterfactual thinking into account and take relevant actions, which determines that there is a positive correlation between their expected inaction and impulse purchase for Internet products.

In fact, this relationship has been partly supported by some empirical studies. Research carried out by Yin and Yu (2009) showed that the direction of expected regret can directly affect impulsive purchases. More direct evidence comes from Chen et al. (2011)'s research on China's real estate market. Expected inaction regret intensifies the anxiety and dissatisfaction in the context of the non-purchase of real estate. It is believed that online consumers usually resort to impulse buying in order to reduce the negative emotions of anxiety. It is easy to understand that if the Internet products can give consumers higher semantic perceived value, it will increase the risk of loss of expected inaction, while counterfactual thinking will prompt online consumers to undertake purchasing behaviors to reduce expected losses. Thus, Hypothesis 3 is proposed as follows:

H3: Expected inaction regret positively affects impulse buying.

Mediating Effect of Expected Inaction Regret

The classic "stimulus-organism-response" (SOR) model can be used to explain the mediating effect of expected inaction regret between product semantic perception and impulse purchases for Internet products. The SOR model, proposed by Woodworth (1928), is commonly used as a theory basis to investigate online impulse buying because this framework has traditionally provided the foundation for consumer behavior studies (Chan et al., 2017; Zheng et al., 2019). According to studies on the context of impulse buying for Internet products, this framework is continuously tested on the relationships between product semantic perception stimuli, customers' expected inaction regret organisms, and online impulse buying behavioral responses.

Product semantics can explain and express the spiritual and cultural attributes contained in products to online consumers through product function combination, form, and appearance design, and various symbols such as text and diagrams. Businesses can also further stimulate consumption desire of Internet products through the creation of an online shopping environment and the interaction of making good friends. This kind of stimulation can enhance expected inaction regret, which further affects the attitude of possession, attitude of belonging, and online purchase behavior. The mediating mechanism of expected inaction regret has been supported by some related studies. For example, Beltagui et al. (2012) found that the aesthetic value of beauty and goodness in products, as well as environmentally friendly values, can both stimulate consumers' pro-social or personal motivation and ultimately increase their desire for consumption experience. In addition, the mediating mechanism of expected inaction regret can also be further explained by the classical effect level model (Lavidge and

Steiner, 1961). According to the effect hierarchy model of "cognition-emotion-meaning," product semantic perception is first the subjective cognition of consumers (the first layer). This kind of cognition stimulates consumers' anxiety emotion (the intermediary layer); and finally promotes consumers to generate "if not bought, there may be a loss" intention (the third layer), and induces consumers to make online impulsive purchases. Thus, the following hypothesis is brought forward:

H4: Expected inaction regret has a mediating mechanism between semantic perception of the product and impulse buying for Internet products.

The Moderating Effect of Self-Control

Self-control is a conscious self-regulation process. It is an individual's adaptive response ability to suppress emotions, desires, ideas, and behaviors, and to achieve individual expectations and social expectations (Gailliot et al., 2007). Online impulsive purchase is the performance of one-sided cognition, reckless decision-making, emotional indulgence, and lack of self-control behavior. Wang and Yao (2018) believed that according to the "desire-willpower" model of impulsive behavior, consumers with impulsive desire may not really make impulsive purchases, and consumers will have corresponding self-control measures. Only when the desire exceeds willpower will online consumers' self-control fail and they make impulse purchases for Internet products. Therefore, even if online consumers have a strong anticipation of inaction regret, self-control will affect impulse purchase behavior.

According to Sultan et al. (2012), self-control is a selective tendency formed between consumers' emotional preference and impulsive consumption. Compared with low self-control ability, online consumers with high self-control are more likely to resist external temptation (Lai et al., 2016). In addition, Luo (2018) took cosmetics consumption in the e-commerce environment as an example and found that consumer self-control played a negative regulatory role between consumer sentiment and impulsive purchases. Therefore, the self-control ability of online consumers can regulate the relationship between expected inaction regret and their impulsive purchases for Internet products, and the stronger the self-control ability is, the more able they are to resist the negative perception of loss associated with expected inaction regret, thus weakening the occurrence of online impulsive purchase behavior. Hence Hypothesis 5 is proposed as follows:

H5: Self-control negatively moderates the relationship between expected inaction regret and impulse buying for Internet products.

RESEARCH DESIGN AND PROCESS

Measurement of Variables

To confirm and ensure the validity of the measurement instrument, back translation of the questionnaire for this study was done. The English version was firstly translated to Chinese and then the Chinese questionnaire was back translated to English by another individual. The two English versions of the questionnaire were compared to ensure their equivalence. On this basis, the applicability of the scale was tested through the researchers' collective research and small-scale investigation, three Internet marketing experts and five experienced online consumers were involved in the pretest and the items were adjusted in terms of wording and rhetoric, so as to finally complete the questionnaire design. All variables were measured with a seven-points Likert scale ranging from "1-strongly disagree" to "7-strongly agree." Finally, a total of 19 measurement items including the semantic perception of product (stimulus), expected inaction regret (organism), online impulse buying (response), and self-control (moderator) from the SOR model are described and listed in **Supplementary Table 1** based on the literature and discussions above.

Research Design

In this paper, the primary data were obtained by the experimental method. The experiment was carried out from March 1 to March 22, 2019, and the subjects were office staff of eight garment manufacturing enterprises in Changzhou and Nanjing of Jiangsu Province through convenience sampling. In order to get close to the actual online shopping scene, a mini humidifier was selected as the experimental material from the famous B2C e-commerce platform 360Buy. There were three reasons for this selection: firstly, the product is suitable for consumers' real needs, for example, many offices use humidifiers because of the dry environment caused by central air conditioning in those offices; secondly, the product price is not high, consumers have purchasing power and the possibility to buy; and thirdly, the semantic design of products has a large space for innovation, which is convenient to distinguish the variable measurement level. To avoid interference to the experiment caused by function, price, and other factors, the experimental materials were all mini humidifiers with a single function, consistent price, convenient use, and the same brand and after-sales service.

The experiment was conducted separately in the company in groups A and B. The unit price of the humidifier in experiment A was 129 yuan, and its appearance was like that of a household electric rice cooker. In the experiment, simple pictures, sources, and a brief description were provided on the website, and the product semantics were relatively simple. The unit price of the humidifier for group B was also 129 yuan, and had the same functional description. However, the humidifier looked just like the head of a cute pig on the website, with the water vapor curling out from the two large nostrils. Simultaneously, the following pictures and text semantics were shown on the website as well: firstly, warm, peaceful, elegant, and other fragmentary text descriptions were provided to the subjects of group B. Secondly, a picture showing a successful white-collar worker beside the humidifier drinking Starbucks coffee was given and shown on the website; thirdly, a picture demonstrating that the humidifier was properly used to create a simple and delicate environment was shown to the online subjects. And lastly, the values of "work and life" were also promoted to the subjects. The experimental design highlights the consistency of Internet product functions and the differences in product semantic perception. It emphasizes the emotional and cultural attributes of the humidifier and maps online consumers' personalities, tastes,

images, identities, and values through semantic symbols. The subjects were placed in comfortable chairs and asked to complete the questionnaire independently. In order to thank the subjects for their cooperation and support, they were given small gifts such as nail clippers before the experiment. Then the experiment was launched by asking the subjects to browse the product on the webpage and then the paper questionnaires were distributed for the subjects to fill in and collected on the spot.

Data Collection

The subjects were randomly assigned to group A and group B and filled in the questionnaire after watching the introduction materials demonstrated by a projector. The first part of the questionnaire consisting of three questions was to help determine whether the subject had entered the experimental situation, if they failed to answer these questions correctly, their questionnaires were deleted according to the method offered by Eisend (2008). The three questions were: ① What do you think of Internet products?; ② Do you need this product?; ③ If you already have the product, would you like to buy it as a gift for others? Then, their answers were discarded if the answer to question ① was not a humidifier, and the questionnaire was also invalid if both options of questions ② and ③ were <2. In addition, questionnaires with more than three missing items, irregular filling, and too low choice discrimination were all taken as invalid samples.

A total of 680 office workers participated in the test and filled in the questionnaire. There were 57 invalid samples which were removed, and 623 valid questionnaires were finally collected. The descriptive analysis of the samples is shown in **Table 1**. A total of 342 respondents were from Nanjing, occupying 54.9% of the sample while 281 respondents were from Changzhou, occupying 45.1% of the total sample. Among the samples, 205 respondents were under 30 years old, accounting for 32.9% and there were 170 aged 31–40, accounting for 27.3%. In addition, 158 respondents were aged 41–50, accounting for 25.3% while 90 respondents were over the age of 51, accounting for 14.5%. For different genders, 338 respondents were men, accounting for 54.2% of the total sample while 285 respondents were women, accounting for the other 45.8%. In terms of the education level of the sample, 208 respondents had high school or technical secondary school degree, 300 respondents had a college degree, and 115 respondents had a bachelor's degree or master's degree; different educational level groups accounted for 33.3, 48.2, and 18.5% of the total sample, respectively. As for the involved groups in terms of different product semantic perception, 283 respondents were in group A while group B had 340 respondents.

DATA ANALYSIS

Common Method Variance Analysis

The autocorrelation of the sample may lead to common method biases, which could be caused by the artificial co-variability between predictors and criteria due to the same data sources or raters, the same measurement environment, the project context, and the characteristics of the project itself. Therefore, two ways were used to check for common method variance. One was to check the correlation coefficient between the four variables, such as product semantic perception. It can be seen from **Table 2** that the maximum correlation coefficient between variables was 0.471, thus there was no strong correlation. The Harman single factor test method was the second method. A one-time exploratory factor analysis was performed with the four variables of product semantic perception. It was found that the interpretation rate of the first principal component was 27.058% when the eigenvalue was >1 and no rotation was done, accounting for less than the critical value of 50%, which indicated that homologous deviation would not have a substantial impact on the data validity analysis.

Reliability and Validity Analysis

Cronbach's coefficient was used to test the internal reliability of variables, and AMOS software was used to conduct confirmatory factor analysis. The test results are shown in **Table 1**. The reliability coefficients of the four variables were all >0.7, indicating that the scale had a high internal consistency. The factor load values were all above 0.6, implying a high correlation between measurement items and latent variables. The combined reliability CR values were all >0.6, suggesting that there was a large internal consistency between the observed variables and the corresponding latent variables. The mean variance extraction value AVE of each latent variable was >0.5, indicating that the observed variable can reflect the internal characteristics of the common latent variable and the aggregation validity was high.

Table 2 also gives the four main indicators of confirmatory factor analysis. In comparison with the standard of model fitness statistics, although some of the RMSEA value fitness evaluation indexes did not reach the perfect standard (<0.05), they were close to the reasonable range of model fitness (<0.08), suggesting that the variable measurement had a high validity.

Descriptive Statistics and Correlation Analysis of Variables

The analysis results of mean, standard deviation, and correlation coefficient of variables are shown in **Table 2**. As can be seen from **Table 3**, there was no significant correlation between age, education background, and semantic perception of products, but there was a significant correlation between gender and semantic perception of products ($\gamma = 0.280^{**}$) and expected inaction regret ($\gamma = 0.172^{**}$). There was a significant positive correlation between product semantic perception, expected inaction regret, and impulse purchase intention. There was a significantly negative correlation between self-control and impulse purchase intention for Internet products ($\gamma = -0.429^{**}$). According to the relevant research of Yu et al. (2016), if the correlation coefficient between variables is all <0.7, it indicates that the concept distinction of variables is reasonable and there is no collinearity threat, so the four variables can be well-distinguished and there was no collinearity, which lays a foundation for further hypothesis testing.

Hypotheses Testing

The measurement items of four variables were averaged and decentralized. Hierarchical regression analysis was used to test the relationship between the variables, and the results are shown

TABLE 1 | Descriptive analysis of samples.

		City		Gender		Education level		
		Nanjing	Changzhou	M	F	High school	College	Higher than bachelor's degree
Age	<30	112	93	120	85	70	95	40
	31–40 years old	90	80	98	73	58	78	35
	41–50 years old	90	68	73	85	50	77	30
	More than 51	50	40	47	42	30	50	10

TABLE 2 | Reliability and validity.

Variables	Measuring item	Factor loading	Cronbach's α	CR	AVE	Model fitness index
Product semantic perception	PM1	0.808	0.904	0.948	0.821	CMIN/DF = 1.606
	PM2	0.776				RMSEA = 0.049
	PM3	0.815				GFI = 0.994
	PM4	0.975				CIF = 0.998
Anticipated regret	AR1	0.684	0.748	0.831	0.552	CMIN/DF = 2.370
	AR2	0.619				RMSEA = 0.074
	AR3	0.679				GFI = 0.972
	AR4	0.631				CIF = 0.978
Impulse buying	IB1	0.696	0.827	0.893	0.676	CMIN/DF = 2.210
	IB2	0.774				RMSEA = 0.070
	IB3	0.744				GFI = 0.991
	IB4	0.740				CIF = 0.993
Self-control	SC1	0.788	0.888	0.935	0.741	CMIN/DF = 2.392
	SC2	0.798				RMSEA = 0.075
	SC3	0.777				GFI = 0.981
	SC4	0.770				CIF = 0.989
	SC5	0.792				

in **Table 4**. Model 1 represents the influence of control variables such as age and product semantic perception on expected inaction regret. The equation as a whole passed the significance test with a determination coefficient of 0.237. Product semantic perception significantly affected expected inaction regret ($\beta = 0.350^{***}$), and H2 was assumed to pass the test. Model 2 tested the influence of semantic perception of products on impulse purchase intention. F statistic showed that the equation as a whole passed the significance test with a determination coefficient of 0.173, and the semantic perception of products positively affected expected inaction regret significantly ($\beta = 0.135^{***}$), and H1 passed the test. Both Model 1 and Model 2 showed that there were significant differences between gender and the explained variables. Further, independent sample T analysis was used to test the difference of gender in expected inaction regret, and significant differences were found ($T = -4.592$, $p < 0.001$) among men ($M = 4.539$, $SD = 0.841$) and women ($M = 5.004$, $SD = 0.738$). Similarly, Model 3 also showed that expected inaction regret positively affected online impulse purchase intention ($\beta = 0.172^{***}$) significantly, thus H3 passed the test.

Referring to the test of mediating effect, the first step was to test the independent variable product semantic perception through Model 1, which positively affected the mediating variable expected inaction regret significantly ($\beta = 0.350^{**}$). The second step was to test the semantic perception of independent variable products through Model 2, which positively affected the dependent variable online impulse purchase intention significantly ($\beta = 0.135^{***}$). The third step was to test (through Model 3) that the mediating variable expected inaction regret positively affected the dependent variable online impulse purchase intention significantly ($\beta = 0.172^{***}$). Based on the first three steps, analysis of Model 4 found that the two variables of semantic perception, anticipated inaction regret, and equations all achieved significance level. In addition, expected inaction regret played a partial intermediary role between semantic perception of products and impulse purchase intention; and the level of mediating effect was $0.350 \times 0.115 = 0.040$, which was the difference between the total effect ($\beta = 0.135^{***}$) and the direct effect ($\beta = 0.095$), thus H4 passed the test.

Model 5 shows that self-control had a negative effect on impulse purchase intention for Internet products ($\beta = -0.315^{***}$), which provides a possibility for self-control to exert a moderating effect. Model 6 also included expected inaction regret and self-control into the regression model. It

TABLE 3 | Descriptive statistics and correlation analysis of variables.

	M	SD	Age	Gender	Education	PM	AR	IB
Age	3.210	1.058						
Gender	1.460	0.499	0.074					
Education	1.850	0.706	−0.022	0.057				
PM	4.524	1.078	0.022	0.148*	−0.039			
AR	4.456	0.823	0.021	0.172**	0.056	0.471**		
IB	4.717	0.693	−0.071	0.094	0.128	0.212**	0.219**	
SC	4.124	0.941	−0.018	0.030	−0.068	0.001	0.060	−0.429**

**indicates $p < 0.1$. **Indicates $p < 0.01$, double-tailed test.*
PM stands for product semantic perception, AR for expected inaction regret, IB for impulse purchase intention, and SC for self-control.

TABLE 4 | Regression analysis on hypothesis testing.

Dependent variable / Independent variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
	AR	IB	IB	IB	IB	IB	IB
Constant term	−0.402	−0.198	−0.157	−0.152	−0.204	−0.100	−0.032
Age	0.004	−0.051	−0.051	−0.052	−0.056	−0.057	−0.065
Gender	0.165*	0.084	0.080	0.066	0.149	0.096	0.082
Education	0.080	0.129	0.109	0.119	0.089	0.078	0.068
PM	0.350***	0.135***		0.095***			
AR			0.172***	0.115***		0.194***	0.190***
SC					−0.315***	−0.325***	−0.336***
AR × SC							−0.137**
R2	0.237	0.173	0.170	0.327	0.211	0.263	0.289
F	18.981***	4.770***	4.589***	4.612***	16.333***	17.313***	16.401***
VR^2							0.026
D.W.	2.057	1.958	1.980	1.969	1.960	1.977	2.004

****Indicates $p < 0.001$, **indicates $p < 0.01$, * indicates $p < 0.1$.*
PM stands for product semantic perception, AR for expected inaction regret, IB for impulse purchase intention, and SC for self-control.

was found that the two variables and the equation passed the significance test, with a determination coefficient of 0.263. Model 7 considers the "interaction between expected inaction regret and self-control," the results show that expected inaction regret affected the impulsive purchase intention ($\beta = 0.190^{***}$), and self-control still negatively impacted online impulse purchase intention ($\beta = -0.336^{***}$). The interaction between expected inaction regret and self-control negatively affected impulsive consumption ($\beta = -0.137^{**}$), indicating that the relationship between expected inaction regret and impulse purchase intention for Internet products was a function of self-control with a moderating effect of −0.137. Therefore, H_5 passed the test. A simple slope estimation was used to plot the moderating effect, as shown in **Figure 2**. Self-control weakened the positive effect of expected inaction regret on impulse purchase intention, that is, compared with low self-control, when consumers had high self-control ability, the positive relationship between expected inaction regret and impulse purchase intention for Internet products was weaker.

CONCLUSION

Findings

Drawing upon product semantic perception as an overarching theoretical framework, this study identifies and conceptualizes a salient purchasing decision mode, and examines how product semantic perception influences impulse buying of consumers for Internet products. It is found that product semantic perception has significant influences on impulse buying through the mediation effects of expected inaction regret. Furthermore, self-control significantly moderates the influences of the expected inaction regret mechanisms on online impulse buying. Overall, our empirical results support all of the proposed hypotheses and generate several new research findings. We summarize the key research findings of this study as follows.

First, this study establishes strong links among product semantic perception, expected inaction regret, and impulse buying for Internet products in the context, responding to the call for more empirical studies to investigate the influences of product semantic perception in new research contexts (Diagne et al., 2016; Eickhoff et al., 2020). Our research findings confirm

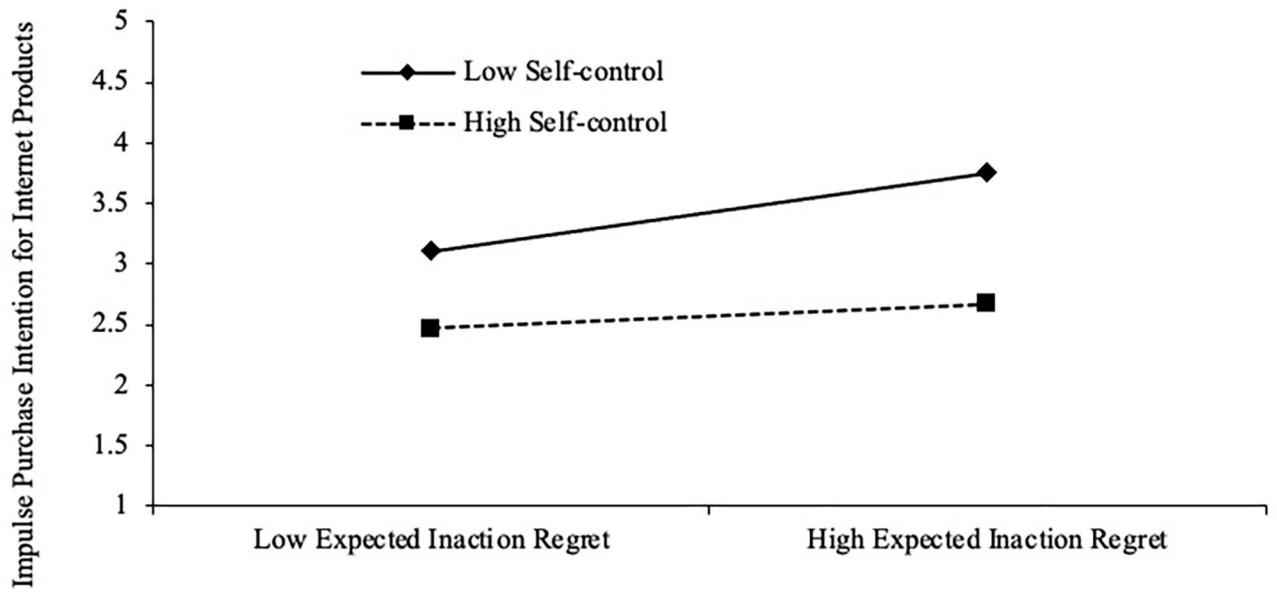


FIGURE 2 | The regulating effect of self-control.

the significant role of higher product semantic perception in stimulating a higher level of "loss" perception and anxiety after the consumption experience (Camille et al., 2004; Sandberg et al., 2016), leading to a higher extent of expected inaction regret. In addition, the semantic perception of products has a significant positive impact on the expectation of inaction and regret, also indicating that the "symbol combination attached to the core products" can meet the psychological needs of online consumers such as culture, emotion and symbolic meaning, and create customer value just like the use function of tangible products. Besides, women are more likely to have higher levels of expected inaction regret than men, which is consistent with the extant literature (Dittmar et al., 1996; Lucas and Koff, 2014). Furthermore, expected inaction regret positively affects impulse purchase for Internet products, indicating that online consumers will still make impulse purchase decisions based on regret minimization even in the face of the semantic "non-use function" demand of products.

Second, this study obtains new research findings by uncovering the mediation mechanism of expected inaction regret between product semantic perception and impulse buying. As reported in the mediation test with the results from regression analysis, expected inaction regret plays a partial mediating role between the semantic perception of products and online impulse purchase intention. Previous research findings suggested that there were consequences of impulse buying such as regret and unnecessary spending, thus strategies like post-purchase communication, seeking social support, and so on have been proposed to cope with expected action regret (Yi and Baumgartner, 2011; Chang and Tseng, 2014). However, few studies have examined the role of expected inaction regret, thus our results extend the previous literature by identifying the mediation effects of expected inaction regret between product semantic perception and online impulse buying. Thus, e-business platforms can more effectively implement product semantic designs, enhancing consumers' sense of pleasure, desire, and impulse, implying the possible losses that might be brought about by expected inaction, and facilitating their online purchases.

Third, this study provides empirical support for previous theoretical studies by responding to their calls for investigating the moderating effects of self-control in different consumer behavioral contexts (Kchaou and Amara, 2014; Dhandra, 2020). In particular, our study incorporates self-control as an anticipated factors, and uncovers its moderating effects on impulse buying mechanisms. Our research findings suggest that self-control negatively moderates the relationship between expected inaction regret and impulse purchases for Internet products, indicating that online consumers will make a comparison between "desire and willpower" before impulse purchases, and self-control weakens the positive effect of expected inaction regret on online impulse purchases. This confirms the viewpoint that gratification and desire for the product can override self-control of consumers which leads to impulse buying (Hoch and Lowenstein, 1991). Therefore, it is interesting and necessary to study the influence of consumerism on the semantic symbols of products to stimulate the purchasing psychology of expected inaction and induce online impulse buying of consumers.

Theoretical Contributions

Our study makes three contributions to the extant literature. First, we establish a theoretical link between product semantic perception and online impulse buying. While previous studies mostly considered psychological factors (Rook and Gardner, 1993; Beatty and Ferrell, 1998; Amos et al., 2014; Bandyopadhyay,

2016), lack of control (Youn and Faber, 2000; Parboteeah et al., 2009; Amos et al., 2014), personality traits (Verplanken and Herabadi, 2001; Chan et al., 2017; Satyavani and Chalam, 2018), demographic characteristics (Dittmar et al., 1996; Wood, 1998; Silvera et al., 2008), environment of retailers, product mix design, and promotion design (Zhou and Wong, 2004; Kacen et al., 2012; Mohan et al., 2013), the role of product semantics in triggering consumers' impulse buying for Internet products remains largely unexplored. To our knowledge, this is one of the first studies that brings product semantic perception to the context of impulse buying. Based on the impulse buying theory and mental accounts theory, our study examines the relationship between product semantic perception and online impulse buying. These research findings can enrich our understanding of impulse buying from a product semantics theoretical perspective.

Second, our study uncovers the mediation effects between expected inaction regret and online impulse buying. Previous studies, though still very a few, considered expected action regret as a construct and investigated the influence of this kind of regret on consumers' online behaviors from a psychologically theoretical perspective (Yi and Baumgartner, 2011; Chang and Tseng, 2014). While in increasing online shopping festivals like "Double Eleven," consumers engage in enjoyment and pleasure and sustain possible losses with inaction regret. In particular, we find that expected inaction regret plays a partial mediating role between the semantic perception of products and online impulse purchase intention. The research findings could interpret the role of expected inaction regret in the context of the rise of the e-commerce era from an affective and psychological theoretical perspective.

Third, our study reveals the moderating effects of self-control on the relationship between expected inaction regret and impulse purchases for Internet products. While prior studies have delved into self-control in the impulse buying context (Parboteeah et al., 2009; Amos et al., 2014; Kchaou and Amara, 2014; Dhandra, 2020), little attention has been paid to the role of self-control concerned with expected inaction regret. Therefore, our empirical results can further enhance our understanding regarding the anticipated effects of self-control in the context of online impulse buying.

Practical Implications

The findings of this study can provide practical guidelines for business developers and operators of online purchase platforms.

First, platform developers and operators need to recognize the importance of the semantic symbol design of product "non-use function" in stimulating impulse buying. On one hand, platform developers and operators can implement semantic symbol design to stimulate consumers to impulsively buy Internet products. Under the wave of consumerism, online consumers pay much attention to the comprehensive experience of emotion in the process of Internet products purchases, and the pragmatic design of products finds it difficult to meet their spiritual and cultural needs. Only through the breakthrough innovation of product semantics can e-commerce enterprises better meet demand and lead a consumption trend. Design becomes the third-dimension innovation driving force besides technology and marketing as design endows products with culture, emotion, and symbolic meaning, and can meet the spiritual and cultural needs of the hedonic consumption process for Internet products. It is worth noting that online platform developers should always remind themselves that semantic design of products cannot be too complicated since many consumers have little time or energy to understand the intricate information transferred to them by the highly competitive online market. Thus, product development requires the design and research team to interpret product symbols well and match them to their potential consumers. Moreover, e-business operators and marketers should recognize that the semantic attributes contained in the product itself with high expected inaction regret can help enhance purchase experience and induce impulse buying.

Second, platform developers and operators should take self-control into consideration when developing product semantic perception, and design the most attractive non-functional features to increase consumers' impulse buying through the Internet. Chinese online consumers' loss aversion and self-control make them rationally control their emotions or desires in the face of the temptation of semantic symbols of Internet products, so as to avoid the "regret" result of substantial purchase losses. Therefore, it is important to stimulate the visual, auditory, tactile, and other senses of consumers, so as to confront the negative influence of self-control and to improve their perception of possible losses caused by expected inaction and stimulate online purchase desire.

Limitations and Research Directions

While our study provides salient theoretical and practical contributions, there are several limitations that may point to future research directions. First, the sample of our questionnaire survey is relative limited. To generalize the research findings of our study, future research can collect data from a wider sample and may be from different countries, thereby investigating if the product semantic perception mechanisms on impulse buying are contingent upon different cultures. Second, our study considers impulse buying as an overall second-order construct. In order to obtain more interesting research results, future research should delve into the specific effects of product semantic perception on different types of impulse buying. Thirdly, our data sample paid little attention to the demographic characteristics of consumers. Further research can collect data from different age groups, occupation groups, and so on to see whether there are differences in findings. Last but not least, future studies can employ a more rigorous neurophysiological design to assess actual impulse buying behaviors, such as measuring blood flow, muscle activation, and brain activity, to avoid the potential common method bias.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

RC contributed to the conceptualization, methodology, supervision, project administration, and validation of this paper. XH was responsible for writing—review and editing and formal analysis. Both authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.676086/full#supplementary-material

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Untying the Influence of Green Brand Authenticity on Electronic Word-of-Mouth Intention: A Moderation–Mediation Model

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Green brands have made considerable strides in recent years; however, their validity has been questioned due to green brand fraud. However, the influence of green brand authenticity on consumer online behavior is still lacking in the e-commerce boom era. This article presents a theoretical framework based on trust and self-determination theory to investigate the influence of green brand authenticity on electronic word-of-mouth (eWOM). The conclusions are drawn from an empirical examination of 292 valid responses. Green brand authenticity influences eWOM intent, which is mediated through brand trust. Self-concept consistency has a moderating effect on the relationship between green brand authenticity and brand trust. The findings paved the way for future green brand development, notably in terms of publicity and promotion. This article also describes its theoretical and management significance, limitations, and future research directions.

Keywords: green brand authenticity, electronic word-of-mouth, brand trust, self-concept consistency, green development

INTRODUCTION

Environmental issues are growing in importance as global warming continues to worsen, the main hindrance to global progress. According to the World Bank data, economic losses across the globe caused by various environmental pollutions reached 2.8% of gross national income in 2018 (UNEP, 2011), leading to a growing call for a green economy as an ideal way for advancing the economy. Additionally, based on direct losses recorded by international businesses, we estimate that the entire loss of consumption, including spillovers across all regions and industries, is approximately $3.8 trillion, or 4.2 percent of global gross domestic product (Lenzen et al., 2020). Featured by low carbon, high resource efficiency, and inclusive development, the green economy is aimed to achieve green growth (Li et al., 2018, 2019a), which could be difficult to realize if without environment-friendly technologies and products (Li et al., 2020; Mealy and Teytelboym, 2020), notably green brand. The green brand has made headway in recent years, and it clearly has a competitive advantage over non-green brands, as it supports sustainable development in a healthier, safer, and more sustainable way (Cinelli and LeBoeuf, 2020). However, the development of a green brand is not smooth sailing, as evidenced by the lack of ability for consumers to distinguish which brand is "green." The chances are that

they might run into green brand fraud problems with an increasing number of brands claim themselves as "green brand." As a result, they would eventually lose trust in the green brand and focus on brand authenticity, or their perception of the brand's reliability, such as quality, as a basis for deciding whether to be more friendly with it (Guèvremont, 2018). Some scholars argued that brand authenticity could bring about positive brand characteristics of persistence and originality (Busser and Shulga, 2019; Durkan, 2020), but whether green brand authenticity could be improved to restore the lost brand trust remains to be studied.

According to the cognitive-behavior theory (Aslin and Rothschild, 1987), when consumers perceive a green brand's authenticity, they will act on that brand. The vigorous development of e-commerce has accelerated consumers' deviation from the traditional way of offline shopping. People will naturally turn to the Internet to express their feelings about the validity of green brands using electronic word-of-mouth (eWOM). The eWOM, filled with both the consumers' positive and negative comments, is also commonly referred to as online review, online recommendation, or online opinion (Serra Cantallops and Salvi, 2014). The study of Litvin et al. (2008) pointed out that interpersonal influence and word-of-mouth (WOM) tends to be some of the most important sources of information when consumers make decisions. As a result of eWOM, most young people have purchased things that are widely popular on social media (Cinelli and LeBoeuf, 2020). In this context, studying the impact of the authenticity of green brands on eWOM intentions is conducive to the promotion of green brands and environmental protection efforts, thereby forming a healthy and green development model. The functional relationship between green brand authenticity and eWOM intention remains largely unclear.

Brand managers are not the only ones liable for constructing the brand tryst and its value; several other aspects assist in creating the green brand authenticity positively, such as brand trust and self-interest consistency. For brand managers, in the pervasive presence of eWOM, establishing an image of green brand authenticity for any brand is the biggest challenge. Brand managers are required to create a positive brand image in the current digital environment (Chaudhuri and Holbrook, 2001; De Vries and Carlson, 2014). Even if the brand is real, it does not mean that the brand is successful because, for some consumers, the brand can represent a real brand, while for other consumers, the brand can have some other connotation, which should be related to emotion (Lude and Prügl, 2018; Cinelli and LeBoeuf, 2020). Sometimes, the market's diagnosis of authenticity is a crucial prerequisite for the product's release since it gives consumers a base for comfort with the product's genuine qualities, despite the company's artificial efforts (Moulard et al., 2016). At present, the millennial has a greater degree of affection for the brand. When the current era retains the green authenticity of the brand, they launch new models or modify the product style according to the market demand. In fact, they did not diverge from the real brand (Ewing et al., 2012).

In this context, self-determination theory proposes: (a) People are born to internalize the adjustment of important boring activities; (b) internalization will produce different self-regulation methods; and (c) social environment affects the internalization process and supervision methods (Deci et al., 1994). That suggests that people's ability to regulate their emotions in response to the same stimulus can differ from one another. The extent to which an individual's self-perception is consistent with their perception of things (in this case, green brand) is generally referred to as self-concept consistency. Then, do consumers with different self-concept consistency have different levels of trust in the brand? Is there a pattern to its effects? Although the importance of brand authenticity has become a consensus, many scholars have limited their research on how consumers judge whether a product is genuine (Cinelli and LeBoeuf, 2020) or identifying a product as being environmentally friendly (Mealy and Teytelboym, 2020). The research on authenticity is still in its infancy (Busser and Shulga, 2019), and its empirical research is still lacking (Moulard et al., 2016). Research on brand authenticity has primarily focused on generic brand determinants, such as brand story, perceived value and trust, brand attachment, and brand loyalty (Malär et al., 2011; Dangelico and Vocalelli, 2017; Bakshi and Mishra, 2018; Cinelli and LeBoeuf, 2020; Huang and Guo, 2021), rather than on specific brand determinants, such as green brand authenticity and eWOM intentions.

Research on green brand authenticity and eWOM intention regarding brand trust and its characteristics, especially the strict requirement on environmental protection, is still under-explored (Eggers et al., 2013). We further need to determine whether buyers value the green brand authenticity and are apprehensive of amicable interactions with green brands. Given that there is little research on the influence mechanism of green brand authenticity on eWOM intention, this paper is intended to fill in this gap by identifying the relationship between green brand authenticity and eWOM. Based on the above, this paper answers the following questions: (1) What is the role of green brand authenticity in developing eWOM intention? (2) does brand trust play a mediating role between the authenticity of the green brand and eWOM intention? and (3) does self-concept consistency have a moderating effect on the mediating effect of brand trust? These questions have important theoretical and practical significance for enriching green brand authenticity and eWOM intention. This paper aims to reveal the influence mechanism of green brand authenticity on eWOM intention and find out the internal relationship. In this paper, a moderation–mediation model is constructed and tested by empirical methods.

This study's structure comprises the following section describing the theoretical review of the relevant literature and the development of hypotheses. The research method is in Section "Research Methodology," and the research results are discussed in Section "Results and Discussions." Conclusions, impacts, limitations, and prospects are given in Section "Conclusion, Implications, Limitations, and Future Prospects" and last the references.

THEORETICAL REVIEW AND HYPOTHESIS DEVELOPMENT

The idea of authenticity can be used as a boundary requirement for consumer evaluation and behavior (Akbar and Wymer, 2017). Perceived authenticity plays a key role in the decision-making process of consumers' brand and repurchase intention (Lude and Prügl, 2018). Over the past decade, a growing quest for authenticity in utilization can be observed in response to market homogeneity. Although the term authenticity has been studied in depth in philosophy, psychology, sociology, management, and many other disciplines, the definition of the concept varies from field to field (Fritz et al., 2017). A considerable amount of research has focused on brand authenticity in marketing, which has long been seen as an integral part of a brand (Schallehn et al., 2014; Kim and Hall, 2015; Moulard et al., 2016; Huang and Guo, 2021). However, it is not enough to simply develop authentic brands and products; the item must also be viewed as authentic by the brand's target consumers. The real and the unreal stem from consumers' recognition and interpretation of things that needs to be considered (Grayson and Martinec, 2004; Napoli et al., 2016). In the context of green marketing, green products' authenticity lies in the subjective perception of consumers (Li et al., 2019b). Therefore, this article underlines the constructive view of green brand authenticity and eWOM, consumers' subjective evaluation of brand authenticity.

The authenticity of a brand is based on its originality, stability, and consistency with the core values of the brand (Fritz et al., 2017). A study by Grayson and Martinec (2004) classifies authenticity into indexical authenticity and iconic authenticity. The former refers to the original product, which is different from the counterfeit goods, while the latter refers to the similarity of the object's physical representation. This is the brand authenticity understood from the objective attribute, but this paper takes the consumer as the research perspective. In order to facilitate consumers' understanding, we believe that brand authenticity is a kind of subjective perception that combines the inherent attributes of a brand with consumer's own experience and knowledge (Morhart et al., 2013), that is, consumer's assessment of the authenticity of the brand image, which serves as the basis for judging whether to conduct friendly interaction with the brand. However, experts have yet to explore the value of brand authenticity in the digital age, when consumers' social media behavior is significantly emphasized (Arya et al., 2019). Similarly, fostering trust in green brands fosters positive involvement, which may have an effect on consumer intentions.

Authenticity has been studied in various ways in the past. As per the research by Ewing et al. (2012), the authenticity of a particular brand can be formed by certain types of authenticity clues. Firstly, the green brand boasts unique characteristics that other brands do not share, notably its green nature. Secondly, quality stands at the core of product competition. Brand authenticity will enhance consumer expectancy of product quality (Cinelli and LeBoeuf, 2020). It is frequently the case that a product's perceived quality gives it an advantage over its competitors when it comes to consumer preference, since consumers naturally feel that brand authenticity implies product quality consumer (Han et al., 2019). Nowadays, the consumer-brand connection process has strengthened, which helps both parties. Social media platforms increase users' curation, innovation, and collaboration options, hence enhancing customer trust (Eggers et al., 2013; Arya et al., 2019). Authenticity is related to consumers' feelings and emotions in the postmodern era, rather than with their knowledge or truth (Phung et al., 2019). For example, it is difficult for consumers to establish whether organic food is chemical-free; thus, trusting the product's authenticity is critical (Huang and Guo, 2021).

In addition, consumers' perception of organizational transparency is a prerequisite for brand authenticity (Busser and Shulga, 2019). The perception of organizational transparency also influences the consumer's judgment on whether the brand is operating honestly, which means that brand integrity is also a prerequisite for consumers to perceive brand authenticity. Therefore, green brand authenticity should include green attributes authenticity, quality commitment authenticity, and integrity authenticity. Recent studies focused on precursors and consequences of perceived authenticity in several research areas (Hede et al., 2014; Ye et al., 2018; Chen et al., 2020; Komarac et al., 2020). However, the concept of green brand authenticity remains sparse in the prior research, which needs to be examined on the relationship of green brand authenticity and eWOM intention. The authors of this study examined the effects of green brand authenticity on eWOM intention, as evaluated by green attributes, quality, and integrity.

Based on the trust theory and self-determination theory, this article proposed a theoretical model from consumers' perspectives and provided a theoretical basis for the follow-up research. From the practical point of view, the exploration of the authenticity of green brands is conducive to consolidating the competitive position of green brands in the market, achieving market success and reputation, and becoming a trustworthy environmental brand (Huang and Guo, 2021). By filling the existing gap in this particular field, the results of this paper can also provide strategic insight to understand the research of green brand authenticity in engendering and facilitating eWOM intention, which is conducive to further developing green brands by virtue of eWOM on the electronic platforms, to alleviate the current situation of low market share of the green brand.

Green Brand Authenticity and eWOM Intention

Brand authenticity has been frequently connected to brand trust (Eggers et al., 2013). In essence, authentic brands are devoted to delivering on their promises (Morhart et al., 2013; Fritz et al., 2017), and consumers trust brands that perform as promised (Napoli et al., 2016). Trust is declining in today's consumer skepticism, and authenticity provides just the antidote for this (Fritz et al., 2017). The key elements of brand authenticity are "individuality," "originality," and "naturalness" (Schallehn et al., 2014; Akbar and Wymer, 2017); "credibility" and "reliability" (Fritz et al., 2017); and "consistency," "continuity," "integrity," and "symbolism" (Eggers et al., 2013; Morhart et al., 2013).

Brand authenticity is communicated through any modicum of origins, originality, uniqueness, or the unique manner in which the brand delivers on its promise (Schallehn et al., 2014). Creativity and personality are two sides of the same coin in brand authenticity. The study of Fritz et al. (2017) describes naturalness as an indication of "genuineness and realness." A brand's personality, originality, and naturalness are also described in a novel branding method and embedded in a genuine environment to differentiate from competitors.

With the development of the service industry, in marketing and publicity literature, the relevance of WOM management in consumer decision-making has been fully recognized. Earlier understanding of WOM was based on a dynamic communication process, a non-commercial communication behavior between the information receiver and the disseminator; that is, who tells what to whom (Herr et al., 1991; Stern, 1994). With the emergence of Internet media, which is said to open a new era of WOM (Hennig-Thurau and Walsh, 2003; Yeh and Choi, 2011), the definition of eWOM is "any positive or negative statement made by a potential, actual or previous consumer about a product or company, which is provided to many people and institutions through the Internet." Compared with traditional WOM, eWOM has more comprehensive sources and more timely and efficient information (Sun et al., 2021), which is one of the reasons why this paper chooses to study eWOM intention.

The current literature focused mainly on the eWOM itself and its results, giving little consideration to the antecedent variables (Ahmad and Laroche, 2017; Ali et al., 2020; Golmohammadi et al., 2020; Sun et al., 2021). Therefore, this paper will fill in this gap by taking green brand authenticity as its antecedent variable (green attributes, quality, and integrity). As one of the possible factors the study of Fritz et al. (2017) discovered that brand authenticity influences the quality of brand relationships and consumer behavior intentions. When consumers perceive green brand authenticity, they will have positive behavioral intentions toward the green brand and also used to positive words while commenting on that specific brand. Such as positive reviews (Morhart et al., 2013; Moulard et al., 2016), the perception of brand authenticity will promote consumers' positive support for eWOM intentions.

Therefore, we predict the following hypothesis:

Hypothesis 1: Green brand authenticity positively affects eWOM intention.

Green Brand Authenticity and Brand Trust

Trust in several different studies refers to "the degree to which citizens have confidence in consistency, reliability, security, and integrity from an organizational, political, socio-economic, and technological perspective" (Mcknight et al., 2011; Shareef et al., 2015; Moulard et al., 2016; Shahzad et al., 2019, 2020; Ismagilova et al., 2020). A study by Munuera-Aleman et al. (2003) believes that brand intent has a more significant impact on consumers than brand reliability, because the latter may not constantly be a precise reflection of the true value of the brand. Consumers are more likely to trust brands that are honest and sincere than those that merely deliver quality. Building trust involves both high-quality service and a truthful approach (Schallehn et al., 2014). Some authors consider that consumers require a brand to meet their operational requirements, and trust is mainly developed by the emotional security that is increased by sympathy and reciprocity (Bakshi and Mishra, 2018). The study of Eggers et al. (2013) examined the associations between brand authenticity, brand trust, and small- and medium-sized enterprise growth and proved that overall brand authenticity fosters brand trust.

Furthermore, Eggers et al. (2013) also investigated that the respondents with high perceptions of authenticity reported significantly higher perceptions of brand authenticity than those with lower perceptions of authenticity. Trust is deemed to be a precondition for online transactions because e-commerce usually has a high degree of uncertainty, especially in social commerce (Nadeem et al., 2020). Most of the time, this may hinder the authenticity of the products and services of a particular brand. Therefore, trust is considered a prerequisite for brands to establish a long-term consumer relationship. Moreover, research on green brand authenticity and brand trust is empirically not tested by the previous researchers. In this view, we can assume that the authenticity of green brands may also have a positive effect on the development of consumer trust in a brand in an online buying context. Therefore, we posit the following hypothesis:

Hypothesis 2: Green brand authenticity positively affects brand trust.

Brand Trust and eWOM Intention

Scholars have provided multiple definitions for trust, but there has been little consensus on trust (Ma and Orgun, 2006). Similarly, trust in e-commerce also turns out to have multiple manifestations (Gefen et al., 2003). Based on multidisciplinary knowledge, Munuera-Aleman et al. (2003) defined brand trust as "confident expectation of brand reliability and intention in case of risks to consumers." Early research provided some insights; for example, Shirai (2017) revealed that price is the most decisive aspect because consumers with high price awareness are more likely to browse multiple Web sites to get the best price. In addition, Tsao and Hsieh (2012) found that if the Web site is not well designed, potential consumers will cancel the transaction when they visit a Web site to make a purchase. They affirmed that the Web site is the only platform where the company can convince potential visitors. Therefore, the Web site must have a professional appearance that reflects the firm's overall competitiveness and products. E-commerce companies can increase consumer confidence by strengthening consumer trust toward their brand, thereby affecting consumers' willingness to buy online (Rahman, 2020). It is possible to boost consumer confidence in eWOM if consumers have faith in online information and believe that it is reliable or legitimate, as has been demonstrated. A positive eWOM can enhance the positive attitude of the consumer toward a prescribed brand

(Ahmad and Laroche, 2017; Rahman, 2020). Therefore, it is equally important in context of current study to measure the impact of brand trust in developing a positive eWOM intentions. Based on these studies, the following hypothesis was proposed:

> *Hypothesis 3*: Brand trust is positively affecting eWOM intention.

Moreover, several studies accept that brand trust is a crucial determinant of consumers' attitudes toward business relationships (Chaudhuri and Holbrook, 2001; Lude and Prügl, 2018), and marketers must become aware of its role in driving marketing success. In brand management, brand trust surpasses consumers' satisfaction with product performance (Aaker, 1996). Therefore, developing and maintaining consumers' online brand trust is crucial, especially for the development of e-commerce (Yeh and Choi, 2011). Brand trust is one of the key elements in a consumer-based brand performance model proposed by Molinillo et al. (2018), and it plays an indispensable role between enterprises and consumers. The studies proved that brand authenticity (Lude and Prügl, 2018) and perceived product quality (Han et al., 2019) could positively promote brand trust. Meanwhile, brand trust can further promote consumers' brand loyalty (Morgan and Hunt, 1994; Durkan, 2020) and recommendation intention (Yeung et al., 2004). In this study context, the authors assume that brand trust can mediate the relationship between green brand authenticity and eWOM intentions. Therefore, the following hypothesis is offered:

> *Hypothesis 4*: Brand trust plays a mediating role between green brand authenticity and eWOM intention.

Moderating Effect of Self-Concept Consistency

Self-concept refers to the individual's cognition and evaluation of self-attributes through self-experience (Sirgy et al., 1997). Self-concept consistency refers to the extent to which an individual's self-attributes are consistent with his or her perception of things (in this case, green brand), and the degree of consistency varies from person to person. In the social media network environment, self-concept consistency plays an important predictive role (De Vries and Carlson, 2014). Consumers will self-certify through an authentic brand. When consumers' self-image matches with brand image, self-concept consistency is considered a motivating factor for brand participation, leading consumers to participate more actively in the interaction with the brand (Morhart et al., 2013; Loureiro et al., 2017). A high level of consistency will increase enthusiasm for the brand in offline and online environments, such as recommendation intention (Kressmann et al., 2006; Usakli and Baloglu, 2011). The degree of consistency between self-image and green brand image will form different self-concept consistency among different people (Boucher, 2021). Different self-concept consistency will act on consumers, which will further affect consumers' interaction with the green brand.

Trust is a kind of subjective consciousness influenced by self-cognition. As self-concept consistency increases, consumers' subjective trust will increase accordingly. The closer the self-image and the brand image are, the more positive the consumer's attitude toward the brand (Graeff, 1996; Boucher, 2011). If an organization commitment to stakeholders matches with its corporate principles, strategy, and articulated vision (examples include Apple, Porsche, etc.), it is said to be brand consistent. The distinctiveness of a firm is generated from its corporate values, which have grown over time as a result of the organization's genesis (Eggers et al., 2013; Phung et al., 2019). Similarly, when consumers have a low green brand authenticity, those with high self-concept consistency may have more trust in the brand and are more willing to conduct positive eWOM than those with low self-concept consistency. Therefore, consumers with low self-concept consistency need more brand trust to consolidate their interaction with the green brand. In conclusion, we put forward that:

> *Hypothesis 5*: Self-concept consistency negatively moderates the effect of green brand authenticity on brand trust.
> *Hypothesis 6*: Self-concept consistency plays a moderating role in the mediating effect of brand trust.

To fulfill the aims of the research, a conceptual framework (see **Figure 1**) was developed.

RESEARCH METHODOLOGY

Sampling and Data Collection

This paper used an online questionnaire[1] to assure respondents' anonymity and confidentiality (Larson, 2019), which was filled out by consumers who had participated in online consumption. The authors use of online questionnaires to collect data, which can protect participants' privacy to a certain degree, is considered the preferred way to avoid some adverse social reactions (Gittelman et al., 2015). In addition, without geographical location and time limitation, online questionnaires are featured by high efficiency and cost-saving (Lefever et al., 2007). Since the respondents were consumers who had participated in online consumption, it was more reasonable to use online questionnaires. Before answering the questionnaire, we gave the participants a questionnaire that provided the basic information and illustrations of a green brand that we designated in advance without knowing the brand name. The questionnaire included questions on respondents' demographic information and a formal questionnaire that included the green brand authenticity scale, brand trust scale, eWOM intention scale, and self-concept consistency scale. Besides, before filling in this questionnaire, a question, "have you ever spread eWOM, such as purchasing reviews," was designed to delete the respondents. If the response was no, the questionnaire was completed; if the answer was yes, the questioning was continued. Participants were provided

[1]www.wjx.cn

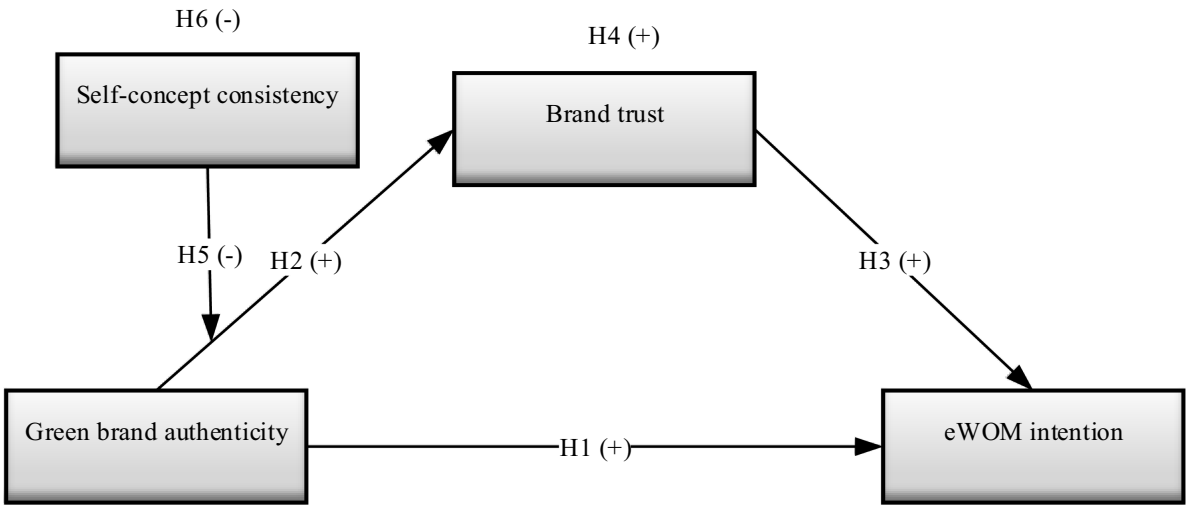


FIGURE 1 | Research model.

essential information and illustrations of a product known to be a green brand with the brand name obscured in this stage of the formal questionnaire, and they were asked to complete the following scales based on the information.

Prior to the formal investigation, a preliminary investigation was carried out. A total of 96 questionnaires were collected in the pre-survey, and 91 valid questionnaires were finally obtained after eliminating the invalid questionnaires. According to the pre-survey analysis, the questionnaire was slightly modified to get the final formal questionnaire and circulated among the respondents during the month of January 2020. As of April 2020, among a total of 335 responses received, 292 cases have been analyzed due to 43 cases with default bias eliminated.

Measures

To assure the reliability and validity of the scales used in this work, the measurements of the variables were based on maturity scales in relevant researches, and some items of the scales were modified after discussions with a team of experts. Participants' response was measured using Likert's 7-point method, from 1 (strongly disagree) to 7 (strongly agree). The following is the scale for each variable, and **Table 1** shows the detailed elements for each measurement.

Green Brand Authenticity

The green brand authenticity scale was referred to the original brand authenticity scale (Napoli et al., 2016). Three dimensions with nine items were used in this scale: (1) green attributes with three items (e.g., "the brand is healthy, energy-saving, and consumer-friendly"), (2) quality with three items (e.g., "the brand is based on quality"), and (3) integrity with three items (e.g., "the brand remains true to its espoused values"). In this paper, the scale with nine items demonstrated good reliability (Cronbach's $\alpha = 0.905$).

Brand Trust

Brand trust referred to the scale of Chaudhuri and Holbrook (2001), with a total of three items (e.g., "I believe in this brand") measured with Likert's 7-point. In this paper, the scale showed good reliability (Cronbach's $\alpha = 0.870$).

eWOM Intention

Electronic word-of-mouth intention originates from the scale in Brown et al. (2005), which contained three items (e.g., "If my friends want to buy this product, I am willing to share it with them by using the sharing function of the link"). In this paper, the measure showed good reliability (Cronbach's $\alpha = 0.859$).

Self-Concept Consistency

The self-concept consistency scale referred to the scale used by Malär et al. (2011), with a total of five items (e.g., "The brand's personality reflects my image"). The measure showed excellent reliability (Cronbach's $\alpha = 0.919$).

Data Analysis Technique

A total of 292 valid answers were received, which met the requirement of 10 answers per item. In order to test the hypothesis, current research prefers PROCESS macro in SPSS rather than other covariance-based structural equation modeling (SEM) programs (Nivedhitha and Sheik Manzoor, 2020). Unlike the SEM program, it is simple and effective to perform mediation and moderation analysis, avoiding sample size limitations and degree of freedom. Moreover, it provides accurate statistical inferences, including specific conditional indirect effects and moderation–mediation indices, and avoids the problems caused by the interaction estimation provided by the latent variable method (Hayes, 2017). This paper used the PROCESS macro (Model 7) to test whether self-concept consistency moderates the mediation process. In addition, to check the indirect effects,

TABLE 1 | Measurement model results.

Variable	Items		Factor loading	AVE	CR
GBA	Green Attribute	The brand is healthy, energy-efficient, and consumer-friendly	0.837	0.631	0.939
		The brand has made a certain amount of public welfare investment	0.806		
		The brand implements the concept of caring for the environment	0.743		
	Quality	The brand focuses on quality	0.829		
		The company strives to maintain long-term quality standards	0.744		
		The brand is well-made	0.816		
	Integrity	The brand will not violate its principles	0.780		
		The brand is faithful to the values it believes in	0.806		
		The brand has always been honest	0.784		
BT	I believe this brand		0.696	0.500	0.749
	This is an honest brand		0.806		
	This brand is safe		0.756		
WOM	If my friend wants to buy this product, I would like to share it with others using the "Share" function of the link		0.696	0.576	0.802
	If my friend is interested, I will introduce the content described by the brand when chatting online with him/her		0.801		
	If I find a forum with a topic similar to this product, I might write a review to recommend the product		0.774		
SC	The personality of the brand is consistent with how I see myself		0.697	0.730	0.931
	The personality of the brand reflects my image		0.835		
	People like me will use the brand		0.840		
	The brand reflects who I am		0.859		
	People who use the brand are very similar to me		0.857		

we used the bootstrapping method (Hayes and Scharkow, 2013) to produce 95% bias-corrected confidence in-intervals from 5,000 resamples of the data effects would be significant when the confidence intervals excluded zero. Since this paper aimed to explore whether brand trust mediated the connection between green brand authenticity and eWOM intention and whether this mediation effect would be moderated by self-concept consistency, the analysis included the following three steps.

Demographic Characteristics

Among the 292 participants, males accounted for 48.6 percent and females for 51.4 percent, indicating an even gender distribution. Results from **Table 2**, 45.5 percent of respondents are under the age of 25 and 35 percent are between the ages of 24 and 34 years. Cumulatively, 80.5 percent of respondents are under the age of 35, suggesting that they may have a stronger proclivity to engage in online activities. We have asked the question about the Internet usage experience of the respondents. According to the findings, only 5.1 percent of respondents have used the Internet for shopping in the last 3 years. Sixty-seven percent of those who answered the survey have been using the Internet for more than 5 years. This will demonstrate to our audience that our participants are mature and well-versed in the usage of Internet. In addition, the authors gathered information on their educational background. The findings reveal that 51.9 percent of respondents have an undergraduate degree in their field. The fact that 31.3 percent of respondents had a graduate degree or higher demonstrates that participants are highly educated.

Common Method Bias

To rule out the possibility of common method bias, the Harman single factor test was applied. The results indicated that the variance interpretation rate for the first component was 43, which is less than the acceptable value of 50 (Gentry and Calantone, 2002; Podsakoff et al., 2003; Kock, 2015). The findings indicated that there was no major common method bias in this study. Meanwhile, variance inflation factor (VIF) values were utilized to determine whether variables were collinear. The VIF values for each dependent and independent variable

TABLE 2 | Demographic information.

Characteristics	Statistic	
	N	Percentage (%)
Gender		
Male	142	48.6
Female	150	51.4
Age		
15–24 years old	133	45.5
25–34 years old	102	35
35–44 years old	50	17.2
Over 44 years old	7	2.3
Internet usage experience		
Less than 3 years	15	5.1
3–5 years	82	28.2
5–10 years	131	44.7
More than 10 years	64	22
Education		
Junior high school and below	14	4.8
High school/Technical secondary school	14	4.8
Higher vocational/Junior college	21	7.2
Proportion of undergraduates	152	51.9
Graduate or above	91	31.3

TABLE 3 | Descriptive statistics and bivariate correlations.

Variable	Mean	SD	1	2	3	4
GBA	4.706	1.070	**0.794**			
BT	5.112	1.209	0.687*	**0.707**		
WOM	4.779	1.363	0.668*	0.640*	**0.759**	
SC	4.493	1.101	0.290*	0.329*	0.354*	**0.854**

*N = 292. SD, standard deviation. *p < 0.01. Diagonal values show the square root of AVE. GBA, green brand authenticity; SC, self-concept consistency; BT, brand trust; and eWOM, electronic word-of-mouth intention. Inclined lines rendered in Boldface show the Square Root of the AVE of each variable.*

were determined to be 1.891, which is also less than the recommended value of 3.3 (Kock, 2015). On the basis of these findings, we can conclude that there was no significant issue of multicollinearity and common method bias.

RESULTS AND DISCUSSIONS

Reliability and Validity Analysis

In this paper, the internal consistency coefficient Cronbach's alpha was used for the reliability test. If Cronbach's α value was above 0.7, the scale would have high reliability (Sekaran, 2006). By using SPSS 25.0 to test the reliability of the obtained data, it was found that the overall Cronbach's α value of the questionnaire was 0.930, and the α value of each variable was above 0.85. Thereby, the internal consistency and stability of the scale were perfect, which met the recommended standards. In addition, six dimensions were extracted by principal component analysis of the scale, and the rotated component matrix was obtained. The factor loading of each item in the scale was according to the recommended values, with associated t-values for all indicators significant at $p < 0.001$, indicating that the scale was magnificent (**Table 1**).

Validity includes content validity and constructs validity. The scales adopted in this paper all referred to the mature scales of existing research and adjusted based on consulting experts in related fields to ensure the content validity of the scales. Construction validity can be tested by convergence validity and discriminant validity. Generally, the average extracted variance (AVE) and composite reliability (CR) are used to measure the convergent validity of the scale. If the AVE value is above 0.5 and the CR value is above 0.7, the convergent validity of the scale is good (Hair et al., 1998, 2010). Using SPSS 25.0 to analyze the validity of the data, the results showed that the AVE value of the scale was in the range of 0.500 to 0.730, and the CR value of the scale was in the range of 0.749 to 0.939, indicating good convergence validity (Fornell and Larcker, 1981; Henseler et al., 2014). Discriminant validity was verified by **Table 3**, where the square root of AVE on the diagonal was greater than other values in its column. In addition, the overall KMO value of the questionnaire was 0.912, and the KMO of each variable was greater than 0.7. Bartlett's test results rejected the null hypothesis at the 0.001 significance level. The results showed that the construct validity of the scale was very good.

Preliminary Analyses

The mean, standard deviation, and zero-order correlation coefficient of all variables were listed (see **Table 3**). The results found that consumers with higher green brand authenticity were more likely to have higher eWOM intention, and consumers with higher brand trust were also the same. Moreover, consumers who had a higher green brand authenticity were more likely to have higher brand trust. In addition, self-concept consistency and other variables showed a positive correlation. The hypothesis of this paper was preliminarily verified.

Testing for Direct and Mediation Effect

Model 1, Model 4, and Model 5 were constructed to test the direct effect between green brand authenticity, brand trust, and eWOM intention (see **Table 4**). According to M1, the regression coefficient of green brand authenticity was 0.687 ($p < 0.001$); that is, green brand authenticity significantly positively affected brand trust, which supported hypothesis 1. Similarly, green brand authenticity ($\beta = 0.668$, $p < 0.001$, M4) and brand trust ($\beta = 0.640$, $p < 0.001$, M5) had a significant positive impact on consumers' eWOM intention, that is, hypotheses 2 and 3 were supported.

After examining the direct effect between green brand authenticity, brand trust, and eWOM intention, Model 6 was constructed to test the mediating effect of brand trust. According to M6, when the variable of brand trust was integrated based on Model 4, the β value of green brand authenticity on eWOM intention dropped from 0.668 to 0.433 ($p < 0.001$). Meanwhile, brand trust significantly influenced eWOM intention ($\beta = 0.342$, $p < 0.001$, M6), indicating that hypothesis 4 was supported.

TABLE 4 | Model testing.

Factor	BT			eWOM		
	M1	M2	M3	M4	M5	M6
GBA	0.687**	0.645**	0.630**	0.668**		0.433**
SC		0.143**	0.128**			
GBA*SC			−0.088**			
BT					0.640**	0.342**
R^2	0.471	0.490	0.497	0.447	0.409	0.509
Adj-R^2	0.469	0.486	0.492	0.445	0.407	0.505
F	258.501**	138.773**	94.866**	234.197**	201.001**	149.621**

**$p < 0.001$.

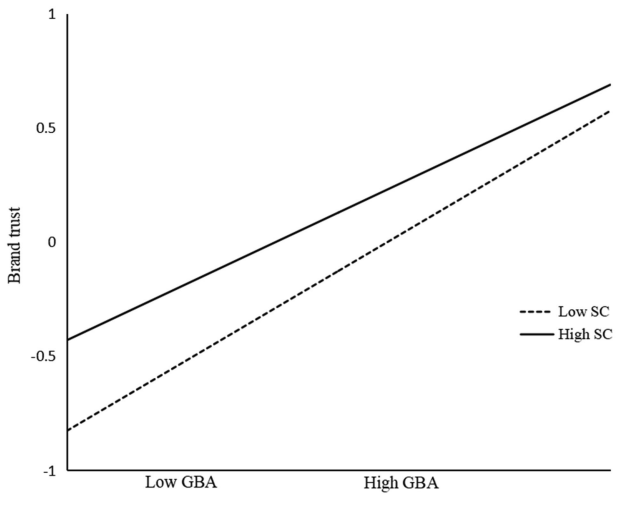


FIGURE 2 | Moderating effects of self-concept consistency.

Testing for Moderation–Mediation

To test the moderating effect, Model 2 was built based on Model 1 after centralizing related variables. Meanwhile, Model 3 was further constructed by introducing the interaction effect. By analyzing the three models, self-concept consistency negatively affected the relationship of green brand authenticity and brand trust ($\beta = -0.088$, $p < 0.001$, M3). From the diagram of the moderating effect of self-concept consistency (**Figure 2**), the slope of the association between green brand authenticity and brand trust was relatively higher for participants with lower self-concept consistency, whereas the slope was relatively weaker when the self-concept consistency of participants was high. With the increase of green brand authenticity, the increase of brand trust is even more significant, which supported hypothesis 5.

In order to test the moderation–mediation effect, the moderating effect of self-concept consistency and the mediating effect of brand trust were integrated using PROCESS macro (Model 7, bootstrap = 5,000), and results are shown in **Table 5**. According to the results from **Table 5**, the confidence interval of self-concept consistency of different degrees did not contain 0 at 95% level, and green brand authenticity had a significant effect on eWOM intention through brand trust, which supported hypothesis 4 again. When self-concept consistency was low, the indirect effect of brand trust was 0.2397, but when self-concept consistency was high, the indirect effect of brand trust dropped to 0.1913. As self-concept consistency improved, the mediating role of brand trust in green brand authenticity and eWOM intention has gradually weakened; that is, the mediating effect of brand trust was negatively moderated by self-concept consistency. Hypothesis 6 was supported.

Major Findings

The study's findings reveal that the authenticity of a green brand improves the brand's eWOM intentions. This result is consistent with prior studies (Morhart et al., 2013), who suggest that when consumers perceive the authenticity of the green attributes, quality, and integrity of a green brand, they will put more confidence in the brand, thereby enhancing their willingness to be engaged in positive brand behavior. Especially, in the era when online social networks and sharing ideas are trendy, eWOM intention will be significantly improved. Additionally, as mentioned by Jumanazarov et al. (2020), consumer satisfaction can boost their intention to spread WOM; shaping the strength of a green brand appears to have a significant impact on consumer perception and behavioral decision-making.

Brand trust plays a mediating effect in the effect of green brand authenticity on eWOM intention as it directly reflects the quality of green brand authenticity. Studies have shown that higher brand authenticity will lead to higher brand trust (Lude and Prügl, 2018). According to Kim et al. (2009), once consumers have established brand trust, they are likely to have a good impression of the brand and have a positive intention to spread the WOM. When it comes to green brands, people are less likely to suggest them if they are not authentic. That said, it tends to be relatively clear that trust serves as the cornerstone of the good interaction between consumers and the brand, based on which brand manager can effectively predict their eWOM intention.

Furthermore, low self-concept consistency has a greater moderating effect on the overall mediating effect of brand trust. The theory of self-determination indicates that consumers with different self-concepts tend to show different degrees in

TABLE 5 | Bootstrap analysis of significance test on moderation–mediation effects.

Moderator	Indirect effect	Standard error	95% confidence interval		Significance
			Bootstrap lower limit	Bootstrap upper limit	
Low self-concept consistency	0.2397	0.0527	0.1402	0.3463	Significant
Self-concept consistency	0.2155	0.0480	0.1273	0.3133	Significant
High self-concept consistency	0.1913	0.0474	0.1079	0.2919	Significant

accepting a brand. Since consumers with high self-concept consistency are more determined than consumers with low self-concept consistency, they are more likely to have trust in a high-fit brand. As a result, their impression of the brand's objective attributes is reduced, while their intention to suggest the brand increases (Usakli and Baloglu, 2011), which is regarded as a positive WOM performance (Seo et al., 2020). As for consumers with low self-concept consistency who have relatively neutral attitudes toward the brand, authenticity can alleviate their uncertainty and help clarify their brand attitude, thereby generating brand trust in the brand. When green brand authenticity is low, high self-concept consistency serves as a protective factor to increase brand trust. However, as green brand authenticity gradually increases, low self-concept consistency has a more significant impact on the overall intermediary effect of brand trust.

CONCLUSION, IMPLICATIONS, LIMITATIONS, AND FUTURE PROSPECTS

Conclusion

This empirical research examines the impact of green brand authenticity on eWOM intention from the consumer's perspective. To that purpose, a quantitative methodology was used, and the conceptual model revealed that green brand authenticity was substantially connected with brand trust and self-concept consistency, indicating that it affected consumers' eWOM intention. Additionally, brand trust was a critical mediator in determining consumer intention or eWOM and self-concept consistency was a critical moderator. Additionally, theoretical and managerial implications are discussed.

Theoretical Implications

The structure of this paper and the key role of its function thus have been verified. That said, this paper provided a valuable theory, which was evidence-based. First, as for measuring brand authenticity, a good many brands researcher set different measurements from multiple dimensions (Schallehn et al., 2014; Akbar and Wymer, 2017; Fritz et al., 2017). This paper explains green brand authenticity through green attributes, quality, and integrity, thus enriching this analysis from the consumers' perspective and providing a solid foundation for future endeavors. Second, brand trust plays a partially mediating role between green brand authenticity and eWOM intention, which could be considered as obvious evidence for the role of trust as a bridge between consumers and brands. The analysis of the mediating effect of brand trust in this paper expands the application of trust theory in green brand authenticity. Third, self-concept consistency has a negative moderating effect on the mediating effect of brand trust. Consumers with high self-concept consistency can be regarded as brand consumers, while low self-concept consistency can be regarded as non-consumers. The results of this paper reveal the difference between brand consumers and non-consumers, with the latter being more easily to be affected by green brand authenticity, which expands the theoretical development of consumer behavior.

In general, the theoretical contribution of this paper is to introduce the concept of green brand to the applicability of authenticity and to expand the research on the path of eWOM intention. Brand authenticity has an impact on the relationship between consumers and the brand (Fritz et al., 2017). This paper confirms for the first time that green brand authenticity contributes to the intention of eWOM. Second, it identifies and explains the mediating role of brand trust and the moderating effect of self-concept consistency in the cognitive-behavioral process, which contributes to the advancement of cognitive-behavioral theory in this area. In addition, the theoretical model of this article is adaptable for potential variables to be considered in the future. In this connection, the research provides a brand-new dimension for the research on green brand authenticity, which is very likely to lay a solid foundation for future sustainable development research.

Management Implications

As the paper focuses on green brands in a relatively emerging market, our research results are helpful for a green brand manager find more effective promotion strategies. Measuring the authenticity of green brands reveals the importance of green attributes, quality, and integrity in ensuring green brand authenticity. Meanwhile, the green attribute trust, the quality of products will directly affect consumers' perception and then consumers' after-sales feedback. Integrity is an important guarantee for the long-term development of a brand. Brand dishonesty will directly affect brand authenticity and may even arouse consumers' suspicion and distrust for the brand, especially for the green brand. In contrast, the quality of products will directly affect consumers' perception and then consumers' after-sales feedback. Therefore, finding the value of a green brand

that consumers care about is conducive to shaping green brand authenticity.

The current goal of green brand construction is to maintain long-term, win-win relationships with consumers for greater consumer life cycle value. To do this, a green brand must gain consumer trust, which is critical to building consumer-brand connection (Eggers et al., 2013). So, authenticity is the perfect remedy for a brand trying to rebuild consumers' trust. The green brand managers should attach greater importance to the mediating role of brand trust and actively enhance consumers' trust in the brand. Through brand information disclosure, brand owners can maintain a relatively close relationship between consumers and green brands, which could also be strengthened through brand activities, both being effective ways to win back the consumers. In addition, brand after-sales service is also an effective way to build brand trust. Meanwhile, the Internet and social media are becoming more convenient in today's transparent world, and small- and medium-sized businesses seeking to promote brand authenticity face significant obstacles. The current study model will assist policymakers in comprehending the fundamental relationship between the constructs and in developing policies appropriately to gain a competitive advantage. Based on the research findings, the green brand managers should not treat consumers with different self-concept consistency in the same way. For consumers with high self-concept consistency, a sound brand relationship should be maintained. Consumers with low self-concept consistency need to enhance brand authenticity, increase brand experience, and actively promote brand interaction. The results show that green brand authenticity has a positive impact on consumers' eWOM intention. The manager should fully leverage the advantages of eWOM as an emerging force. That said, viral marketing must serve as an essential component of eWOM to gain greater exposure.

Limitations and Future Prospects

This study offers some limitations and future research directions for researchers. First, the nature of this study was cross-sectional, and data were gathered from Chinese consumers using an online source of medium with small sample size. We suggest future research could take green brand authenticity and eWOM intention using longitudinal research design in Western samples to confirm the generalizability of the model. Second, while this work focuses on green brand authenticity and customer perceptions and confidence in various brands vary significantly, future research should shed additional light on various types of brands. Third, this study exclusively discusses the eWOM intentions, with no consideration given to offline WOM. It is also possible to consider the disparities in time and location between online and offline WOM and the differences in interpersonal intimacy between the two. Finally, this study has the potential to examine the usage of green branding for fraud, which may be covered in further research in the future.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

YX: conceptualization, software, and writing—original draft preparation. YX and FS: methodology. JD and FS: validation. YX and XL: formal analysis and data curation. FS and XL: writing—review and editing. FS: visualization. JD: supervision, project administration, and funding acquisition. All authors have read and agreed to the published version of the manuscript.

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Exploring the Relationship Between Visual Aesthetics and Social Commerce Through Visual Information Adoption Unimodel

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The visual revolution and attention economy of the digital world have put visual aesthetic communication into the primary position of social media marketing. However, this phenomenon remains underexplored within social commerce research. This study thus develops a visual information adoption unimodel (VIAUM), to explore the relationship between visual aesthetics and social commerce intentions. Users with social commerce experience are invited to complete our online survey, and 321 valid data are collected. The results reveal that visual aesthetics has direct and indirect (*via* perceived usefulness) effects on the social commerce intention of users. Besides, interdependent self-construal (InterSC) strengthens the direct effect between visual aesthetics and social commerce intention. In contrast, independent self-construal weakens the mediation effects of perceived usefulness. This study is among the first attempts to empirically examine the intervening mechanism and boundary conditions between the visual aesthetics of self-presentation of micro-celebrity and the social commerce intention of consumers.

Keywords: social commerce, visual aesthetics, visual communication, micro-celebrity, self-construal, visual information adoption unimodel

INTRODUCTION

With the advancement of digital technology and the ubiquity of social networking, social commerce has emerged as a trendy business model of e-commerce (Liang and Turban, 2011; Chen and Shen, 2015; Busalim and Hussin, 2016). By integrating social media tools and web 2.0 into e-commerce, social commerce enables users to share commercial-related information with/from peer users online (Chen and Shen, 2015; Busalim and Hussin, 2016; Han et al., 2018), and thus is also known as "referral economy" (Wang and Zhang, 2012). Recently, the prevalence of visual-oriented social media platforms, such as Instagram, Facebook, and TikTok, has made visual information the dominant form of online communication over verbal information (Wang and Zhang, 2012; Schroeder, 2013). Meanwhile, the visual-mediated environment also raises attention distraction and choice overload challenges for social commerce business (Townsend and Kahn, 2014; Kusumasondjaja, 2019). In such a condition, catching "eyeballs" and strategically presenting visual information become the keys to the success of social commerce (Schroeder, 2004; García-Rapp, 2017; Aljukhadar et al., 2020).

Individuals usually adopt a set of attention-getting techniques for self-presentation and strategic communication (Marwick, 2015; Djafarova and Trofimenko, 2019), among which visual aesthetics is of top priority (Kusumasondjaja, 2019). Visual aesthetics refers to the aesthetic style of self-presentations embedded in visual communication strategies of the presenter and the extent to which other users perceive these presentations to be visually appealing and aesthetically impressive (Sanchez-Franco and Rondan-Cataluña, 2010; Liu et al., 2013). The significant role of visual aesthetics of websites has been widely discussed in the e-commerce context (Harris and Goode, 2010; Liu et al., 2013; Lorenzo-Romero et al., 2013). However, unlike traditional e-commerce that largely relies on system features to enhance shopping efficiency, social commerce prioritizes the power of user-generated content to drive commercial performance (Chen and Shen, 2015; Busalim and Hussin, 2016; Han et al., 2018). Since individuals control these social media contents, the visual aesthetics of the content results from the deliberate self-presentation of the individuals (Djafarova and Trofimenko, 2019). As such, it is the visual aesthetics of self-presentation of individuals rather than that of the web system that should be underscored in a social commerce context. Furthermore, in the lens of social information, visual aesthetics is a "bearer of meaning" that embodies the engaging lifestyle and unique tastes of presenters (Marwick, 2015; Brydges and Sjöholm, 2019; Leaver et al., 2020, p. 55). In other words, visual aesthetics can serve as a critical visual communication strategy that attracts attention and conveys meaningful information (Schroeder, 2011; Marwick, 2015; Aljukhadar et al., 2020; Leaver et al., 2020). However, despite its significance, little empirical research has examined how visual aesthetics works on the decision-making of consumers, especially in a social commerce context. This study, thus, aims to fill this gap by investigating the relationship between visual aesthetic presentations and social commerce intentions.

Based on the existing literature on visual heuristics, information adoption, and the single-route persuasion model, this study develops a visual information adoption unimodel (VIAUM), specifying visual aesthetics of the visual aesthetics of self-presentation of micro-celebrity as the antecedent, perceived usefulness as the mediator, and self-construal as the boundary condition, to understand how visual aesthetics works on social commerce intention. The present research expects to contribute the literature from three perspectives. First, focusing on the visual presentations of micro-celebrities, we demonstrate that a visual aesthetic self-presentation strategy is effective in social commerce marketing. Micro-celebrities are online users who achieve status as opinion leaders and can affect other behaviors and decision-making of users due to their attractive and influential posts (Djafarova and Trofimenko, 2019; Jin et al., 2019; Al-Emadi and Ben Yahia, 2020). Accordingly, focusing on user-generated from micro-celebrities provides us a better perspective to understand the impact of social information on social commerce platforms. Besides, existing literature suggests that the rise of micro-celebrities is primarily due to the increasing popularity in the practice of visual self-presentation (Schroeder, 2011; Marwick, 2015; Djafarova and Trofimenko, 2019). Micro-celebrities usually conduct various elaborate and aesthetic appealing tactics for self-presentations to accumulate their follower base and get commercial rewards from the "advertorials" of product and service (Abidin, 2016; Pedroni, 2017; Giles and Edwards, 2018). Therefore, working on visual aesthetic strategies of micro-celebrities is conducive to acquiring in-depth knowledge about strategic visual communication in social commerce.

Second, this study introduces perceived usefulness as the mediator between visual aesthetics and social commerce intention. Past research focuses mainly on physical attractiveness as a source characteristic for the visual effects of micro-celebrities (Chu and Kamal, 2008; Lee and Watkins, 2016; Sokolova and Kefi, 2020). From this perspective, visual aesthetics was thus seen as a content-irrelevant peripheral cue for persuasion (Sussman and Siegal, 2003). Besides, regarding the impact on consumer behaviors, most of these studies stressed the emotional functions of visual aesthetics of micro-celebrities, such as parasocial interaction (Lee and Watkins, 2016; Sokolova and Kefi, 2020) and attachment (Ki et al., 2020). However, the visual presentation is usually the composite of images and words or spoken languages, making it hard to distinguish between the central argument and source information (Couper et al., 2007). For instance, a visual presentation showcasing micro-celebrity wearing garments or experiencing certain services can provide aesthetic experience in parallel with product/service-related information. Accordingly, inconsistent with the visual communication literature (Schroeder, 2004; Harris, 2006; Couper et al., 2007; Simmonds et al., 2020), this study regards visual aesthetics as a source of information that combines aesthetic experience with valuable messages. In the established persuasion theories, the perceived usefulness of the information is a determinant factor in information adoption behaviors of receivers (Sussman and Siegal, 2003; Mudambi and Schuff, 2010). Therefore, our research examines the utilitarian function of visual aesthetics on social commerce intention *via* an intervening mechanism of perceived usefulness.

Finally, we tried to understand the effectiveness of visual aesthetic communication by relating self-construal to the depth of processing and capacity regarding visual information. As human behavior is formulated by the complex interaction of external incentives and individual factors, visual information adoption behaviors would vary between recipients (Singelis, 1994; Tsai, 2007; Braun et al., 2013; Hu et al., 2016). Self-construal is a remarkable discriminator influencing consumer responses to various marketing stimuli (Tsai, 2007; Hu et al., 2016; Aljukhadar et al., 2017; Haberstroh et al., 2018). It refers to the definition of self and structure of self-schema of an individual in relation to the surroundings (Markus and Kitayama, 1991; Ahluwalia, 2008; Aljukhadar et al., 2017). Individuals with independent self-construal (IndSC) view themselves as individuated entities distinct from others who value uniqueness and internal attributes. People with interdependent self-construal (InterSC), in contrast, hold a more socially embedded self-view that emphasizes connectedness, social contexts, and interpersonal relationships (Markus and Kitayama, 1991; Haberstroh et al., 2018). Reflecting the perceptions, evaluations, and behaviors of the individuals regarding the relationship of the self to

the contexts (Markus and Kitayama, 1991), self-construal has been used to explain differences of the individuals in attention, perception, and interpretation of visual information (Cross et al., 2011; Han and Humphreys, 2016; Haberstroh et al., 2018). Hence, we examined the boundary condition of direct and indirect influences of visual aesthetics on social commerce intention by taking self-construal as the moderator.

THEORY AND HYPOTHESES DEVELOPMENT

Theoretical Model

Visual Aesthetics as a Visual Heuristic

Recent literature on heuristic decision-making has put forward a new theoretical perspective for visual communication (Harris, 2006; Gigerenzer and Gaissmaier, 2011; Toepoel and Dillman, 2011; Townsend and Kahn, 2014; Berube, 2019). Heuristics is known as "efficient cognitive processes" or "mental shortcuts," which involve the advantages of effort reduction and/or attribute substitution (Gigerenzer and Gaissmaier, 2011; Berube, 2019). Pieces of research point out that the human brain processes visual depiction profoundly faster than verbal and textual stimulus (Townsend and Kahn, 2014; Seifert and Chattaraman, 2020). Besides, visual presentations are verified to be more memorable and more directly connected to meaning than verbal depiction (Townsend and Kahn, 2014; Marwick, 2015; Jin and Ryu, 2019). In addition, following the principle of "bounded rationality" (Simon, 1955), several academics indicate a "less is more" effect of simple heuristics in which heuristics is more accurate than rational models (Wübben and Wangenheim, 2008; Gigerenzer and Gaissmaier, 2011; Saab and Botelho, 2020). Visual heuristics, thus, refers to methods that make use of salient visual cues for more accessible, quicker, and/or more accurate decision-making than complex approaches (e.g., the systematic mode in ELM and the central route in HSM, Kruglanski and Thompson, 1999; Gigerenzer and Gaissmaier, 2011; Saab and Botelho, 2020).

Studies suggest that heuristic strategies are particularly applicable to "large worlds" where the environment is complex, full of uncertainty, and quick decisions are needed (Wübben and Wangenheim, 2008; Gigerenzer and Gaissmaier, 2011). Based on the logic of cognitive saving, visual heuristics is also proved to be efficient in attention-seeking under the "ephemeral but omnipresent" interactive visual ecology (Harris, 2006; Couper et al., 2007; Marwick, 2015; Zulli, 2018). Social commerce involves a business environment of information saturation and content overload (Marwick, 2015; Kusumasondjaja, 2019), where cognitive limitations exist in terms of recognizing all relevant knowledge (Gigerenzer and Gaissmaier, 2011), and thus attentions become scarce and elusive resources to obtain (Zulli, 2018). Besides, Pallak et al. (1983) suggest that a visual-oriented environment encourages heuristic processing for information judgments. This tendency is also confirmed in recent social-media literature in which visual contents are found to be more welcoming than written texts among online users (Townsend and Kahn, 2014; Marwick, 2015; Kádeková and Holienčinová, 2018). In short, visual heuristics should be critical strategic communication tools in the context of social commerce.

The impression of visual aesthetics results from the innate visceral response of an individual that hardly requires cognitive effort to make a judgment (Lorenzo-Romero et al., 2013; Palmer and Peterson, 2016). Evidence shows that visual aesthetics can generate a first impression of a website (Lorenzo-Romero et al., 2013), or that of an individual (Stockemer and Praino, 2017), within 100 ms of exposure. Meanwhile, existing literature indicates that visual aesthetics generates a halo effect that increases the overall evaluation of the targets, known as "attractiveness premium" (Lucker et al., 1981; Palmer and Peterson, 2016). Past studies have confirmed visual aesthetics as a practical heuristic shortcut in influencing attitudes and behaviors of individuals, especially in "low information rationality" environments like political elections (Palmer and Peterson, 2016; Stockemer and Praino, 2017) and online markets (Phelan et al., 2011; Bhandari et al., 2019).

Visual Information Adoption Unimodel

The information adoption model (IAM, Sussman and Siegal, 2003) is an appropriate theoretical framework to explore the persuasive mechanism of visual information in social commerce environments (Chung et al., 2015; Erkan and Evans, 2016; Tapanainen et al., 2021). Information adoption model explains an informational influence process in which information adoption intentions of individuals are based on their perceived information usefulness influenced by information argument and source credibility (Sussman and Siegal, 2003). Peripheral cues, such as visual aesthetics, are treated as content-independent information from external sources whose persuasive power is believed to be less critical than argument messages when forming evaluations (Kruglanski and Thompson, 1999; Sussman and Siegal, 2003). Nevertheless, we suggest that IAM is not fully applicable to visual communication for the following reasons.

First, the original IAM is conducted in a text-based media where peripheral cues cannot reflect the message itself (Sussman and Siegal, 2003). In a visual-based context (e.g., social commerce); however, things may be complicated. Visual language is "the integration of words, images, and shapes into a single communication unit" (Horn, 1998, p. 8). Visual heuristics thus is seldom viewed in isolation from contents (Harris, 2006; Couper et al., 2007). For example, visual presentations of micro-celebrities usually include relevant product attributes in parallel with the showcase of themselves in the form of he/she who is wearing the products or experiencing the services (McQuarrie et al., 2013; Jin and Ryu, 2019). Therefore, peripheral cues from external sources can also be information-relevant. In some cases, visual aesthetics is even considered as the most essential "hardware" (i.e., central arguments) for a product or service (McFarlane and Samsioe, 2020). For instance, individuals may find a visual aesthetic presentation of a micro-celebrity as inspiring information that provides helpful aesthetic style advice such as outfitting matching and wearing effects (McCormick and Livett, 2012). Customers thus would rely on source attributes such as visual styles and physical attractiveness for the diagnostic evaluations of products or services (Yang et al., 2010; Schroeder, 2013; Schnurr et al., 2017). In other words, there is no absolute dichotomy between visual heuristics and message arguments

as suggested in dual-route models (Kruglanski and Thompson, 1999).

For these reasons, we suggest that a unimodel of IAM may be more suitable for the present study. Unimodel is a single-route persuasion model developed upon lay epistemic theory (LET) that demonstrates the process of reasoning from evidence to conclusion depended on motivation and cognitive capacity (Kruglanski and Thompson, 1999). Unimodel regards both heuristics and message arguments as equivalent-functional evidence to make evaluative inferences, making no distinct processes of information types (Kruglanski and Thompson, 1999). Instead, it allows an in-depth and extensive discussion about the "cognitive responses to persuasion" rooted in motivation and cognitive abilities (Kruglanski and Thompson, 1999). In short, unimodel holds a fundamental belief that the motivation and cognitive abilities of individuals rather than the information type will differ the persuasive results.

In conclusion, by integrating visual heuristic theories (Harris, 2006; Gigerenzer and Gaissmaier, 2011; Berube, 2019), IAM (Sussman and Siegal, 2003), and persuasive unimodel (Kruglanski and Thompson, 1999), we construct a VIAUM in an effort to provide a new framework for understanding the visual communication in a social commerce environment. Primarily, we take visual aesthetics—a predominant visual heuristic strategy—as inferential evidence (information) that will work on information adoption behaviors of individuals through the intervening effect of perceived usefulness. Kruglanski and Thompson (1999) indicate that motivation and cognitive capacity of the individuals would exert different cognitive responses to persuasion and thus influences the judgment formation process. Self-construal is a self-related concept that reflects the differences of the individuals in motivation and cognitive styles (Cross et al., 2011; Liu et al., 2015; Cheek and Norem, 2017). As such, we assume that self-construal may play as a moderator in our proposed framework that will make a significant difference in persuasion effects. Moreover, visual aesthetics will exert preferential choices in addition to cognition and interpretations (Schroeder, 2004; Townsend and Kahn, 2014). Gigerenzer and Gaissmaier (2011) indicate that inferences and preferences of visual heuristics are usually embedded in identical cognitive processes. Thus, we infer that visual aesthetics will also drive a direct effect on information adoption due to a process of preferential choice (Gigerenzer and Gaissmaier, 2011; Townsend and Kahn, 2014). Besides, scholars suggest that rational trade-offs and capacity limitations will activate visual heuristics for decision-making (Gigerenzer and Gaissmaier, 2011), which implies a possible moderating effect of motivations and cognitive abilities between visual aesthetics and information adoption intentions.

Moreover, individuals usually engage in information-seeking and obtaining activities for better purchasing decisions on social commerce platforms (Busalim and Hussin, 2016; Han et al., 2018). Social commerce involves receiving shopping information and products on social networking sites to support purchasing decisions (Hajli and Sims, 2015; Horng and Wu, 2020). Moreover, by applying commercial functions to social networking sites, social commerce also implies engaging in direct transactions on social commerce platforms (Hajli, 2013; Fu et al., 2019). In sum, referring to the willingness to accept the recommendation or engage in direct trading on the social commerce platform, social commerce intention is then used as a replacement of information adoption to fit in the context of social commerce. Our integrated theoretical model is thus presented in **Figure 1**.

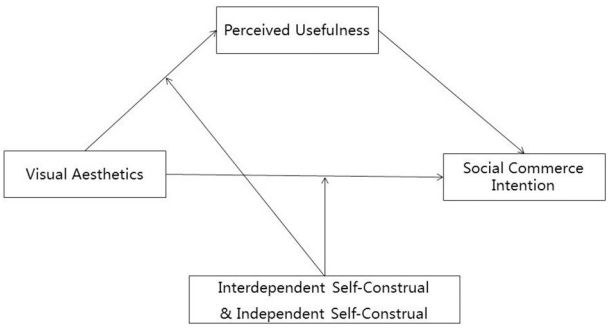


FIGURE 1 | Visual information adoption unimodel (VIAUM) in the context of social commerce.

Hypotheses Development

Visual Aesthetics and Social Commerce Intention

In the practice of micro-celebrity, visual aesthetics usually refers to a kind of self-presentation strategy that involves a careful and elaborate aesthetic design of visual presentations (e.g., plog, vlog, and livestreaming) to attract attention, convey meanings as well as obtain commercial rewards (Schroeder, 2004; Marwick, 2015; Zulli, 2018; Brydges and Sjöholm, 2019; Jin and Ryu, 2019; Leaver et al., 2020). It encourages the use of aesthetic tactics (such as filters, Photoshop, and beauty devices) to share product/service-related information or embed commercial messages into the display of attractive appearances and aspirational visions of life (Schroeder, 2004, 2011; Brydges and Sjöholm, 2019; Jin and Ryu, 2019; Leaver et al., 2020). To be noticed, we consider the physical attractiveness of micro-celebrities as a component of their visual-presentation strategies instead of merely a preordained source attribute (as discussed in source credibility models). With this regard, the physical attractiveness indicates carefully crafted body efforts of micro-celebrities that thus embodied a taste or aesthetic style with a judgmental power (McQuarrie et al., 2013; Abidin, 2016; Jin and Ryu, 2019; Ki and Kim, 2019).

Past studies suggest that visual aesthetics of websites is the "decisive trigger" for social media engagement of consumers (Greussing and Boomgaarden, 2019).Visual aesthetics can contribute to the overall evaluations of interfaces (Phelan et al., 2011; Lorenzo-Romero et al., 2013; Greussing and Boomgaarden, 2019), impulsive purchase intentions (Liu et al., 2013; Park et al., 2015), and online purchase intentions (Schnurr et al., 2017). Meanwhile, literature on influencer marketing has suggested that the visual aesthetics of self-presentations are the main drivers to draw attention and the perquisites of users of being influential on the social media platforms for micro-celebrities

(Marwick, 2015; Djafarova and Trofimenko, 2019; Ki and Kim, 2019). When consumers find self-presentation of a micro-celebrity visually attractive, they will follow him or her and exert approach behaviors (Haberstroh et al., 2018). Besides, past research indicates that attractive salespeople positively impact the products associated with them and thus increase purchase intention of consumers (Ahearne et al., 1999). Besides, as a type of visual heuristics, visual aesthetics will also activate shortcut judgment of consumers and thus prompt consumers to make quick and intuitive decisions, especially in an information-rich but uncertain social commerce environment (Gigerenzer and Gaissmaier, 2011; Wang and Zhang, 2012; Berube, 2019; Ishfaq et al., 2020). Hence, we predict that:

H1: visual aesthetics is positively related to social commerce intention.

The Mediating Role of Perceived Usefulness

Perceived usefulness refers to the extent to which individuals regard the information as beneficial for their tasks (Sussman and Siegal, 2003, p. 49). It is a critical information diagnostic indicator in the decision-making of people (Mudambi and Schuff, 2010). The relationship between aesthetics and usability has been confirmed in the field of information systems (Tractinsky et al., 2000; Sanchez-Franco and Rondan-Cataluña, 2010; Longstreet et al., 2021). Based on the "Gestalt" approach, theorists suggest that individuals intend to organize different elements of a visual presentation together to make an overall judgment as well as the associated inference from one another (Tonder and Van Spehar, 2013; Park et al., 2015; Bhandari et al., 2019). Consequently, a good impression of visual aesthetics will result in a favorable inference on other attributes of the whole visual presentation, such as the usability of websites (Sanchez-Franco and Rondan-Cataluña, 2010; Longstreet et al., 2021). Meanwhile, Coursaris and Van Osch (2016) and Wang et al. (2019) claim that visual aesthetics can reduce cognitive load and thus increase the efficiency and usability of the websites. A negative aesthetic impression toward design of websites, on the other hand, hinders the cognitive elaboration process of information due to a waste of cognitive resources and thus decreases the perceptions of usefulness (Coursaris and Van Osch, 2016; Greussing and Boomgaarden, 2019). There is relatively little examination of the utilitarian function of visual aesthetics in the field of influencer marketing. However, qualitative studies suggest that consumers did take micro-celebrities' visual aesthetics as practical style advice that provides them inspiration and information for better grips with products when considering a purchase (McCormick and Livett, 2012; Djafarova and Trofimenko, 2019).

Perceived usefulness is a critical predictor of the intentions of individuals to adopt certain information (Sussman and Siegal, 2003; Chung et al., 2015; Erkan and Evans, 2016; Tapanainen et al., 2021). For example, Chung et al. (2015) indicate that the perception of usefulness of UGCs affects adoption intentions of users for online travel information. Erkan and Evans (2016) prove that a positive e-WOM increases purchase intention of consumers through the perception of information usefulness. Tapanainen et al. (2021), recently, have also found evidence between perceived usefulness and information adoption behaviors regarding tourism destinations. Moreover, the usefulness of information is also found to be the main reason for followership of individuals toward micro-celebrities as well as recommendation adoptions (Chen et al., 2019; Djafarova and Trofimenko, 2019). Taken together, we assume that visual aesthetics positively affects perceived usefulness, which, in turn, positively influences social commerce intentions. As such, we propose that:

H2: Perceived usefulness mediates the relationship between visual aesthetics and s-commerce intention.

The Moderating Role of Self-Construal

Self-construal refers to how individuals perceive, comprehend, and interpret themselves by the cognition of their relationship with the surroundings (Markus and Kitayama, 1991; Han and Humphreys, 2016). Based on the view of the self as related to or distinct from others, two types of self-construals are conceptualized, namely independent self-construal (IndSC) or InterSC (Markus and Kitayama, 1991). Existing literature suggests that self-construal is an essential personality pattern to explain the differences of individuals in perceptions, motivations, judgments, and behaviors (Markus and Kitayama, 1991; Cross et al., 2011; Haberstroh et al., 2018). Individuals with IndSC prefer to be distinct and unique and usually emphasize self-fulfillment and internal attributes. In contrast, people with InterSC are more relationship-dependent and thus focus on social connectedness, relationships, and contexts (Singelis, 1994; Cross et al., 2011). Accordingly, IndSC and InterSC individuals present significant differences in the cognitive and motivational process for decision-making and actions (Cross et al., 2011; Fang, 2017; Haberstroh et al., 2018). Specifically, IndSC individuals are more goal oriented and exert an analytic thinking style, focusing on the functional judgment of the task detached from its social context. In contrast, InterSC individuals are more socially sensitive and promote a holistic thinking style that makes judgments in consideration of social contexts (Konrath et al., 2009; Voyer and Franks, 2014; Cheek and Norem, 2017; Fang, 2017). Previous research indicated that self-construal will modulate the social information process and perceptual information processing of individuals (Liu et al., 2015). In short, individuals with different self-construals may process and respond to the same visual information distinctively (Hu et al., 2016), thus making a difference in the relationship between visual aesthetics and social commerce intention.

Recent studies have indicated that the different cognitive frameworks between the two types of self-construals may influence attention, priority, and response of individuals to visual information (Liddell et al., 2015; Liu et al., 2015). With an analytical cognitive style, IndSC individuals are oriented to focal objects and "make attribution and prediction with reference to internal properties of the objects" (Lin and Han, 2009), and thus perform better in local-level tasks, emphasizing decontextualized dimensions (Liddell et al., 2015). Alternatively, the holistic thinking InterSC individuals are more likely to attend to the contextual background and understand the visual information as an interconnected whole (Choi and Totten, 2012), and then are adept at handling global-level tasks (Liddell et al., 2015). Existing

literature suggests that the nature of these perceptual processing tasks will regulate attentional control mechanisms of individuals (Hedden et al., 2008; Liddell et al., 2015; Liu et al., 2015). The bias toward local processing takes more attentional efforts for IndSC individuals to perform the global task, leading to greater brain activation in this case. Likewise, active attention occurs when InterSC individuals need to deal with local tasks (Hedden et al., 2008; Liddell et al., 2015).

As aforementioned, a visual presentation is a multifunctional object that provides aesthetic experience and valuable information in parallel (Couper et al., 2007; McCormick and Livett, 2012; Djafarova and Trofimenko, 2019). It is a "gestalt-like" visual compound that will generate optimal effect from a holistic higher-level configuration, indicating the need for global-level processing (Haberstroh et al., 2018). Hence, it can infer that automatic attention toward the visual presentation may be enough for an InterSC individual to make an evaluation (Simmonds et al., 2020). That is, InterSC individuals are more likely to prime the visual heuristics for decision-making. InterSC, therefore, should moderate the direct path from visual aesthetics to social commerce intention. Besides, visual aesthetics also delivers social information involving the "aesthetic self" and social identity of a certain micro-celebrity (Djafarova and Trofimenko, 2019). InterSC individuals represent a more flexible and variable self that would adapt their behaviors to match the social contexts (Singelis, 1994; Haberstroh et al., 2018). As a result, InterSC individuals are more likely to seek similarities and assimilate with others, thus generating more willingness to mimic and adopt a visual aesthetic suggestion (Aljukhadar et al., 2017). As such, we predict that:

H3: InterSC moderates the positive influence of visual aesthetics (VA) and social commerce intention (SCI), such that the effect is stronger when InterSC is higher.

Conversely, IndSC individuals may give active attention to the visual compound to allow the cognitive processing to analyze the internal attributes against perceptual interference (Liddell et al., 2015; Simmonds et al., 2020). As such, we predict that IndSC should moderate the indirect path through perceived usefulness. Besides, scholars suggest that IndSC individuals are goal/performance-orientated, preferring analytic judgments based on internal attributes (Cross et al., 2011; Voyer and Franks, 2014; Fang, 2017). When viewing the micro-celebrities visual aesthetic presentations, IndSC may emphasize utilitarian aspects of the information, such as style advice and the visualization of related products and services in the presentations, to support their shoppings (McCormick and Livett, 2012). With this regard, IndSC individuals may confront more perceptual conflicts between the target and interference in this kind of composite information (Liddell et al., 2015). As a result, more cognitive resources would require to deal with the visual aesthetics information that may decrease the perception of information usefulness. Moreover, IndSC individuals are self-determined, egocentric, and decontextualized. They would direct their behaviors and responses according to their inner feelings without being influenced by any surroundings (Millan and Reynolds, 2014; Fang, 2017). Accordingly, they may be less likely to take further actions by a descending perception of usefulness. Consequently, we indicate that:

H4a: IndSC weakens the positive effect of visual aesthetics on perceived usefulness (PU), such that the positive relationship between VA and PU is weaker when IndSC is higher.

H4b: IndSC negatively moderates the mediation effect of PU between VA and SCI, such that a higher IndSC leads to a weaker mediation effect of PU.

Data Collection and Sample

We designed an online survey, including all the constructs in our proposed model and other demographic variables in the questionnaire. We focused on the Chinese market in that China is reported as one of the largest s-commerce markets in the world (Kemp, 2020). The survey was conducted through a professional survey platform (https://wj.qq.com). Then, we posted a URL of our questionnaire through "Circle of Friends" and "Group Chat" on the Wechat platform to encourage people to participate in our research as much as possible. In order to ensure the respondents are experienced with the concept of "social commerce," we only collected data from those who had used social commerce platforms in the past 6 months.

Furthermore, we also put two simple logical questions in our survey to ensure that the respondents were conscientiously filling the survey. In exchange, we provided a ¥3 gift certificate for those who fully and responsibly completed the questionnaire. Finally, there were a total of 321 valid questionnaires we collected to be analyzed. About 70% of our respondents were females, and 58.6% of the participants were between 18 and 25 years old. Moreover, most of them (78.8%) had a bachelor's degree or above, and almost 44.2% got paid less than ¥2,000 monthly.

Measures

All the constructs in our hypotheses were adapted from prior research with some fine-tuning to fit the social commerce context. In particular, the measures of visual aesthetics of self-presentations of micro-celebrity were modified from Park et al. (2015) and Chen et al. (2019). As perceived, usefulness was a mature construct but examined under a relatively new area; we chose to include both classic items from Davis (1989) and trendy items from Xiang et al. (2016) for our measurement. Items for social commerce intention were modified from Horng and Wu (2020). Lastly, self-construal items were adopted from Hofmann et al. (2021) and Singelis (1994). All the items were measured on a seven-point Likert Scale, ranging from 1 (strongly disagree) to 7 (strongly agree).

Statistical Analysis

SPSS26.0, AMOS23.0, and Hayes' PROCESS for SPSS were used for data analysis. Firstly, Cronbach's alpha tested in SPSS 26.0 was used to examine the reliability of our measurement. Values of Cronbach's α were all above the standard of 0.7 (see **Table 1**; Hair et al., 2010). Then, a confirmatory factor analysis (CFA) was conducted in AMOS 23.0 to check the convergent and discriminant validity of the proposed model. Followed by this, the PROCESS for SPSS (Model 4) was used to test the direct effect of the visual aesthetics on social commerce intention and their indirect effect *via* perceived usefulness (Hayes, 2018). Finally, Model 8 of the PROCESS macro was used to examine the moderated mediation effect of the proposed hypotheses

based on the regression bootstrapping method [5,000 bootstrap samples to estimate 95% confidence interval (CI); Hayes, 2018]. CIs excluding zero suggested the significance of indirect effects (Hayes, 2018).

RESULTS

Measurement Model

We used a CFA to test our measurement model composed of visual aesthetics, perceived usefulness, and social commerce intention. The results of fit indices suggest that the model has a good fit with the data (chi-square/df = 2.074 <3, AGFI = 0.937 >0.9, GFI = 0.966 >0.9, RMSEA = 0.058 <0.08 and the SRMR = 0.0293 <0.05, Hooper et al., 2008). The examinations of factor loadings (>0.5, Hair et al., 2010), composite reliability (CR, 0.836–0.910 >0.6), and average variance extraction (AVE, 0.562–0.772 >0.5) are presented in **Table 1**, which demonstrate a satisfactory level of convergent validity (Fornell and Larcker, 1981). Moreover, as suggested by Fornell and Larcker (1981), the values of AVE square root should surpass their inter-construct correlations to prove the discriminant validity of the model. The results providing evidence of high-convergent validity are presented in **Table 2**, along with means and SDs.

Direct and Indirect Effects

We used a two-step examination for the structural model. In the first step, we conducted a simple linear regression analysis in SPSS 26.0 to examine the relationship of factors with social commerce intention. The proposed model has explained 54.3% of the variance in s-commerce intention within a middle level (Hair et al., 2010). Visual aesthetics is significantly related to social commerce intention (B = 0.190, p < 0.005), thus supporting H1. Meanwhile, perceived usefulness is significantly related to social commerce intention (B = 0.688, p < 0.001). Then, a further mediation effect can be examined. In the next step, Hayes (2018) Model 4 was used to examine whether the mediation effect of perceived usefulness exists between visual aesthetics and social commerce intention. As shown in **Table 3**, the bootstrapping results indicate that the indirect effect of visual aesthetics (VA) on s-commerce intention (SCI) through perceived usefulness (PU) is significant (direct effect: B = 0.190, p <0.005, 95% CI, excluding zero; indirect effect: B = 0.433, p < 0.001, 95% CI, excluding zero). Therefore, H2 is supported.

The Moderated Mediation Effect

Hayes (2018) Model 8 was applied to examine the moderating role of InterSC between VA and SCI (H3), the conditional effect of IndSC between VA and PU (H4), and the moderated mediation effect in which IndSC moderates the mediation effect of PU on the relationship between VA and SCI (H5). InterSC and IndSC were used as moderators to run Model 8 separately and finally got all the hypotheses tests regarding conditional effects. The results are all presented in **Table 4**.

The results reveal that the interaction effect of VA × InterSCon SCI is significant (B = 0.055, p < 0.05, 95% CI, excluding zero), showing that InterSC moderates the positive relationship between VA and SCI. Aiken and West (1991) suggested that the interaction effects are plotted at ± 1 SD from the mean of InterSC (**Figure 2**). A simple slope test examines the strength of the relationship between VA and SCI at different (high/low) levels of InterSC. The results indicate that the conditional direct effect of VA on SCI is not significant when InterSC is low (B = 0.087, p > 0.05, 95% CI, including zero). In contrast, the conditional direct effect of VA on SCI is significant and strong (B = 0.211, p < 0.005, 95% CI, excluding zero) at a high InterSC level. H3 thus is supported.

The interaction effect of VA × IndSC on PU is significant (B = −0.073, p < 0.05, 95% CI, excluding zero), showing that IndSC negatively moderates the positive effect of VA on PU. Following the approach of Aiken and West (1991), these interactions are plotted at ± 1 SD from the mean of IndSC (**Figure 3**). The simple slope approach is used to test the strength of the relationship between VA and PU at different levels (high/low) of IndSC. The results reveal that the VA-PU relationship is strong (B = 0.478, p < 0.001, 95% CI, excluding zero) when IndSC is at a low level, while the relationship is weak (B = 0.321, p < 0.001, 95% CI, excluding zero) when IndSC is at a high level. Thus, H4a is proved. The results depict that IndSC moderates the indirect relationship between VA and SCI *via* PU (bootstrap estimate = −0.045, bias-corrected CI, excluding zero). As shown in **Table 4**, the conditional indirect effect (*via* PU) of VA on SCI is weaker (bootstrap estimate = 0.198, bias-corrected CI, including zero) at a high level of IndSC (+1 SD) than that at a low level of IndSC (−1 SD) (bootstrap estimate = 0.295, bias-corrected CI, including zero). Hence, H4b is supported.

DISCUSSION

Micro-celebrities play a significant role in the social commerce economy by encouraging the participant and purchasing behaviors of online consumers (Kádeková and Holienčinová, 2018; SanMiguel and Sádaba, 2018). The rise of visual-oriented platforms further enlarges the influence of micro-celebrities by providing them opportunities to aesthetically design and present themselves (Djafarova and Trofimenko, 2019; Jin et al., 2019), which is helpful for attention-attraction and follower-accumulation (Leaver et al., 2020; Djafarova and Bowes, 2021). In an era of "attention is profitable," visual aesthetics is probably more important than competence or expertise for micro-celebrities popularity (Marwick, 2015). The present study, thus, provides the first attempt to empirically examine the relationship between the visual aesthetics of self-presentation and social commerce intentions of micro-celebrities with the discussions about the direct effect, intervene mechanism, and boundary conditions between them.

Our empirical findings confirm the significant role of visual aesthetic presentations in the context of social commerce. Drawn on visual heuristic theory and VIAUM, the present outcomes depict that visual aesthetics has a positive direct relationship with social commerce intention (H1) and a positive indirect influence *via* perceived usefulness (H2). We suggest that visual aesthetics can be an effective visual heuristics as a "preference" for quick and intuitive choices (Townsend and

TABLE 1 | Main variable measurement items, reliability, and factor loadings.

Construct Items		Factor loading	CR	AVE	α	Source
Visual aesthetics (VA)			**0.876**	**0.703**	**0.875**	Park et al., 2015; Chen et al., 2019
VA1	The visual presentation of the micro-celebrity is visually appeal	0.850				
VA2	The way the micro-celebrity presented his/her visual contents is attractively arranged	0.878				
VA3	I am motived to watch this micro-celebrity's visual presentation for their visual aesthetics	0.784				
Perceived usefulness (PU)			**0.887**	**0.724**	**0.887**	Davis, 1989; Xiang et al., 2016
PU1	I find watch the visual presentations of the micro-celebrity useful for my purchase decision makings	0.854				
PU2	Watching the micro-celebrity's visual presentations can improve my shopping performance	0.828				
PU3	Watching the micro-celebrity's visual presentations make it easier for me to make purchase decisions	0.870				
Social commerce intention (SCI)			**0.910**	**0.772**	**0.909**	Horng and Wu, 2020
SCI1	I will consider the recommendations of the micro-celebrity when I want to shop.	0.858				
SCI2	I am willing to buy products recommended by this micro-celebrity	0.922				
SCI3	I will ask the micro-celebrity to provide me with their suggestions before I go shopping	0.854				
Interdependent self-construal (InterSC)			**0.836**	**0.562**	**0.836**	Singelis, 1994; Hofmann et al., 2021
InterSC1	It is important for me to maintain harmony within my group	0.712				
InterSC2	it is important to me to respect decisions made by the group	0.778				
InterSC3	I often have the feeling that my relationships with others are more important than my own accomplishments	0.798				
InterSC4	I have respect for the authority figures with whom I interact	0.706				
Independent Self-Construal (IndSC)			**0.849**	**0.588**	**0.845**	
IndSC1	Having a lively imagination is important to me	0.810				
IndSC2	My personal identity independent of others is very important to me	0.871				
IndSC3	I enjoy being unique and different from others in many respects	0.722				
IndSC4	Being able to take care of myself is a primary concern for me	0.644				

Kahn, 2014; Greussing and Boomgaarden, 2019; Ishfaq et al., 2020). Besides, it can also serve as a practical "inference" for rational judgment, which leads to better decision-making (Mahon-Haft and Dillman, 2010; Gigerenzer and Gaissmaier, 2011; Coursaris and Van Osch, 2016). The mediation mechanism of perceived usefulness found in the study clarifies how visual aesthetics information can effectively communicate to consumers and consequently influence their social commerce behaviors. Moreover, our findings reveal that self-construal makes a significant difference in the persuasion effects of visual aesthetics on social commerce intention. The results show that InterSC strengthens the positive relationship between visual aesthetics

TABLE 2 | Discriminant validity of the constructs, mean, and standard deviation.

	Mean	SD	SCI	PU	VA
Social commerce intention	4.706	1.340	**0.879**		
Perceived usefulness	4.900	1.217	0.807	**0.851**	
Visual aesthetics	4.779	1.172	0.613	0.680	**0.838**

SD is Standard deviation, while bold numbers are the square root of the average variance extracted.

TABLE 3 | Mediation results—the indirect effect of VA on SCI *via* PU (PROCESS model 4, 95% CI).

Effect	B	SE	t	p	LLCI	ULCI
Total effect: VA→ SCI	0.623	0.054	11.606	0.000	0.518	0.729
Direct effect: VA→ PU	0.630	0.046	13.625	0.000	0.539	0.721
PU→ SCI	0.688	0.052	13.101	0.000	0.584	0.791
VA→ SCI	0.190	0.055	3.486	0.001	0.083	0.297
Indirect effect	**B**	**SE**	**Z**	**P**	**BootLLCI**	**BootULCI**
VA→ PU→ SCI	0.433	0.046	9.430	0.000	0.312	0.570

N = 321. B, Unstandardized regression coefficients; LL, Lower limit; CI, Confidence interval; UL, Upper limit; Boot, Bootstrap (sample = 5, 000).

and social commerce intention (H3), while IndSC weakens this relationship by decreasing the perceived usefulness (H4a, H4b). This finding is in accord with the self-construal research in which InterSC and IndSC individuals are proved distinct in cognitive-perceptual styles. With a holistic and context-dependent cognitive style, InterSC individuals will rely more on contextual information than those IndSC people with an analytic and decontextualized cognitive style when making decisions (Lin et al., 2008; Cross et al., 2011; Liu et al., 2015). As InterSC individuals are biased in local processing, visual aesthetic presentations containing an implication of aesthetic advice or product-related visualization will exert active attention of IndSC individuals to diagnose the visual cues for rational decisions (Liddell et al., 2015; Simmonds et al., 2020). Consequently, as more attentional resources and cognitive efforts are required to process it, the perceived usefulness of visual aesthetics decreases, and then social commerce intention follows for IndSC individuals (Liddell et al., 2015; Fang, 2017).

In short, this study suggests that visual aesthetics is an effective self-presentation strategy that will encourage the social commerce intention of online consumers. Previous studies announced that the visual aesthetics of salespeople or micro-celebrities cannot directly influence the purchase decisions of consumers (Ahearne et al., 1999; Djafarova and Trofimenko, 2019). Conversely, based on heuristic theory, our empirical research verifies that visual aesthetics serves as a low-resources shortcut that leads to direct decision-making. Besides, online consumers nowadays are fed up with the commercial-driven "advertorials" on social media. They perceive these ads as compelling persuasion knowledge manipulated by the brands or presenters and, therefore, would not take them as the source of information (Singh et al., 2020). In the lens of visual communication, we suggest that the visual aesthetics of self-presentation of micro-celebrity is a compound visual information that can attract attention, provide aesthetic experiences, and convey useful information. This multifunctional information is more ambiguous in promotional intentions and less compulsive (in persuasion) and thus generates a better persuasion effect than the commercial-related posts (Rietveld et al., 2020). It is worth mentioning that, although the power of visual aesthetics increases in the InterSC group, its perceived usefulness diminishes in the IndSC group and thus affects the ultimate social commerce intention. Micro-celebrities need to consider the comprehensive characteristics of the target audiences when conducting a visual aesthetics strategy. That is, they need to maintain and enhance this visual aesthetics within the followers with InterSC. Nevertheless, they should work on increasing the perceived usefulness of the IndSC followers by offering more attribute-related cues.

Theoretical Contributions

The present research contributes to the literature in at least three aspects. First, previous studies on visual aesthetics have been limited to the web-system perspectives due to the emphasis of e-commerce on maximizing efficiency (Lorenzo-Romero et al., 2013; Chen et al., 2018; Longstreet et al., 2021). We extend this study to the social commerce domain by emphasizing the visual aesthetics effects from the perspectives of visual presentations of micro-celebrities. Besides, by viewing visual aesthetic presentations as means of visual communication, intervening aesthetic experience with knowledge dissemination, we expand the scope of the visual aesthetics of micro-celebrities from physical attractiveness to strategic communication (Couper et al., 2007; Berube, 2019; Seifert and Chattaraman, 2020).

In addition, we introduce a VIAUM for the first time to explore the underlying mechanism through which visual aesthetics affects social commerce intention. By highlighting the prominent role of visual heuristics, VIAUM provides a practical and flexible framework to understand the persuasive process of contextual information in the digital world (Gigerenzer

TABLE 4 | Moderated mediation analysis—self-construal (InterSC and IndSC) moderates the direct and indirect relationship between VA and SCI (PROCESS model 8, 95% CI).

	B	se	*t*	*p*	LLCI	ULCI
Model 1: SCI as outcome						
PU	0.607	0.057	10.575	0.000	0.494	0.720
VA	0.149	0.055	2.729	0.007	0.042	0.256
InterSC	0.235	0.059	4.017	0.000	0.120	0.350
VA X InterSC	0.055	0.026	2.102	0.036	0.004	0.107
The conditional direct effect of VA on SCI at values of InterSC						
InterSC (-1 SD)	0.087	0.062	1.407	0.160	−0.034	0.208
InterSC (+1 SD)	0.211	0.063	3.370	0.001	0.088	0.335
Model 2: PU as outcome						
VA	0.399	0.046	8.732	0.000	0.309	0.489
IndSC	0.447	0.054	8.221	0.000	0.340	0.554
VA X IndSC	−0.073	0.025	−2.884	0.004	−0.122	−0.023
The conditional direct effect of VA on PU at values of IndSC						
IndSC (−1 SD)	0.478	0.054	8.869	0.000	0.372	0.584
IndSC (+1 SD)	0.321	0.053	6.093	0.000	0.217	0.424
Bootstrapping results for the indirect effect (via PU) between VA and SCI						
Index of moderated mediation	**Index**	**SE (Boot)**		**BootLLCI**	**BootULCI**	
IndSC(moderator)		−0.045	0.021		−0.092	−0.009
The conditional indirect effect of VA ON SCI via PU						
IndSC (−1 SD)		0.295	0.062		0.185	0.427
IndSC (+1 SD)		0.198	0.067		0.091	0.355

N = 321. B, unstandardized regression coefficients; LL, lower limit; CI, confidence interval; UL, upper limit; Boot, bootstrap (sample = 5,000); VA, visual aesthetics; PU, perceived usefulness; SCI, social commerce intention; InterSC, interdependent self-construal; IndSC, independent self-construal.

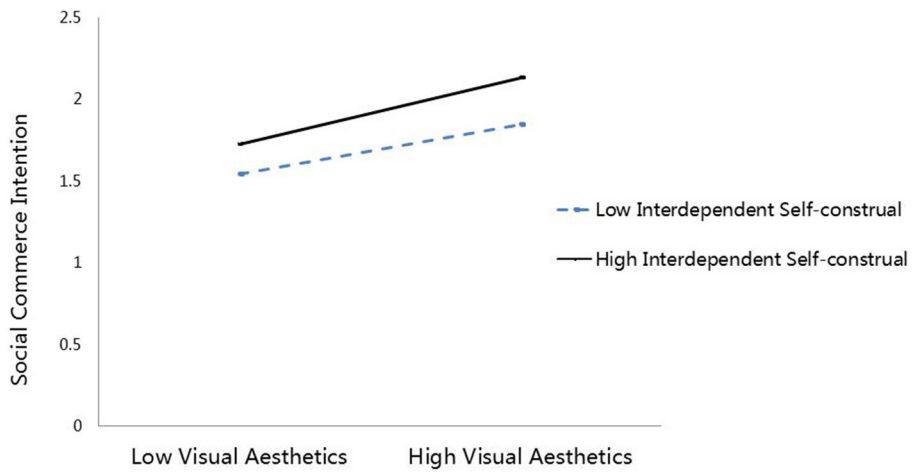


FIGURE 2 | The moderating effect of interdependent self-construal between visual aesthetics and social commerce intention.

and Gaissmaier, 2011; Saab and Botelho, 2020). Previous studies generally held a principle that central arguments usually override the judgmental influences of visual heuristics. Besides, visual aesthetics is likely to shape cognitive bias and thus drives irrational decisions (Ishfaq et al., 2020). Similarly, visual aesthetics is usually considered as mood-related cues that influence responses of consumers based on an affective system (Kim and Lennon, 2008; Phelan et al., 2011). Our VIAUM implies that visual aesthetics (as heuristics) is functionally equivalent with central arguments that provide essential evidence for cognitive inferences. Similar to the dual-code audiovisual cues, visual aesthetic presentations can elicit the automatic attention of individuals as an external stimulus and generate their internal processing as a message of implicit meaning (Simmonds et al., 2020). By confirming a reasoning mechanism (*via* perceived usefulness) between visual aesthetics and behavioral responses

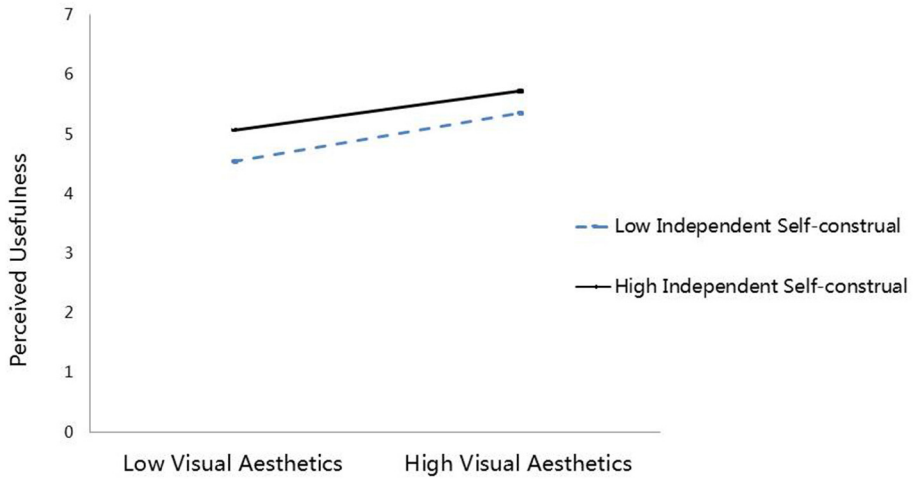


FIGURE 3 | The moderating effect of independent self-construal between visual aesthetics and perceived usefulness.

of consumers, our empirical results of VIAUM thus explain how visual information makes sense to consumers. In short, the developed and empirically validated VIAUM leads to a shift in the understanding of visual communication in the social commerce environment from the descriptive level to conceptual and explanatory levels (Wang and Zhang, 2012).

Last but not least, we innovatively incorporated self-construal to explain the differences of the individuals in visual persuasion effects. Our findings indicate that self-construct orientation of people, namely InterSC and IndSC, significantly affect direct and indirect visual aesthetics (*via* perceived usefulness) effects on social commerce intention of individuals. By focusing the persuasive process of visual information on motivation and cognitive ability rather than information types, the VIAUM framework conforms to the principle of "triadic reciprocal determinism" in which psychological cognition is regarded as a complicated process of the "triangle interaction" of contexts, individuals, and behaviors (Bandura, 1986). As such, VIAUM allows an in-depth but straightforward exploration of visual communication strategy in the context of social commerce. VIAUM, therefore, responds to the call of McNamara and Houston (McNamara and Houston, 2009, p. 673) of building "simple mechanisms that will evolve in complex environments" rather than "complex models of optimal behavior in simple environments."

Managerial Implications

Beyond our theoretical development, the present study may serve as guidance for social-commerce operators, brand managers, and micro-celebrities. First, we suggest that visual aesthetic strategy is a prerequisite for visual communication in the context of social commerce. According to our results, visual aesthetics can promote the direct social commerce intentions of consumers. Meanwhile, visual aesthetics facilitates the perceived usefulness of the visual information, encouraging consumers to take further actions regarding social commerce. In short, for business conducted in such a visually dominated environment, it is necessary to apply aesthetic skills in their visual presentations to attract attention and influence consumers for ultimate commercial ends. Besides, based on VIAUM and related theories, we suggest that visual aesthetics means more than physical attractiveness. It implies that brand managers should cooperate with micro-celebrities who can aesthetically present their contents rather than merely good-looking ones.

However, although visual aesthetics is effective in social commerce marketing, its influence varies significantly from person to person. According to our findings, the effect of visual aesthetics is more evident for people with InterSC regarding their direct social commerce intentions. Moreover, for people with independent self-construal, the role of visual aesthetic strategies in the usefulness perception and the further responses is even weakened. Therefore, we suggest that personalized visual aesthetic strategies should be implemented for consumers with different consumption demands. Specifically, for those consumers with InterSC traits, sustainable and enhanced visual aesthetics strategies are encouraged. However, for those consumers with IndSC, the visual aesthetics strategy should be carefully conducted or collocate with more attribute implications.

Limitations and Future Research Directions

This study is not without its limitations. First, most of the respondents to this research were females (70%) and university students (58.6%), limiting the generality of the results. According to Wang and Zhang (2012), women are more interested in social networks than men, making social commerce a female-dominated business. In this respect, our findings may be quite different in the male population. Besides, Kádeková and Holienčinová (2018) indicate that the social networks and visual contents are more prevalent in millennials. Alternative effects may be generated from people of different age stages. Therefore,

future research should be conducted in a larger scope of social groups to further verify the linkages between visual aesthetic communication and social commerce intentions.

Additionally, selection bias may influence our results in that the present study does not define product types. Past studies indicated that evaluations, attitudes, and decision-making of consumers vary between hedonic products and utilitarian products (Dhar and Wertenbroch, 2000; Lee et al., 2012). Especially, hedonic goods are perceived to be more meaning carrying and social expressive, while utilitarian goods are more instrumental and functional (Dhar and Wertenbroch, 2000; Lee et al., 2012). As a result, the positive interaction effect of visual aesthetics and InterSC on social commerce intention may be further strengthened by presentations with hedonic products than utilization products. On the contrary, the negative interaction effect of visual aesthetic and IndSC on perceived usefulness may be mitigated in the context of utilization-product-related presentations. At this point, there is a need for further examination.

Furthermore, the measurement of visual aesthetics in the present research is based on the overall aesthetic impression of visual presentations. Visual aesthetics may result from different visual rhetoric techniques (Schroeder, 2004; Yang et al., 2010; Leaver et al., 2020). Previous studies claim that presentation styles significantly influence product perceptions of consumers and the effectiveness of an advertisement (Yang et al., 2010). Visual presentations with multiple modalities, such as texts with pictures (Toepoel and Couper, 2011) and audio with visual images (Kusumasondjaja, 2019; Simmonds et al., 2020), will facilitate understanding and perceptions of consumers of the visual information and thus generate more positive responses than simple and plain modalities (Toepoel and Couper, 2011; Kusumasondjaja, 2019). However, Townsend and Kahn (2014) indicate that a content-rich visual presentation may cause a problem of choice overload and thus generate negative consumer responses. Especially, DeRosia and McQuarrie (2019) find that different propensity of individuals to process visual information (VisProp) will elicit different evaluations of the visual aesthetics toward a visual advertisement. For these reasons, further exploration is needed for the antecedents of visual aesthetics perceptions.

CONCLUSION

By conducting a VIAUM to examine the relationships between visual aesthetics of self-presentation of micro-celebrities and intention of consumers for social commerce, the main conclusions of the present research should be three-fold. First, we suggest that visual aesthetics will directly influence social commerce intentions of individuals. Second, an intervening mechanism confirms that visual aesthetics will indirectly affect social commerce intentions through perceived usefulness. Finally, as human behavior intentions may form from external and internal causes, this study also explores the interaction effects of visual aesthetics and self-construal of individuals on social commerce intentions. According to our findings, the positive effect of visual aesthetics on social commerce intention is more substantial for InterSC individuals. Meanwhile, people with a higher level of IndSC lead to a decreasing effect of visual aesthetics on perceived usefulness and further weaken the indirect effect between visual aesthetics and social commerce intention.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

All the authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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SUPPLEMENTARY MATERIAL

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Subtle Signals of Status on Social Network Sites: Evidence From China

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Social network sites (SNS) have been indispensable channels for people to access information, present themselves, and conduct commercial activities. Existing literature on online consumer behavior mainly focus on Western consumers and on explicit conspicuous signals. However, reports have shown that SNS users in China have exceeded 370 million, ranking the first in the world. Meanwhile, more and more consumers display status in more implicit ways nowadays. To fill these gaps, the present research was conducted to investigate the subtle signals of status for Chinese consumers on SNS. We proposed that frequent SNS posting leads to higher status perception among Chinese consumers. The psychological process of this effect is perceived busyness. These hypotheses received convergent support in a set of three studies. Study 1 used secondary data to preliminarily verify the positive correlation between SNS posting frequency and perceived social status. Studies 2A and 2B adopted the causal chain method to test the underlying mechanism of the effect, and to provide causal evidence for the entire relationship chain. Specifically, Study 2A examined how SNS posting frequency affects perceived busyness. Furthermore, Study 2B explored whether the differences in perceived busyness will affect social status perceptions. Implications of these findings and potential extensions in future are discussed.

Keywords: SNS, subtle signals, social status, perceived busyness, Chinese consumers

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INTRODUCTION

Digital network, mobile and social network sites (SNS), have become an indispensable part of the daily lives of people all over the world. In January 2021, the population of the world has reached 7.83 billion and the number of SNS users is 4.2 billion. This figure has increased by 490 million in the past year with a year-on-year increase of more than 13%. The number of SNS users now accounts for more than 53% of the global population. On an average, more than 1.3 million new users join SNS every day which means about 155,000 new users join SNS per second (Sina Finance, 2021). Surprisingly, over one in five people use SNS in the world. SNS may be the biggest communication system in the last 15 years since it enabled people to connect with others and express their views on a global scale. The number of SNS users in China has reached 1.04 billion, with a penetration rate of 72%, far higher than the global rate of 49%. According to the report "digital 2020" that was jointly released by We Are Social (2020), there are 1.04 billion SNS users in China, accounting for

a large proportion of the 3.8 billion people who use SNS around the globe. SNS users in China have increased by 15 million, and each user has an average of 9.3 accounts.

Due to the rapid development of SNS, many scholars have devoted themselves to this field. Researches have shown that SNS has been an indispensable part in the daily life of people. When people are immersed in SNS for a long time, their attitudes, behaviors, and living habits are deeply influenced by SNS (e.g., Heinonen, 2011; Bai and Hao, 2013; Yang et al., 2017; Abeza et al., 2020; Cao et al., 2021). SNS is one of the "best opportunities" for a brand to connect with potential consumers. It can make a deeper connection with consumers, gain the trust of consumers, and further guide consumer behaviors (Sajid, 2016). The research of Bellezza et al. (2017) shows that when the cultural background is different, the information conveyed to other users by SNS posting state is different. Some scholars have also found that compared with collectivist countries such as China and Thailand, individualistic countries such as the United Kingdom, the United States, and Australia are less likely to use SNS to make purchase decisions. In China and Thailand, SNS plays an important role in forming opinions (Goodrich and De Mooij, 2014). It is worth noting that current researches on online consumer behavior mainly focus on Western consumers, and the research into the characteristics of high social status users needs to be explored in the context of Chinese society.

Scholars have indicated that wealthy people present their social status by showing off their expensive luxury goods (Berger and Ward, 2010). Valsesia et al. (2020) found that under the premise of having a large number of followers, people with less followers have a positive impact on SNS users. Some scholars have also found that the subtle signals of perceived busyness on SNS can illustrate their social status. The simple self-expression on SNS has gradually been unable to satisfy users. Additionally, there is exaggerated information on the WeChat Moments of some users. An increasing number of users "show" their superiority on WeChat Moments to show their social status (Shen, 2020). Recent researches have demonstrated that users use WeChat Moments to show off their status, culture, connections, taste, etc. to further demonstrate their individual socioeconomic status, which can help them meet the personalized needs of the self-expression of the users (Shao, 2020). The majority of the current researches have to do with direct conspicuous consumption (e.g., Ordabayeva and Chandon, 2011; Wang et al., 2015; Gao et al., 2016), while lack of attention to subtle signals.

The research on conspicuous consumption has started ever since last century. Consumers can transmit the information about their social and economic status through a series of products (Ordabayeva and Chandon, 2011). Some scholars have shown that people present their social status by showing off their personal goods (Belk et al., 1982; Burroughs et al., 1991). Users with high social status usually play a guiding role on social media, that is, they can play the role of opinion leaders. Opinion leaders are individuals who convey a large amount of information on SNS and deliver the information to other users (Arndt, 1967). Individuals with high social influence or social status feel entitled to more than low-status individuals and can often influence the consumer behaviors of other people (Hu et al., 2016). The common social media marketing strategy is to identify a group of opinion leaders and let them share specific products or brands, since the products or brands shared by individuals with high social status are more likely to be trusted and accepted by the public (Saravanakumar and Sugantha Lakshmi, 2012; Valsesia et al., 2020). Existing literature on online consumer behaviors mainly put focus on Western consumers, whereas research concentrating on the characteristics of high social status users in the Chinese social context is still in its infancy. This study focuses on how the behavior of SNS users affects social status perception in the eyes of others in the context of Chinese society. We test the underlying mechanism of the effect. Furthermore, what is the psychological mechanism of the effect? Does this effect always exist? The current literature does not answer these questions.

The present research investigated the subtle signals of status for Chinese consumers on SNS. Our research mainly was concerned with the relation between SNS posting frequency and perceived social status among Chinese consumers. We proposed that frequent SNS posting leads to the higher status perception among Chinese consumers. The psychological process of this effect is perceived busyness. The user who has frequent SNS posting will be perceived as leisurely by others, which can be further inferred that they have a higher social status. These hypotheses received convergent support in both laboratory experiments and secondary data from the real situation. The present research takes the influence of cultural differences into consideration. In addition, the present research also makes a theoretical contribution to the literature on conspicuous consumption that further enriches the literature on subtle signals of status.

This research contributes greatly to the corresponding literature. Firstly, the research makes a theoretical contribution to the literature of SNS. Although previous researches have begun to study online consumer behavior (e.g., Williamson, 2010; Khan, 2017; Mieczkowski et al., 2020), this research explores the differences in SNS posting frequency to show different communication information. Users who have frequent SNS posting are often considered to spend more time on SNS, and so they are considered more at leisure. Conversely, users who have less frequent SNS posting are often considered to spend less time on SNS which means they are busier (Bellezza et al., 2017). Secondly, previous researches on online consumer behavior mainly focus on Western consumers (Williamson, 2010; Hajli, 2014; Abeza et al., 2017; Bellezza et al., 2017), while this research found that different level of busyness has different effects on social status in different cultural backgrounds. Bellezza et al. (2017) demonstrated that busy people are considered to have a higher social status in the United States. In China, we found that busy people are considered to have a lower social status than those who are comparatively less busy. This is because people must devote a lot of time to work in order to meet the basic needs of life, and so busy people have a lower social status (Li and Zhou, 2014).

Thirdly, previous researchers found that consumers can transmit the information of their social and economic status through explicit conspicuous signals (Belk et al., 1982; Burroughs et al., 1991; Ordabayeva and Chandon, 2011). An increasing number of consumers display status in more implicit ways. The

research investigates how users can efficiently use SNS to display status, in a word, how SNS users in China can improve their social status. The research has made further explorations that the busy signals released on social media platforms can play the role of a mediator. The research also explored whether the differences in perceived busyness would affect social status perceptions. Besides, a detailed study about the subtle signal show-off on emerging social media has been made, thereby refining the research topics in this field.

THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

Social Network Sites and Perceived Busyness

Social network sites are Internet applications based on the ideas and technologies of Web 2.0 (Internet 2.0). Users can use SNS for creation, emotional communication, and information sharing (Abeza et al., 2017). Some scholars also defined SNS as an online platform that allows users to create, share, and exchange information. The content carried by SNS includes texts, images, audio, and video (Mieczkowski et al., 2020). The emergence of social media is conducive for people to access information, present themselves, and conduct commercial activities (Khan, 2017). In other words, SNS uses a series of communication software for information exchange, and users can share their views and opinions on the SNS. Information transmission on SNS is based on interpersonal relationship, and SNS is an important platform for interpersonal communication (Diakopoulos and Naaman, 2011). SNS is based on a complex interpersonal network, and so organizations can seek value from consumers and other stakeholders through it (Abeza et al., 2020). Reasonable use of social media can promote interaction between consumers and enterprises thereby increasing the trust of consumers in enterprises and their intention to buy products (Hajli, 2014). SNS marketing can promote brand humanization, enhance the product experience, and loyalty of the consumer to the brand (Williamson, 2010). SNS has become a new platform for advertising marketing and it provides brands with unique opportunities to cultivate relationships with consumers. Enterprises can publish products or brand information to large amounts of users on SNS. With the rapid development of SNS, marketers are paying attention to various SNS opportunities and are beginning to implement new SNS marketing methods at an unprecedented speed.

Busyness is the perception of an individual to internal stress, which is caused by a lack of time to complete valuable work and often leads to absent-mindedness (Thompson et al., 2008). The research on busyness is mainly focused on the time allocation decisions, that is, how individuals allocate their time in paid work, household work, or with leisure.

Festini et al. (2016) have stated that the busyness of a person is related to the amount of working hours, speed and meaning, etc. A study by Gershuny (2005) showed that individuals who allocate more time to work are often considered to be busier. On the contrary, individuals who allocate more time to hobbies and interests are often considered to be more at leisure. Frequent SNS posting users are defined as those who frequently post Moments, Weibo, etc. (Hajli, 2014). Based on the above discussions, social media is a tool for information communication and entertainment. Frequent SNS posting users will be considered to spend more time on leisure and have plenty of leisure time.

Since the beginning of the last century, research on limited resources has appeared to have gradually developed into an important basic theory of economics research. Western economists believe that economics arises from the scarcity of objective existence and the need for choice. Behind this definition, it implies that the important idea of economics is that, the goods are scarce, and so the society must use resources effectively (Zhou, 2004). Kahneman (1973) believed that if resources and capacity are limited these resources can be flexibly allocated to complete multitasks or even do different things at the same time, but the premise of completing the task is that the required resources and capacity do not exceed the available resources and capacity. The resource of time as a kind of "virtual item" is the same for everyone, but the allocation of time by individuals is different. In other words, everyone can choose different ways of time consumption, such as work, leisure, housework, etc. Individuals who spend more time on social media and less time at work are considered at leisure (Gershuny, 2005; Bellezza et al., 2017; Schulte et al., 2017).

Perceived Busyness and Social Status

Social status refers to the positions individuals or nuclear families occupy in the status structure of a given society, which is composed of education, occupation, sex, and marital status (Hollingshead, 1975; Bornstein et al., 2003; Adams and Weakliem, 2011). Some scholars have shown that individuals with high social status have higher initiative and stronger motivation. High initiative also makes people of high social status more resolute and courageous. Also, resources in social networks would contribute to the goal attainment of people and would improve the quality of life of an individual (Li et al., 2018). They have a higher action orientation than ordinary people and are less disturbed by the outside world. However, individuals with low social status are more likely to be influenced by the outside world and would often blindly follow the crowd (Davis, 1992; Galinsky et al., 2008; Brooks, 2010; Zhao et al., 2019). The actions of individuals with high social status are more oriented, and individuals with high social status can also guide the behavior habits of other individuals (Grewal and Stephen, 2019). Individuals with higher social status were less satisfied with unfair treatment than their lower status counterparts, supporting the perspective that high social status individuals feel entitled to more than low-status individuals (Hu et al., 2016). Compared with the research on the consequences of social status, the discussion on the antecedents of social status can be regarded as a new research topic. It is only in recent years that some scholars begin to devote themselves to this field. The private and subjective dimension of religion matters for well-being in China by helping adherents have an improved sense of social status relative to the non-religious (Chen and Williams, 2016). On Chinese social

media platforms such as WeChat and QQ, Yang et al. (2017) found that SNSs use behaviors (i.e., selfies, status update, social feedback, and privacy control) that could also promote the attitude of individuals (i.e., desire for continuous attention and admiration of others). It is worth noting that studies have indicated that perceived busyness, education level, social class, religion, racism, and SNSs use behaviors as antecedents of social status (Thompson and Subich, 2011; Chen and Williams, 2016; Huang et al., 2016; Bellezza et al., 2017; Yang et al., 2017). The studies on the antecedents of social status are not large enough in number but influential.

Bellezza et al. (2017) discovered an alternative kind of conspicuous consumption that operated by shifting the focus from the preciousness and scarcity of goods to the preciousness and scarcity of individuals. Research has demonstrated that people who spend more time at work are considered to have higher social status in the United States where the perceived social mobility is high, but in a country with low perceived social mobility such as Italy, the conclusion is the opposite. In the study of perceived social status, the samples from the United States and Italy come to the opposite conclusion which further enlightened us to think about cultural differences. Social mobility refers to the change that moves people up and down the status ladder. Davidai and Gilovich (2015) put forward the concept of perceived social mobility from the perspective of individual subjectivity, which refers to the degree to which a person perceives that he can rise on the economic ladder in society. Perceived social mobility is reflected in a fair social system. People believe that they have the will to pursue opportunities and improve their social status through hard work (Bjørnskov et al., 2013). Social mobility is related to economic mobility, power mobility, consumption mobility, and status mobility. Low perceived mobility means low social economic mobility and low income (Ning, 2014). Under high social mobility, people at the bottom of the society will seize the opportunity to flow to the upper society; under low social mobility, people at the bottom of the society lack the chance to struggle for it (Xu and Liu, 2011). Social mobility is fundamental in American culture (Bellezza et al., 2017). Some studies have measured the social class of individuals by evaluating the availability of educational resources and have found that Americans believe that everyone has the opportunity to succeed through hard work (Kraus et al., 2010; Kraus and Tan, 2015). However, the Chinese people prefer to move to the upper class through direct inheritance (family wealth) or ties of homophily (social connection) (Li et al., 2015). The weakening of social mobility has become a critical problem when the Chinese social class is increasingly solidified and the people at the bottom of the society feel that they lack the opportunity to move to the upper class (Li and Zhou, 2014; Ning, 2014). The popularization of higher education has generally enhanced the extent of social equity and equality in Chinese. Nonetheless, as the return on education have flattened out recently, the social mobility has slowed down (Mok and Wu, 2016). In the case of low perceived mobility level in China, individuals who provide more working hours are more likely to be under greater life pressure. Correspondingly, they must provide more working hours to meet material needs.

First, we posit individuals who spend more time on social media and less time at work are considered leisure. Specific to social status, we propose that the more leisure people are the higher social status they are considered to possess. Although the relationship between frequent SNS posting and social status has not been tested directly, existing studies have found that the causal chain method, as the experimental psychological method, directly manipulates mediating variables and provides stronger causal evidence for mediating effects (Kim and Gal, 2014; McFerran and Argo, 2014; Han et al., 2016). In conclusion, we put forward hypothesis 1 and hypothesis 2:

H1: More frequent SNS posting leads to higher status perceptions among Chinese consumers.

H2: This effect was mediated by perceived busyness, with consumers believing that people who post more frequently on SNS are less busy and therefore have higher social status.

To test the hypotheses, we designed and conducted three empirical studies. Study 1 used secondary data to preliminarily verify the positive correlation between SNS posting frequency and perceived social status. The goal of Study 1 was to verify the basic effect of this study. After the basic effect has been verified, the underlying mechanism of the effect would be tested. Based on the increasing use of SNS, we considered the problems of how the posting frequency of WeChat Moment affects perceived busyness and how the perceived busyness affects this basic effect. Study 2 aimed to use the method of laboratory experiments to test H1 and H2. Studies 2A and 2B adopted the causal chain method to test the underlying mechanism of the effect. Specifically, Study 2A examined the relationship between the posting frequency of WeChat Moment and perceived busyness, followed by the manipulation of the mediating variables to further explore whether the differences in perceived busyness affect perceived social status and to provide direct support for the whole causal chain.

STUDY 1

The main purpose of Study 1 is to establish the correlation between SNS posting frequency and perceived social status and to provide preliminary evidence for the basic hypothesis of the study.

Measures

Study 1 takes universities in China as the object and analyzes the relationship between the frequency of publishing articles on their official accounts and the ranking of these schools. Specifically, we adopted the top 90 universities as the data of perceived social status, which comes from the top 600 list of the universities of China in 2020 released by Wu Shulian, leader of the research group of China Institute of Management Science in May 2020. We collected the number of official accounts issued by the official account platform of the school during the week from December 10, 2020 to December 16, 2020, and we used this data to measure the SNS posting frequency. After collecting the data, we analyzed the relationship between the ranking of the school and the official account posting frequency.

Results

As shown in **Table 1**, the results of the correlation analysis initially supported the hypothesis of this article. Specifically, there is a significant negative correlation between the ranking of the school and the official account posting frequency ($r = -0.28$, $p < 0.01$).

In other words, the top-ranked schools update their official accounts more frequently than the lower-ranked schools, that is, schools with higher social influence are more active on social media.

Discussion

Study 1 used secondary data to preliminarily verify the positive correlation between SNS posting frequency and perceived social status. However, this only provides a small amount of support for the effects of SNS posting frequency and perceived social status. In addition, correlations cannot be an argument for causality. Therefore, we will use an experimental approach to further test this effect in the following study.

STUDY 2A

With the causal chain method, we first manipulated the independent variable to examine the causal relationship between the independent and mediating variable, and then manipulated the mediator to test the relationship between the mediator and the dependent variable. These two steps, therefore, provide strong evidence for the entire causal chain from the independent variable to the dependent variable through mediation (Spencer et al., 2005). The causal chain method is also widely used in consumer research (e.g., Kim and Gal, 2014; McFerran and Argo, 2014; Han et al., 2016). Accordingly, Study 2A manipulates the frequency of WeChat Moments posting and tests its effect on perceived busyness, and Study 2B manipulates perceived busyness and explores whether it affects perceived social status.

Participants and Procedure

Study 2A uses the method of laboratory experiments. We recruited 98 participants from the subject pool of a large public university in China. They would get extra credits for participating in experimental research. The number of men was 22 (22.4%) and women was 76 (77.6%). Before the experiment began, we assured him/her of anonymity.

Study 2A adopted one factor between-subjects design (WeChat Moments posting frequency: 1 time vs. 2 times vs. 7 times). Participants were asked to read information about a virtual character Li Hong, and were shown with the content of Li Hong's Moments in the past 7 days. We randomly assigned participants to one of the three conditions, such as post one WeChat Moment every week, post two WeChat Moments every week, post seven WeChat Moments every week. In order to control the potential confounding variables, the content of the WeChat Moment in the provided pictures is similar (all the content of the WeChat Moment is about life; as shown in **Figure 1**), the only difference is the WeChat Moment posting frequency. Next, all the participants were required to respond to the following items.

TABLE 1 | Results of descriptive statistics and correlation analysis ($N = 90$).

	M	*SD*	
The national ranking	45.50	26.13	
SNS weekly posting frequency	6.38	1.82	−0.28**

$^{**}p < 0.01$; $n = 90$.

Items for Manipulation Check

Manipulation checks measured WeChat Moment posting frequency. In particular, all the subjects were asked about "according to the WeChat Moment in the past 7 days, what do you think of the number of WeChat Moment she sent?" (1 = the quantity is very small; 5 = the quantity is more).

Items for Busyness

We asked the subjects to evaluate Li Hong's busyness according to the content of the picture. Participants answered the following two questions (Bellezza et al., 2017): "Li Hong has been working for a long time" "Li Hong is very busy" (1 = strongly disagree; 5 = strongly agree). We averaged the scores of the two questions ($\alpha = 0.78$) as the dependent variable. Cronbach's of those two items was 0.78.

Results

Manipulation Checks

The Moments posting frequency is the dependent variable. One-way ANOVA was adopted in this experiment. The results showed that the frequency of Posting on Moments had a significant effect [$F(2, 71) = 26.93$, $p < 0.01$]. The more frequently Li Hong updated the Moments in a week, the subjects felt that the more Moments she posted ($M_{one\ WeChat\ Moment} = 2.42$, $SD_{one\ WeChat\ Moment} = 1.14$; $M_{two\ WeChat\ Moment} = 3.04$, $SD_{two\ WeChat\ Moment} = 0.98$; $M_{seven\ WeChat\ Moment} = 4.40$, $SD_{seven\ WeChat\ Moment} = 0.77$).

The perceived busyness is the dependent variable. One-way ANOVA was adopted in this experiment. Study 2A explored whether the differences in WeChat Moment posting frequency affected perceived busyness, which means to compare the difference of perceived busyness when the WeChat Moment posting frequency is one, two, and seven. The results showed that the WeChat Moment posting frequency had a significant impact [$F(2, 71) = 6.78$, $p < 0.05$]. Specifically, frequency posting WeChat Moment would mean a higher level of leisure ($M_{one\ WeChat\ Moment} = 2.83$, $SD_{one\ WeChat\ Moment} = 0.76$; $M_{two\ WeChat\ Moment} = 2.68$, $SD_{two\ WeChat\ Moment} = 0.69$; $M_{seven\ WeChat\ Moment} = 2.18$, $SD_{seven\ WeChat\ Moment} = 0.59$). The result indicates that people who frequently post WeChat in a week are considered to be more at leisure and less busy. On the contrary, people who have infrequent WeChat postings in a week are considered to be busier and at less leisure.

Discussion

Study 2A verified the relationship between the WeChat Moment posting frequency and perceived busyness through a laboratory



FIGURE 1 | Pictures with different WeChat Moment posting frequency.

experiment. In the following research, we will improve the discussion of the intermediary mechanism to supplement the entire chain of causality based on research 2A to verify the mediation mechanism.

STUDY 2B

Participants and Procedure

Study 2B uses the method of laboratory experiments. We recruited 218 participants from the subject pool of a large public university in China. They could get extra credits for participating in experimental research. The number of men was 45 (20.6%) and women was 173 (79.4%). Before the experiment began, we assured him/her of anonymity. The research adopted one factor between-subjects design (Conditions: busyness vs. leisure). We randomly assigned participants to one of the two conditions, namely busyness and leisure (Bellezza et al., 2017). Participants were asked to read information about a virtual character Li Hong's life. The information in the busyness condition is "Li Hong has been working all week, spending 10 min to eat at noon every day." While the information in the leisure condition is "Li Hong hardly works this week and enjoys a long noon break every day." Next, all the participants were required to respond to the following items.

Items for Manipulation Check

Lastly, manipulation checks measured Sally's level of busyness, Specifically, they were asked: "Li Hong spends many hours at work;" "Li Hong is busy" (1 = strongly disagree, 5 = strongly agree). We averaged the scores of the two questions ($\alpha = 0.84$) as the mediating variables (perceived busyness).

Items for Perceived Social Status

Subsequently, we measured perceived social status using two distinct measures. A primary measure of status was developed based on previous status definitions (Veblen and Galbraith, 1973; Bourdieu, 1984; Scott et al., 2013) to include both social status and financial resources (wealth and income). Specifically, participants answered the following two questions: "how would you rank the financial resources, social influence and state of the individual described" "how would you rank the social status of the individual described." (1 = low social status; 5 = high social status). We averaged the scores of the two questions ($\alpha = 0.94$) as the dependent variable (social state).

We adapted the widely used MacArthur scale of subjective socioeconomic status (Adler et al., 2000; Anderson et al., 2012) to assess the status of a third party. The measure consists of a drawing of a ladder with 10 rungs representing where people stand in society in terms of money, status, and influence (5 represents people at the top of society and 1 represents people at the bottom of society, as shown in **Figure 2**). The participants



FIGURE 2 | The MacArthur Scale of Subjective Socioeconomic Status.

were told that the people at the top of the ladder were at the top of the society and they had the best living conditions, the highest income, the highest education level, and the most decent work. The people at the bottom of the ladder are at the bottom of the society with the worst living conditions, lowest income, the lowest education level, and the least decent work. Participants were instructed to pick the rung where they would place Li Hong (Adler et al., 2000; Anderson et al., 2012).

Results

Manipulation checks. Perceived busyness is the dependent variable. One-way ANOVA was adopted in this experiment. The results showed that the manipulation of busyness had a significant effect [$F(1, 216) = 182.15$, $p < 0.001$]. Compared with the participants in the leisure condition ($M_{leisure} = 2.52$, $SD_{leisure} = 0.91$), participants in the busy condition ($M_{busy} = 4.12$, $SD_{busy} = 0.84$) perceived Li Hong as more busyness. The manipulation of the level of busyness is effective.

The social status is the dependent variable. One-way ANOVA was adopted in this experiment. The results are consistent with our expectations. Compared with participants in the busy condition ($M_{busy} = 2.76$, $SD_{busy} = 0.71$), participants in the leisure condition ($M_{leisure} = 3.37$, $SD_{leisure} = 0.75$) perceived Li Hong as higher in social status [$F(1, 216) = 37.90$, $p < 0.001$]. They placed her on a higher rung on the socioeconomic status ladder ($M_{busy} = 2.79$, $SD_{busy} = 0.76$; $M_{leisure} = 3.39$, $SD_{leisure} = 0.69$).

Discussion

Study 2B directly manipulates the perceived busyness, and the results show how the differences in perceived busyness affect social status perceptions, which further verifies the mediating role of perceived busyness. These hypotheses received convergent support in a set of three studies. In conclusion, Studies 2A and 2B provide strong support for the mechanism of conspicuous behavior on SNS. In this paper, hypothesis 1 and hypothesis 2 are verified by three experiments.

GENERAL DISCUSSION

Research Findings

This research systematically introduces the relationship between SNS posting frequency and perceived social status. Firstly, the target of study 1 is to establish the correlation between SNS posting frequency and perceived social status so as to provide preliminary evidence for the basic hypothesis of the study. This research uses secondary data to preliminarily verify the correlation between SNS posting frequency and perceived social status. Study 1 shows that schools with higher social status update their official accounts more frequently, revealing the positive correlation between SNS posting frequency and perceived social status. Correlations cannot be an argument for causality. Therefore, in Study 2, the research uses an experimental approach to further test this effect. Studies 2A and 2B adopt the causal chain method to test the underlying mechanism of the effect, and to provide causal evidence for the entire relationship chain. Research 2A uses WeChat Moment posting frequency as the symbol of SNS posting frequency. The results of study 2A shows that people who post WeChat more frequently in a week are considered to be more at leisure and less busy. On the contrary, people who have lower frequency posting on WeChat in a week are considered to be busier and less at leisure. The results of Study 2B indicates that the busier people are considered to have the lower social status. Conversely, the more leisure people are considered to have the higher social status. The results of Studies 2A and 2B provide directly support for the causal chain of mediating effect. In general, the research systematically verifies the relationship between SNS posting frequency and perceived social status, and further verifies the internal psychological mechanism of this basic effect. The research proves that this effect is universal (whether it is correlation or causal relationship).

Theoretical Contributions

Nowadays more and more consumers show status in more implicit ways. The research has indicated that consumers will judge the social status of users based on the SNS posting frequency. In addition, the research tests the underlying mechanism of the effect. Therefore, the first theoretical contribution of this paper is the literature on SNS. Being different from previous researches on online consumer behaviors (e.g., Williamson, 2010; Khan, 2017; Mieczkowski et al., 2020), this research explores the impact of SNS on perceived social status. Current research on online consumer behavior mainly focuses on Western consumers (Williamson, 2010; Hajli, 2014; Abeza et al., 2017), whereas this research takes the impact of cultural differences into consideration. Different from previous researches which focus on the consequences of social status (e.g., Davis, 1992; Galinsky et al., 2008; Brooks, 2010), this research is consistent with the latest research directions (Thompson and Subich, 2011; Bellezza et al., 2017; Yang et al., 2017). The research is dedicated to understanding the antecedents of social status. By verifying the correlation between SNS posting frequency and perceived social status, this study further enriches and provides further evidence for this series of studies.

The research also makes a theoretical contribution to the literature of conspicuous consumption. Existing literature on consumer behaviors mainly concentrates on explicit conspicuous signals (e.g., Ordabayeva and Chandon, 2011; Wang et al., 2015; Gao et al., 2016); The research investigated the subtle signals of status on SNS. Consumers purchase products with obvious conspicuous signals to improve their social status, but some

subtle signals can also play the same role (e.g., Dubois et al., 2012; Shao, 2020; Shen, 2020; Valsesia et al., 2020). This research further tests how to make conspicuous consumption in SNS, which comes to a conclusion that people who have frequent SNS posting are considered to have higher social status.

Substantive Contributions

In addition to significant theoretical contributions, this study also has direct instructive value for consumers, enterprises, policy makers, etc. Firstly, this research reveals the psychological mechanism of the dazzling wealth of consumers in SNS. If someone wants to show his social status, in addition to buying general luxury goods, improving the activity of SNS is also an effective way. Secondly, consumers are more willing to believe that individuals with frequent SNS posting are considered to have high social status and can play the role of consumer purchase orientation.

Research shows that the content generated by users on SNS is able to guide the behavior of consumers, which reduces the impact of traditional marketing. Companies should not only rely on traditional marketing promotion, but also participate more in SNS activities, and further use SNS to enhance corporate brand image and promote interaction with potential consumers.

Internet is an immaterial zone beyond time and space limitation, which emerged with the development of the information and technology industry. Based on the advent of Internet technology, various forms of social media have aroused and become cyber-communities that corresponded with the living habits of young consumers. Generally speaking, a cyber-community constructed by social media can be described as follows: (1) low access threshold, (2) low authority, and (3) huge user stock and traffic. Therefore, the findings of the research also call for the government to strengthen the guidance of information on social media.

Research Limitations and Future Research Directions

It is important to acknowledge that though we strive to be rigorous and detailed in each step, there are still limitations due to several factors, and these limitations point to the future research direction which is described below.

Laboratory experimental method was used in this study. Since the experimental sample is not randomly sampled and the subjects are not representative enough of all the consumers, the external validity of the study may be reduced and the inferential ability may be weaker. For example, it's probable that some individuals do not browse SNS in the recruitment objects. In the future research, we need to screen out those who have relevant browsing experience in advance to increase the external validity. Besides, other possible confounders remain unchecked. For example, the posting content may change the social status perception of subjects. Specifically, frequent posts about travel and eating-out experiences may send a signal that the person posting them has the spare cash to do so. Future research should examine whether the money-spending signals underlying these activities confound our causal chain.

The experimental site is similar to the real SNS, but differences still exist. The location of the experiment is not exactly the same as the place where the subjects usually visit SNS, which may also lead to some errors. To improve the experiment, the overarching design should be as realistic as possible, and the process of the experiment ought to be as simple and clear as possible to avoid making the participants feel that they are doing the experiment instead of immersing themselves in the simulated network. The future research can adopt the method of field experiment to test the hypothesis in the "real" situation and verify the causal relationship.

This research verifies the basic effect relationship between SNS posting frequency and perceived social status, and considers the psychological process of this effect as perceived busyness. In the future research, we can broaden the research in this field and look for possible boundary conditions. For example, environmental variables including social environment and physical environment might play a moderating role.

Additionally, though our focus was on the subtle signals of status for Chinese consumers on SNS, another interesting question that stems from Study 2B is that whether people with more leisure time have higher social status. It would also be interesting to explore whether people with high social status play a leading role in social media, which means they act as opinion leaders according to the KOL theory (Moynihan, 2008). For instance, do individuals with higher social status have greater SNS influence, i.e., a large number of followers, huge appeal, and so on? These possibilities await further investigations.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the research ethics board of Shanghai University of International Business and Economics. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

WW designed the studies and made a significant revision to the earlier version of the manuscript. TS assisted in research and data collection and wrote the manuscript. YY collected and analyzed the data. SF and JS revised the manuscript. ZY designed the studies and revised the manuscript. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.741602/full#supplementary-material

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Data-Driven Discrimination, Perceived Fairness, and Consumer Trust–The Perspective of Consumer Attribution

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With the development of consumer-centric data collection, storage, and analysis technologies, there is growing popularity for firms to use the behavioral data of individual consumers to implement data-driven discrimination strategies. Different from traditional price discrimination, such data-driven discrimination can take more diverse forms and often discriminates particularly against firms' established customers whom firms know the best. Despite the widespread attention from both the academia and the public, little research examines how consumers react to such discrimination enabled by big data. Based on attribution theory, this paper examines how different ways of consumer attribution of data-driven discrimination influence perceived fairness and consumer trust toward the firm. Specifically, we hypothesize that controllability by consumers and locus of causality of data-driven discrimination interactively influence perceived fairness, which further affects consumer trust. We conduct two experiments to test the hypotheses. Study 1 uses a 2(controllability: high vs. low) × 2(locus of causality: internal vs. external) between-subjects design. The results show a significant interaction between controllability and locus of causality on consumer trust. When consumers attribute data-driven discrimination to themselves (internal attribution), consumer trust is significantly lower in low-controllable situations than that in high-controllable situations. When consumers attribute the discrimination to the firm (external attribution), however, the impact of controllability on consumer trust is nonsignificant. Moreover, we show that perceived fairness plays a mediating role in the interaction effect of controllability and locus of causality on consumer trust. Study 2 uses a similar design to replicate the findings of Study 1 and further examines the moderating role of consumer self-concept clarity. The results show that the findings of study 1 apply only to consumers with low self-concept clarity. For consumers with high self-concept clarity, regardless of the locus of causality (internal or external), consumer trust is significantly higher in high-controllable situations than that in low-controllable situations. Finally, we discuss the theoretical and managerial implications and conclude the paper by pointing out future research directions.

Keywords: data-driven discrimination, perceived fairness, consumer trust, attribution, consumer self-concept clarity

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INTRODUCTION

Due to the advancement of data storage technologies and big data analytics, increasingly more firms have been tracking and analyzing individual consumers' online shopping behaviors (e.g., online search, browsing, and purchasing). Based on the insights obtained from such behavioral data, firms are able to implement data-driven discrimination against certain groups of consumers, especially the established or loyal ones (Hannak et al., 2014). Previous research has not clearly defined the concept of data-driven discrimination, but researchers have discussed its similarities to and differences from traditional discrimination (Žliobaitė and Custers, 2016; Criado and Such, 2019).

In essence, data-driven discrimination is one special type of discrimination resulting from the convergence of "big data" and predictive analytic techniques or algorithms. Different from traditional price discrimination, this type of discrimination enabled by advanced data analytics can take more diverse forms and is not limited to the dimension of price. For example, the firm may offer coupons or gifts only to customers who are found to be more sensitive to promotions by algorithms. Second and more importantly, data-driven discrimination may especially discriminate against firms' established customers whom firms know the best, the practice of which has been known as loyalty penalty (Parker, 2021). Thus, it differs from personalized marketing or loyalty program, which is used by firms to better serve their loyal customers through analyzing customer behavioral data (Stourm et al., 2020). This may be the reason why data-driven discrimination has raised widespread controversy among the public. Finally, compared to traditional price discrimination, data-driven discrimination may not be easily detected by consumers through social comparison. This is because online product or service information is usually delivered privately to each individual customer's account, which makes it difficult for consumers to compare with others. However, the detection of common forms of data-driven discrimination can still be relatively easy through other ways (e.g., by browsing anonymously rather than using the regular account), especially as consumers in the marketplace have been becoming more and more sophisticated. It is no wonder that increasingly more consumers report being discriminated by firms' algorithms.

Recently, such data-driven discrimination is prevalent in a broad spectrum of sectors, including but not limited to airline or hotel reservation, online ride-hailing service, and online retailing. According to a survey by China Youth Daily in 2018, 63.4% of the respondents believed that it was common for firms to use data analytics to discriminate, and 51.3% of the respondents had been discriminated in some ways by such data-driven strategies (China Youth Daily, 2018). Despite its prevalence in practice, it remains unclear how consumers would respond to such data-driven discrimination. According to a survey conducted by the Beijing Consumer's Association in 2019, 83.74% of consumers among the 3,185 interviewees believed that such data-driven discrimination infringed consumers' right to fair deals, which was perceived to be very unfair. Some other consumers, however, believed that such discrimination is relatively acceptable (Beijing Consumer's Association, 2019).

Why do consumers respond to such data-driven discrimination differently? As the extremely important equity for a firm (Sirdeshmukh et al., 2002; Mal et al., 2018), whether and when can consumer trust toward the firm be eroded by such data-driven discrimination? This paper intends to answer these questions. Prior research on consumer response to price discrimination mainly examines its general negative effect on perceived fairness and trust. For example, Garbarino and Maxwell (2010) show that price discrimination that violates social norms (e.g., setting prices based on individual consumer demand) is perceived to be more unfair, which further adversely influences consumer trust. Grewal et al. (2004) also suggest that pricing tactics contrary to norms, such as charging a frequent customer more, engender less trust than pricing tactics consistent with norms. Very few studies, however, examine whether and when consumer response to a particular form of discrimination can be more or less negative, especially when the discrimination is data-driven and apparently violates social norms. As being discriminated by algorithms can be interpreted in various ways, consumers may attribute the discrimination differently. For instance, being discriminated may be either because of the firms' abuse of consumer personal data without their explicit consent or because of loyal customers' careless disclosure of their personal information to the firm. With different attributions, reactions to such discrimination can vary. Therefore, from a theoretical point of view, consumer response to data-driven discrimination may to a large extent depend on their attribution of the discrimination. Yet, little research examines consumer response to data-driven discrimination from the perspective of attribution.

It is worth noting that some research has examined consumer fairness perception of price increases from the attribution perspective (e.g., Vaidyanathan and Aggarwal, 2003). However, different from simple price increases, price discrimination involves charging different prices to different customers, the practice of which can be more likely to violate social norms and thus arouse more unfair perceptions. More importantly, whether to practice price discrimination is the firm's free choice and thus is fully controlled by the firm and cannot be justified by uncontrollable factors like a price increase does (e.g., cost surge). Likewise, whether to practice data-driven discrimination is also fully controlled by the firm, and thus, a firm perspective (as in previous research) when making attributions regarding controllability is no longer appropriate. Instead, the controllability by consumers toward data-driven discrimination can be either high or low, depending on whether consumers can avoid being discriminated through changing their profile settings or shopping behaviors. Thus, in our research setting, we innovatively adopt a consumer perspective when examining the attribution of data-driven discrimination.

Specifically, this paper discusses the controllability and locus of causality of data-driven discrimination from a consumer perspective and examines how different attributions influence perceived fairness and consumer trust toward the firm. Based on previous literature, we hypothesize that controllability by consumers and locus of causality of data-driven discrimination may interactively influence perceived fairness, which further

affects consumer trust toward the firm. Furthermore, as a boundary condition, we also explore the moderating role of consumer self-concept clarity in the above relationship. These investigations would not only extend theoretical literature on attribution theory and consumer response to discrimination, but also provide important implications for firms practicing data-driven discrimination.

Below, we first develop the research hypotheses and introduce our research framework. Then, we conduct two laboratory experiments to test the hypotheses. Finally, we briefly summarize the findings and implications and conclude the paper with discussing the future research directions.

RESEARCH HYPOTHESES

Attribution of Data-Driven Discrimination and Perceived Fairness

Prior research has mainly examined data-driven discrimination in the public sectors from the perspective of social justice. These studies usually focus on the gender, religion, or race biases generated by data-driven discrimination and discuss related legal issues and ethical concerns (e.g., Kim, 2016; Gillis and Spiess, 2019; Kennedy, 2021). In online shopping, data-driven discrimination has been even more common. Online retailers usually discriminate against customers based on their past shopping behaviors rather than innate traits (e.g., race and gender; Ezrachi and Stucke, 2016). For instance, Hannak et al. (2014) examined 16 top e-commerce sites in the United States and found that nine of them were relying on consumer behavioral data to perform price discrimination and price steering. Relatively little academic research, however, examines data-driven discrimination in online shopping and its impact on consumer behavior.

In this paper, we define data-driven discrimination in online shopping narrowly as firms' strategy or practice to discriminate against customers who are loyal and insensitive to certain marketing stimuli through analyzing customer behavioral data (using algorithms or machine learning methods). With the aid of data analytics, discrimination with loyalty penalty becomes more pervasive and has aroused widespread attention (Addleshaw Goddard LLP, 2018; Parker, 2021). Previous research on price discrimination shows that consumers generally respond negatively to price discrimination that violates social norms (e.g., Garbarino and Maxwell, 2010). However, few studies have examined when consumers can respond more or less negatively to data-driven discrimination, which apparently violates social norms. Faced with different forms of data-driven discrimination, consumer perceptions and reactions may differ. Even in face of the same form of data-driven discrimination, the response of different consumers may also be divergent. This paper examines consumer response to data-driven discrimination in online shopping from the theoretical perspective of attribution.

Weiner's (1979) attribution theory proposes that people try to make causal inferences about observed behaviors, and these inferences will affect their responses. According to attribution theory, there are three dimensions of attribution: controllability, locus of causality, and stability (Weiner, 1979). Controllability refers to whether consumers believe that the reasons that affect their success or failure can be changed by personal will. When consumers attribute product failure to the firm's controllable behavior, they will feel angry and intend to hurt the firm (Weiner, 1980; Folkes, 1984). Locus of causality refers to consumers' belief that their success or failure is caused by individual reasons or by external factors. If consumers think that negative consequences are related to a firm, they may intend to reduce the benefits of the firm. While stability refers to whether consumers believe that the reasons affecting their success or failure are stable, whether they are consistent in similar situations, and whether they will change over time. Researchers have already found that the stability of firm behaviors affects consumers' expectations of whether future results will change and then affects consumer perceived fairness and trust (Kalapurakal et al., 1991; Nikbin et al., 2012, 2016). Thus, this paper will focus only on the impact of controllability and locus of causality on perceived fairness and consumer trust.

While applying attribution theory to explain consumer behavior, previous research mostly examines how the controllability by the *firm* affects consumer response. When consumers believe that the firm has volitional control over the negative consequences, they are more likely to show negative emotions and responses toward the firm. For example, when consumers find that product failure is caused by the firm's controllable behaviors, they will be much angrier and may even take actions to hurt the firm (e.g., spreading negative word-of-mouth and purchasing less; Folkes, 1984). In the research setting of data-driven discrimination, the firm is usually believed to have full control over its discrimination strategy based on data analytics. Consumers, however, may or may not be able to exert any influence on whether to be discriminated. According to the dual entitlement principle, both firms and consumers have the right to obtain corresponding benefits (Urbany et al., 1989). As the control of the firm is enhanced and higher profits are obtained, the control of consumers can be weakened, and unfair perceptions may be induced. However, relatively little research examines the impact of the controllability by *consumers* on fairness perception in new digital settings such as data-driven discrimination.

In this paper, we define the controllability of data-driven discrimination from a consumer perspective, which captures whether consumers can avoid being discriminated by changing their own profile settings or behaviors. To achieve discrimination, the firm needs both algorithms and consumer behavioral data. The algorithms are programmed instructions and cannot be controlled by consumers. As the input to algorithms, consumer behavioral data, however, are generated by the consumers themselves and thus can be controlled. Consumers agree the firm to monitor their shopping behavior and in return the firm promises to offer products or services that are tailored to consumers' personal needs and interests (e.g., more personalized offers or promotions). Realizing that the firm is using their personal data to discriminate against them, consumers may opt out of their agreement with the firm for sharing behavioral data. In practice, they may also strategically adjust

their shopping behaviors to avoid being discriminated. For example, consumers can anti-discriminate through deleting or adjusting their cookie settings, disguising themselves as nonacquaintances by browsing anonymously, and putting an interested product into the shopping cart without checking out (CBC News, 2015). Therefore, in the marketplace where consumers have been increasingly sophisticated, the controllability of data-driven discrimination perceived by consumers has becoming higher.

For those who perceive higher controllability, they may have avoided being discriminated through adjusting their own profile settings or shopping behaviors. Thus, these consumers are likely to treat data-driven discrimination as a game in which they can exert some influence toward their own benefits (CBC News, 2015). For example, when consumers are interested in buying an item, they may put it into the shopping cart without checking out and wait until the firm offers a coupon for exactly the same item (i.e., the so-called waiting game). In scenarios like this, consumers can actually benefit from the firm's practice of data-driven discrimination through strategically altering their shopping behaviors. As a result, their perceived unfairness toward data-driven discrimination may not be very high. For consumers who cannot avoid being discriminated no matter how they change their behaviors (low controllability), they may fully blame the firm for putting them at disadvantage. Thus, consumers may believe that the firm obtains undeserved profits at the expense of their interests. According to the dual entitlement principle, when certain firm practice (e.g., a price increase) increases the firm's profits beyond its reference or deserved entitlement, consumers will feel more unfair (Kahneman et al., 1986; Novoseltsev and Warlop, 2002). Hence, for consumers with low controllability, the discrimination may not be easily rationalized or justified, which makes consumers perceive data-driven discrimination to be more unfair. Thus, we conjecture that perceived fairness of consumers with high controllability is significantly higher than that of those with low controllability. Hence, we propose H1a.

> *H1a*: Perceived fairness toward data-driven discrimination is higher for consumers with high controllability than those with low controllability.

In our research setting, locus of causality refers to whether being discriminated is caused by consumers themselves or by other parties (e.g., the firm). From a consumer perspective, if consumers believe that they are discriminated due to their own reasons (e.g., they accidentally clicked the button of "Agree to Enterprise Access to Personal Data"), it is internal attribution. On the other hand, if consumers believe that being discriminated is caused by other factors (e.g., the firm's abuse of consumer personal data), then it is external attribution. When consumers make an external attribution, it is highly likely that they consider the firm to be fully responsible for the discrimination. This is because whether to discriminate against certain consumers using algorithms mainly depends on the firm's free choice of strategy. In this case, consumers may infer that the firm is abusing the collected consumer behavioral data to maximize its own profits at the expense of the consumers' benefits, and thus, consumer perception of unfairness can be rather strong (Vaidyanathan and Aggarwal, 2003). By contrast, when consumers make an internal attribution, they may mainly blame themselves rather than the firm for being discriminated. Thus, consumers' unfair perception can be relatively weak. As a result, compared with external attribution, consumer perceived fairness is higher when they internally attribute data-driven discrimination. Therefore, we proposed H1b.

> *H1b*: Compared with external attribution, consumer perceived fairness is higher when consumers attribute data-driven discrimination internally to themselves.

Furthermore, controllability and locus of causality may have an interaction effect on perceived fairness. When consumers attribute data-driven discrimination to the firm or other parties (external attribution), they blame the firm or other parties for being discriminated. The unfairness perception is so high that it may lead to strong negative emotions (e.g., anger) among consumers (Pillutla and Murnighan, 1996; Hofman et al., 2012; Claudia, 2013). Consumers who are invoked strong negative emotions may tend to activate System 1 for information processing (Farrell et al., 2014; Laakasuo et al., 2015) and may not cognitively evaluate whether and how the controllability by them will make a difference. In addition, when consumers believe that it is the firm's fault, they may perceive it highly unacceptable if they need to make efforts to avoid being discriminated (even if they could have done so). Instead, it is the firm that should take responsibility and change its strategy to help consumers avoid such discrimination. In this case, controllability may not matter much for consumers. Therefore, under external attribution, controllability may have a relatively weak impact on fairness perception.

When consumers attribute data-driven discrimination internally to themselves (internal attribution), however, controllability by consumers may make a difference. In this circumstance, consumers mainly blame themselves for being discriminated. Thus, they are less likely to generate very strong negative emotions. In this circumstance, System 2 is relatively more likely to be activated (Farrell et al., 2014). This induces consumers to consider how they could have done to avoid being discriminated. In other words, consumers may cognitively seek ways to get rid of the discrimination, which makes controllability more important. Moreover, when consumers consider themselves as responsible for being discriminated, they may feel more obligated to make efforts to improve the situation they are involved in. In this case, high vs. low controllability can be crucial in the formation of fairness perception. As a result, under internal attribution, controllability may have a much stronger impact on fairness perception.

Based on the above speculation, we propose H1c.

> *H1c*: Controllability and locus of causality of data-driven discrimination have an interaction effect on consumer perceived fairness. Compared with external attribution,

controllability has a stronger positive impact on consumer perceived fairness under internal attribution.

Attribution of Data-Driven Discrimination and Consumer Trust

Consumer trust plays an important role in managing customer relationship and maintaining the long-term development of a firm (Kennedy et al., 2001; Andersen and Kumar, 2006). Recent research suggests that consumer perceived fairness is positively correlated with consumer trust (Hubbell and Chory-Assad, 2005; Lee, 2018). For instance, Mushagalusa et al. (2021) examine the impact of price fairness in financial institutions and show that price fairness positively affects consumer trust and satisfaction, thereby reducing customer switching intentions. Therefore, we conjecture that the impact of controllability and locus of causality on consumer perceived fairness may be transferred to consumer trust.

Specifically, compared to low controllability, consumers with high controllability may believe that the firm still offers some opportunities for them to avoid being discriminated. These consumers may perceive the firm to be relatively more conscientious than firms that do not leave any way for consumers to anti-discriminate (i.e., low controllability). Thus, these consumers may have higher trust toward the firm than those with low controllability. Hence, we propose H2a.

H2a: The higher controllability of data-driven discrimination by consumers, the higher consumer trust.

Regarding locus of causality, when consumers attribute the discrimination to themselves, they tend to focus on how to make a difference and are relatively more likely to forgive the firm for practicing data-driven discrimination. By contrast, for consumers who attribute the discrimination to other parties, especially the firm, they are more likely to form very strong negative emotions toward the firm. In this case, they are less likely to trust the firm anymore. Hence, we propose H2b.

H2b: Compared with external attribution, consumer trust is higher when consumers internally attribute the data-driven discrimination.

In a similar vein, we propose that there is an interaction effect between controllability and locus of causality on consumer trust (H2c). Compared to consumers under internal attribution, consumers who attribute the discrimination externally to the firm or other parties tend to experience stronger negative emotions toward the firm (e.g., anger). This may erode consumer trust toward the firm irrespective of how controllable the discrimination is by consumers. Thus, we conjecture that the positive impact of controllability on consumer trust is stronger for consumers with internal attribution than those with external attribution. Hence, we propose H2c.

H2c: Controllability and locus of causality of data-driven discrimination have an interaction effect on consumer trust. Compared with external attribution, controllability has a stronger positive impact on consumer trust under internal attribution.

Substantial research shows that trust is gradually generated based on a series of favorable (or fair) interactions with other people or things (Holmes, 1991; Holtz, 2013). If consumers believe that a firm is fair, then the firm is also perceived to be more credible (Van den Bos et al., 1997). Fairness perception is found to be an effective predictor of individual's trust in an organization (Hubbell and Chory-Assad, 2005). Furthermore, previous research shows that perception of fairness significantly increases consumer satisfaction and trust (Mushagalusa et al., 2021). Thus, the dominant research on trust and fairness indicates that trust is a result of fairness. Thus, based on H1c and H2c, we further propose that the interaction between controllability and locus of causality affects consumer trust through perceived fairness (H3).

H3: Perceived fairness mediates the interaction effect of controllability and locus of causality of data-driven discrimination on consumer trust.

The Moderating Role of Consumer Self-Concept Clarity

Self-Concept Clarity refers to the degree to which individuals define their self-concept clearly and accurately (Campbell et al., 1996). Individuals with high self-concept clarity have more consistent self-belief and are less likely to change the description of their own personality traits (Campbell, 1990). Related research suggests that consumers with low self-concept clarity are more likely to be affected by marketing strategies (Mittal, 2015) and are more likely to purchase products recommended by sales assistants (Lee et al., 2010). For these consumers, in face of data-driven discrimination, their trust toward the firm may also be more easily swayed by other factors such as the locus of causality and controllability perceived by consumers. When attributing data-driven discrimination externally to the firm, consumer evaluation of the firm can be very low, which may lead to a negative halo effect toward the firm (Beckwith and Lehmann, 1976; Boatwright et al., 2008). In this case, regardless of high vs. low controllability, consumer trust toward the firm can be very low. Under internal attribution, however, consumers mainly blame themselves for being discriminated, and thus, they may be more likely to take actions to change the present situation. In this case, controllability of data-driven discrimination becomes more important, and it may have a much greater impact on consumer trust.

By contrast, consumers with high self-concept clarity mainly make decisions based on their independent opinions (Setterlund and Niedenthal, 1993). Previous research suggests that these consumers are more problem-solving-oriented in decision-making (Bechtoldt et al., 2010). Thus, when being discriminated, these consumers care more about how to change the present situation and get rid of discrimination through proactive behaviors, irrespective of internal vs. external attribution. In this case, high vs. low controllability perceived by consumers can be crucial

for them to form attitude toward the firm. Specifically, high controllability would lead to much higher consumer trust than low controllability. That is to say, controllability may generally have a significant positive effect on consumer trust no matter whether consumers internally or externally attribute the data-driven discrimination.

As a result, we conjecture that consumer self-concept clarity moderates the interaction effect between controllability and locus of causality on consumer trust, and propose H4a and H4b.

> *H4a*: For consumers with low self-concept clarity, controllability and locus of causality of data-driven discrimination have an interaction effect on consumer trust. Compared with external attribution, controllability has a stronger positive impact on consumer trust under internal attribution.
>
> *H4b*: For consumers with high self-concept clarity, controllability and locus of causality of data-driven discrimination have no interaction effect on consumer trust. Compared with low controllability, high controllability significantly improves consumer trust, no matter whether it is external attribution or internal attribution.

Our research framework is shown in **Figure 1**. In the next section, we will test our theoretical framework using two lab experiments.

STUDY 1: THE IMPACT OF THE ATTRIBUTION OF DATA-DRIVEN DISCRIMINATION

Method

Study 1 is a 2(controllability: high vs. low) × 2(locus of causality: internal vs. external) between-subjects design. We conducted the experiment on one of the largest data collection platforms in China. A total of 137 qualified undergraduate students participated in the experiment and were randomly assigned into one of the four conditions.

During the experiment, we first asked the subjects to imagine that they were discriminated by being imposed an additional service fee (compared to other consumers) while booking tickets online. The booking website took advantage of their database to analyze the behavior of different consumers and intentionally chose certain "prospective" loyal customers to charge them "Gold Medal Service" fees as a default option. All subjects read the same description of such a data-driven discrimination scenario. The only difference for the four conditions is the manipulation of consumer attribution of the website's discrimination.

For internal attribution conditions, the subjects imagined that they were discriminated because they accidentally clicked the button of "Agree to Enterprise Access to Personal Data" when they registered at the booking website. For external attribution conditions, the subjects imagined that they were discriminated because the online booking website (similar to other booking websites) tracks and uses consumers' behavioral data without their explicit consent. To manipulate low controllability, we asked the subjects to imagine that they could not change their status of being discriminated at the booking website even if they change their profile settings or browsing behaviors. In high-controllable conditions, however, the subjects imagined that they could change the status of being discriminated at the booking website by changing their profile settings or browsing behaviors (e.g., frequently visiting discount tickets).

After the subjects read the scenario, they reported their perceived fairness regarding the discrimination and their trust toward the booking website (on 5-point scales). We also asked the subjects to report how much they feel angry, frustrated, guilt, and anxious when facing with the scenario. This is because previous research suggests that emotion plays a non-negligible role in the formation of fairness judgments and subsequent fairness-related decision-making (Barsky et al., 2011; Zheng et al., 2017; Barclay and Kiefer, 2019). For example, Campbell (2007) suggests that emotional reactions affect perceived price fairness. Pillutla and Murnighan (1996) indicates that when respondents perceive ultimatum offers unfair, they will feel angry and reject the offer. Existing research has also found that disadvantaged-unfairness is stronger than advantaged-unfairness and that the disadvantaged-unfairness will cause negative reactions such as negative emotions, reduced demand,

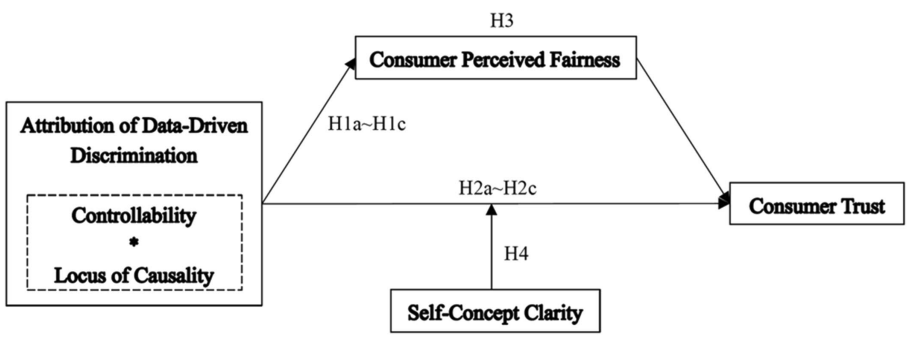


FIGURE 1 | Research Framework.

and the spread of negative word-of-mouth (Martins, 1995; Xia et al., 2004).

As a manipulation check for controllability toward the discrimination, the subjects indicated how much they agree with the following statements: "I can strategically change my behavior to avoid being discriminated," "No matter how I change my behavior, I cannot avoid being discriminated," and "The situation of being discriminated is something that I can control by strategically changing my behavior" (5-point scale, 1 = strongly disagree; 5 = strongly agree). Regarding the manipulation check for the locus of causality, we asked the subjects to indicate their agreement with the following statements: "I am discriminated due to my own reasons," and "I am discriminated due to other reasons instead of myself" (5-point scale, 1 = strongly disagree; 5 = strongly agree). Finally, the subjects left their demographic information (e.g., gender and age) and were compensated with a cash lottery.

Results

Manipulation Check

The results show that the manipulation of attribution is successful. Specifically, the evaluation of the controllability in high-controllable conditions is significantly higher than that in low-controllable conditions ($M_{\text{high controllability}} = 3.47$, $M_{\text{low controllability}} = 2.55$, $F(1,135) = 33.967$, $p < 0.001$). Compared with external attribution conditions, the subjects in the internal attribution conditions are significantly more inclined to believe that they are discriminated by the website because of their own reasons ($M_{\text{internal attribution}} = 2.61$, $M_{\text{external attribution}} = 1.98$, $F(1,135) = 17.247$, $p < 0.001$).

Perceived Fairness

A linear regression model with controllability (0 = low controllability, 1 = high controllability) and locus of causality (0 = external attribution, 1 = internal attribution) as independent variables and perceived fairness as the dependent variable was conducted. The results show that the effect of controllability is significant. Compared with the low-controllable conditions, perceived fairness is significantly higher in high-controllable conditions ($M_{\text{high controllability}} = 2.25$, $M_{\text{low controllability}} = 1.83$, $t(134) = 2.277$, $p < 0.05$). Therefore, H1a is supported. The effect of the locus of causality on perceived fairness, however, is not significant ($t(134) = 0.624$, $p = 0.534$). Thus, H1b is not supported.

After including the interaction between controllability and locus of causality into the regression, it was found that the two-way interaction is significant ($t(133) = 2.034$, $p < 0.05$). As shown in **Figure 2**, when consumers attribute the data-driven discrimination to the firm (external attribution), the effect of controllability on perceived fairness is not significant. That is, regardless of the level of the controllability, consumer perceived fairness is relatively low ($M_{\text{high controllability}} = 2.00$, $M_{\text{low controllability}} = 1.95$, $t(66) = 0.186$, $p = 0.853$). When consumers attribute the data-driven discrimination to themselves (internal attribution), however, perceived fairness is significantly higher in high-controllable conditions than that in low-controllable conditions ($M_{\text{high controllability}} = 2.51$, $M_{\text{low controllability}} = 1.71$, $t(67) = 3.006$, $p < 0.01$). Therefore, the positive effect of controllability on perceived fairness is stronger under internal attribution (than under external attribution). Hence, H1c is supported.

Consumer Trust

Regarding consumer trust, the effect of controllability is significant and consumer trust is significantly higher in high-controllable conditions than that in low-controllable conditions ($M_{\text{high controllability}} = 2.28$, $M_{\text{low controllability}} = 1.93$, $t(134) = 2.119$, $p < 0.05$). Therefore, H2a is also supported. However, the effect of the locus of causality on consumer trust is not significant ($t(134) = 0.482$, $p = 0.630$), and thus, H2b is not supported. After including the interaction between controllability and locus of causality into the regression, it was found that the interaction effect is significant ($t(133) = 1.744$, $p < 0.10$). As shown in **Figure 3**, the effect of controllability on consumer trust is only significant when consumers attribute data-driven discrimination to themselves (internal attribution; $M_{\text{high controllability}} = 2.47$, $M_{\text{low controllability}} = 1.84$, $t(67) = 2.653$, $p < 0.01$). When consumers attribute data-driven discrimination to the firm (external attribution), however, the effect of controllability becomes nonsignificant ($M_{\text{high controllability}} = 2.09$, $M_{\text{low controllability}} = 2.03$, $t(66) = 0.280$, $p = 0.781$). Therefore, H2c is supported.

The Mediating Role of Perceived Fairness

In this analysis, we test whether perceived fairness mediates the significant interaction effect between controllability and the locus of causality on consumer trust. As shown above, the interaction effect between controllability and the locus of causality on perceived fairness is statistically significant ($t(133) = 2.034$, $p < 0.05$). Moreover, when we regress consumer trust on perceived fairness and the interaction between controllability and the locus of causality, the effect of perceived fairness is positive and significant ($t(132) = 11.034$, $p < 0.001$) while the interaction effect becomes nonsignificant ($t(132) = 0.455$, $p = 0.65$). This indicates that perceived fairness fully mediates the interaction effect between controllability and the locus of causality on consumer trust. To formally test the mediating effect of perceived fairness, we conducted a mediated moderation analysis using the process procedure in SPSS [Model 8, Hayes (2017)]. The results show that the mediated moderation is significant (95% CI = [0.0190, 0.9264], based on 5,000 samples). Therefore, H3 is supported.

Furthermore, we also explored the mediating role of consumer emotions. The results show that controllability significantly reduces consumer anger ($M_{\text{high controllability}} = 3.89$, $M_{\text{low controllability}} = 4.18$, $t(134) = -1.809$, $p = 0.073$), and the chain intermediary effect "controllability – consumer perceived fairness – consumer angry – consumer trust" is significant (95%CI = [0.0008, 0.0708], based on 5,000 samples). Compared with low-controllable conditions, consumers perceive higher fairness, lower angry, and higher trust in high-controllable conditions. The locus of causality, however, mainly influences consumer guilt. Compared with external attribution, consumer guilt is significantly higher when consumers internally attribute the data-driven discrimination to themselves ($M_{\text{internal attribution}} = 2.48$, $M_{\text{external attribution}} = 1.93$,

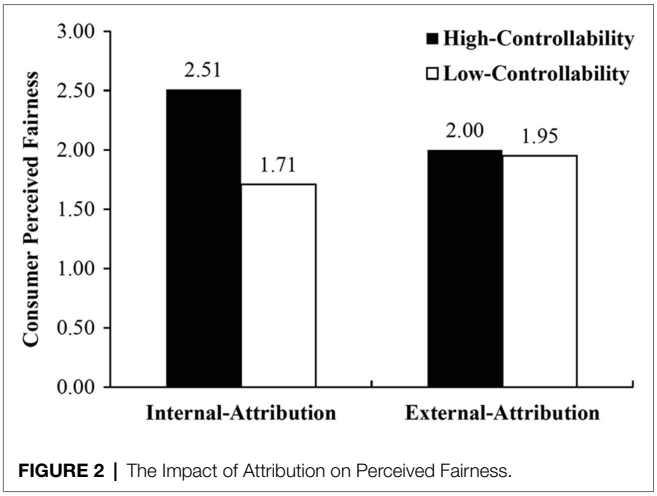


FIGURE 2 | The Impact of Attribution on Perceived Fairness.

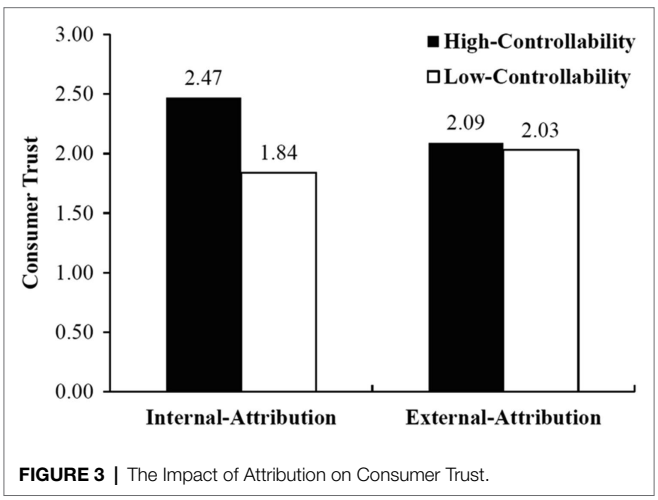


FIGURE 3 | The Impact of Attribution on Consumer Trust.

$t(134) = 2.729$, $p < 0.01$). Moreover, our data support a chain intermediary effect "locus of causality – guilt – consumer perceived fairness - consumer angry – consumer trust" (95%CI = [0.0007, 0.0396], based on 5,000 samples), though the total effect of locus of causality on consumer trust is not significant. These findings indicate that different emotions may play important and different roles in the impact of attribution on perceived fairness and consumer trust toward the firm, which extend the "cognitive attribution-emotion-behavior" model of Weiner (1980).

Discussion

Study 1 shows an interactive impact of controllability and locus of causality on consumer trust and the mediating role of perceived fairness in the above relationship. The results generally support an "attribution-perceived fairness-consumer trust" model in the context of data-driven discrimination. Other than perceived fairness, however, there can be other reasons why consumers in the internal attribution and high controllability condition would have higher trust. For example, these consumers may have less privacy concerns or higher general autonomy or control perceptions, which leads them to have higher trust. To rule out these alternative explanations, we conducted another experiment using general online shoppers rather than college students as subjects. The design and scenarios are the same with those of Study 1, except that we further measured consumer privacy concerns and general perceived autonomy over personal information (Sheng et al., 2008; Robert and You, 2018). The results from this experiment have largely replicated those of Study 1. However, the interaction effect of controllability and locus of causality on either privacy concerns ($p = 0.17$) or perceived autonomy ($p = 0.47$) is not significant. Thus, these two alternative explanations cannot explain the interaction effect of controllability and locus of causality on consumer trust.

STUDY 2: THE MODERATING ROLE OF SELF-CONCEPT CLARITY

In Study 2, we used another discrimination scenario to replicate the conclusions of study 1 and further examined the moderating role of self-concept clarity.

Method

Study 2 is also a 2(controllability: high vs. low) × 2(locus of causality: internal vs. external) between-subjects design. One hundred and fifty qualified undergraduate students participated in the study. All subjects were randomly assigned into one of the four conditions.

During the experiment, the subjects were first shown the description of the discrimination scenario. The subjects imagined that she/he is a loyal customer to an online retailer, which tracks customer shopping behavior and is proficient at utilizing data analytics to treat customers differently. We asked the subjects to imagine that "You and your colleague both made a purchase (of the same product) at the online retailer the other day, but the retailer only provided gifts to your colleague, who is new to the online retailer." All subjects read the same scenario description, and the only difference for the four conditions is the attribution of the retailer's discrimination.

For internal attribution conditions, the subjects imagined that they were treated differently because "you accidentally clicked the button of 'Agree to Enterprise Access to Personal Data' when registering at the retailer." "This allows the retailer to analyze your personal data and identify that you will still be loyal to the retailer even if it does not provide you the gifts." For external attribution conditions, the subjects imagined that they were treated differently because "the retailer (similar to other retailers) tracks and uses your behavioral data without your consent." "This allows the retailer to analyze your personal data and identify that you will still be loyal to the retailer even if it does not provide you the gifts." To manipulate low controllability, we asked the subjects to imagine that "you could not change the status of being discriminated at the retailer even if you change your profile settings or browsing behaviors." In high-controllable conditions, however, the subjects imagined that "you could change the status of being discriminated at

the retailer by changing your profile settings or browsing behaviors (e.g., opt out of the agreement for sharing your data with the retailer)."

After reading the scenario, we asked the subjects to report their perceived fairness of the practice of the retailer and their trust toward the retailer (5-point scale). Then, we measured the subjects' self-concept clarity using the scale developed in previous research (Campbell et al., 1996; 5-point scale) and used a median split to classify subjects into high vs. low self-concept clarity. To be noted, we followed most prior literature to consider self-concept clarity as a stable and enduring disposition of consumers (e.g., Savary and Dhar, 2020) and did not directly manipulate self-concept clarity. The items for the manipulation check of controllability and locus of causality are similar to those of study 1. Finally, the subjects left their demographic information (e.g., gender and age) and were thanked and fully debriefed.

Results

Manipulation Check

Compared to low controllability conditions, subjects in high controllability conditions perceived that the situation was significantly more controllable ($M_{\text{high controllability}} = 3.52$, $M_{\text{low controllability}} = 2.44$, $t(148) = 13.178$, $p < 0.001$). Furthermore, subjects in internal attribution conditions were significantly more inclined to believe that being discriminated was caused by their own reasons than those in external attribution conditions ($M_{\text{internal attribution}} = 3.62$, $M_{\text{external attribution}} = 2.30$, $t(148) = 17.850$, $p < 0.001$). Thus, the experimental manipulation was successful.

The Moderating Role of Self-Concept Clarity

We first examined the impact of attribution of data-driven discrimination on consumer trust and found similar results to those of Study 1. That is, controllability significantly improves consumer trust and the interaction between controllability and locus of causality is also significant. Then, we categorized subjects into high vs. low self-concept clarity using a median split and examined the three-way interaction of self-concept clarity, controllability, and locus of causality. The results show that the three-way interaction on consumer trust is significant ($t(142) = -1.808$, $p < 0.10$; see **Table 1**). Moreover, the two-way interaction effect between controllability and locus of causality is also significant ($t(142) = 3.013$, $p < 0.01$).

To delve into the three-way interaction and test H4a and H4b, we conducted a linear regression for subjects with high vs. low self-concept clarity separately. For subjects with low self-concept clarity, we replicated the conclusions of Study 1. As shown in Panel (A) of **Figure 4**, the interaction between controllability and locus of causality significantly affects consumer trust ($t(69) = 3.108$, $p < 0.01$). In particular, the effect of controllability on consumer trust is only significant under internal attribution ($M_{\text{high controllability}} = 2.62$, $M_{\text{low controllability}} = 1.60$, $t(39) = 3.866$, $p < 0.001$). For external attribution, regardless of controllability, consumer trust is relatively low ($M_{\text{high controllability}} = 1.80$, $M_{\text{low controllability}} = 1.94$, $t(30) = -0.557$, $p = 0.581$). As a result, H4a is supported. For subjects with a clear and accurate self-concept, however, the interaction between controllability and locus of causality is not significant ($t(73) = 0.493$, $p = 0.623$). For these subjects, as shown in Panel (B) of **Figure 4**, no matter whether being discriminated is caused by themselves or by the firm, consumer trust in low-controllable conditions is significantly lower than that in high-controllable conditions (internal attribution: $M_{\text{high controllability}} = 2.41$, $M_{\text{low controllability}} = 1.61$, $t(33) = 2.874$, $p < 0.01$; external attribution: $M_{\text{high controllability}} = 2.35$, $M_{\text{low controllability}} = 1.74$, $t(40) = 2.319$, $p < 0.05$). Thus, H4b is also supported.

TABLE 1 | Regression analysis results (Study 2).

	Coefficients	Std. Error	t-value	value of p
Intercept	1.941***	0.198	9.817	0.000
Controllability	−0.141	0.289	−0.489	0.626
Locus of Causality	−0.341	0.269	−1.269	0.207
Self-Concept Clarity	−0.204	0.272	−0.751	0.454
Controllability × Locus of Causality	1.160***	0.385	3.013	0.003
Controllability × Self-Concept Clarity	0.752*	0.384	1.960	0.052
Locus of Causality × Self-Concept Clarity	0.215	0.380	0.567	0.571
Controllability × Locus of Causality × Self-Concept Clarity	−0.971*	0.537	−1.808	0.073

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

Discussion

Study 2 used another discrimination scenario and replicated the findings of Study 1. More importantly, Study 2 examines a boundary condition of the interaction effect of controllability and locus of causality on consumer trust, in which the interaction effect holds solely for consumers with low self-concept clarity. For consumers with high self-concept clarity, only the main effect of controllability on consumer trust is significant. This may be because consumers with high self-concept clarity are more problem-solving-oriented and care more about how to avoid being discriminated by strategically changing their behaviors, rendering them less likely to be affected by the locus of causality and more likely to be influenced by controllability.

To be noted, similar to the results of Study 1, Study 2 shows no significant impact of locus of causality on perceived fairness or trust. We conjecture that the nonsignificant impact of locus of causality in our research setting can be caused by a ceiling effect. Data-driven discrimination, especially discrimination against the firm's loyal customers, breaks social norms and cannot be easily justified or rationalized by the firm. Even if the firm claims that consumers themselves (rather than the firm) can be responsible for their being discriminated, consumers may still feel highly unfair (and have lower trust) when facing such discrimination. In this circumstance, locus of causality (internal or external) may not significantly affect perceived fairness and consumer trust.

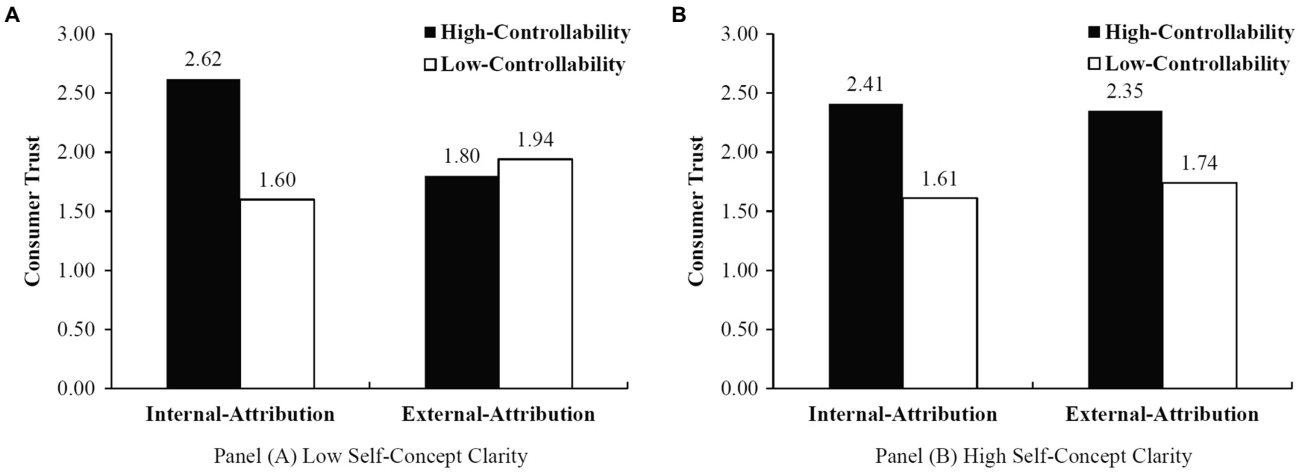


FIGURE 4 | Impact of Attribution for Consumers with Low (Panel **A**) vs. High (Panel **B**) Self-Concept Clarity.

GENERAL DISCUSSION

This research employs attribution theory to investigate how consumers respond to a new type of discrimination that emerges with the development of big data analytics – data-driven discrimination. We conducted two laboratory experiments to examine how the different attributions of data-driven discrimination from a consumer perspective (i.e., controllability and locus of causality) affect perceived fairness and consumer trust toward the firm and obtained some interesting findings.

First, we show a significant interaction effect between the controllability and locus of causality of data-driven discrimination on consumer perceived fairness. The controllability by consumers can only increase consumer perceived fairness when consumers attribute the discrimination internally to themselves. The effect of locus of causality, however, cannot significantly affect perceived fairness. Thus, consumers generally perceive data-driven discrimination to be highly unfair even if being discriminated may be due to their own reasons. This finding is inconsistent with previous research which suggests that consumers perceive a price increase to be more unfair if they attribute the price increase internally to the firm rather than external factors (e.g., Xia et al., 2004). The nonsignificant impact of locus of causality in our research setting could be caused by a ceiling effect, in which data-driven discrimination (with either internal or external attribution) generates extremely unfair perceptions. Second, we show that the above interaction effect on perceived fairness can be transferred to consumer trust. This finding indicates an "attribution-perceived fairness-consumer trust" model, and alternative mechanisms through privacy concerns or perceived autonomy over personal information are not supported. Hence, data-driven discrimination can greatly erode consumer trust toward the firm, especially when the discrimination is attributed in certain ways (e.g., external attribution or internal attribution with low controllability) and high unfairness perceptions are generated. This suggests that data-driven discrimination may have profound influence on a firm's customer relationship management. Finally, the interaction effect between the controllability and locus of causality on consumer trust varies according to consumer self-concept clarity. The interaction effect holds only for consumers with low self-concept clarity; for consumers with high self-concept clarity, controllability plays a dominant role.

Theoretically, this paper contributes to related literature on consumer response to discrimination and attribution theory. Despite the widespread attention aroused by data-driven discrimination, little empirical research examines how consumers respond to it. Previous research on consumer response to price discrimination only examines its general negative impact on perceived fairness and consumer trust, whether and when consumers respond to discrimination less negatively, especially when the discrimination is data-driven and norm-breaking, remains understudied. This article fills the research gap and provides insights into how the attribution of data-driven discrimination may affect consumer fairness perception and trust toward the firm. Second, we extend attribution theory to examine consumer response to a new type of discrimination emerging in data-rich environments. Different from previous research, we innovatively discuss the attributions of data-driven discrimination (i.e., controllability and locus of causality) from the consumer perspective and examine how these two interactively influence consumer response. These investigations are new to the literature and provide additional insights (beyond those in previous literature) into how attributions may affect consumer fairness perceptions. For example, in our research setting, we show that controllability and locus of causality have an interaction effect on consumer response to data-driven discrimination, while locus of causality *per se* has no significant effect. Finally, based on the "cognitive attribution-emotion-behavior" model, the results of this paper suggest an "attribution-perceived fairness-consumer trust" model for consumer response to data-driven discrimination. Our results also reveal the important role that different emotions play in the relationship between attribution and consumer trust. Our conclusions

illuminate the underlying mechanism and boundary condition of the interaction effect between controllability and locus of causality regarding data-driven discrimination on consumer trust, thereby providing fine-grained insights into how and when attribution may reshape consumer trust.

The conclusions of this article also provide some managerial implications. First, when strategically deciding whether to involve in data-driven discrimination, firms may survey possible consumer attributions of their data-driven discrimination and take these attributions into serious consideration. Increasingly more firms are involving in the practice of data-driven discrimination, but few of them are aware of how certain attributions can generate extremely unfair perceptions and ruin their reputation among consumers. Second, when firms encounter a crisis due to discriminating consumers using data analytics, they had better emphasize the potential ways through which consumers can avoid being discriminated (i.e., the controllability by consumers). This is because controllability by consumers may help firms attenuate the negative effects of discrimination (e.g., eroded trust). Furthermore, the firm should also pay attention to consumers' attribution of locus of causality of its data-driven discrimination as whether communicating controllability with consumers is effective further depends on locus of causality. When consumers externally attribute the discrimination to the firm or other parties, for instance, consumer perceived fairness and trust toward the firm can be very low even if consumers have volitional control over whether to be discriminated. In the face of this situation, the firm may need to apologize publicly and make substantial compensation to consumers in a timely manner, so as not to greatly erode consumer trust. Third, when firms are dealing with crises caused by its practice of data-driven discrimination, they may also need to adjust their strategies according to consumer characteristics such as self-concept clarity. For consumers with high self-concept clarity, communicating controllability can be an effective strategy to maintain consumer trust. For consumers with low self-concept clarity, however, communicating controllability only works for consumers who attribute the discrimination internally to themselves. Finally, when implementing data-driven discrimination, firms should be especially cautious of perceived fairness and consumer emotions, as they mediate the effect of the attribution of data-driven discrimination on consumer trust. Firms may try to introduce its practice of data-driven discrimination to consumers in more justified ways, which helps firms increase consumer perceived fairness and consumer trust. Firms should also be wary of consumers' negative emotional reactions to their data-driven discrimination, as emotions like anger may be the key between unfairness perception and eroded trust. Consumer guilt (aroused by internal vs. external attribution), however, can generate higher fairness perception, lower anger, and higher trust. Thus, when facing a crisis, inducing consumers to be guilty may help firms attenuate the negative effects of involving in data-driven discrimination.

As the first attempt to examine consumer response to data-driven discrimination, this article has several limitations awaiting further research. First, we mainly focus on data-driven discrimination with loyalty penalty, in which the discrimination is against the firm's loyal customers. Future research may extend our research to examine consumer response to more general forms of data-driven discrimination where no loyalty penalty is involved. Second, in Study 2, we measured (rather than manipulated) consumer self-concept clarity and classified subjects into high vs. low self-concept clarity by a median split. Though this is common practice in consumer behavior literature, this may to some extent compromise our internal validity. Therefore, future research may directly manipulate consumer self-concept clarity and more formally examine its moderating role. Third, we show the effect of attribution regarding data-driven discrimination on consumer trust using only two studies with two specific discrimination scenarios. As data-driven discrimination has diverse forms, future research may replicate our findings using other more interesting discrimination scenarios. Finally, similar to most previous research, we used laboratory experiments to ensure internal validity and establish causal relationship. Future research can examine the effect of attribution of data-driven discrimination in more realistic settings and use more general population as subjects, to enhance the external validity.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

LS and YT: conceived and designed the study, literature search, and synthesis. YT: data collection and analysis. LS: wrote the paper. All authors contributed to the article and approved the submitted version.

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How Culture and Trustworthiness Interact in Different E-Commerce Contexts: A Comparative Analysis of Consumers' Intention to Purchase on Platforms of Different Origins

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The outgrowth of e-commerce has advanced the development of countries' economies. Today, online marketplaces are targeting not only their local customers but are also spreading their interests overseas, expanding cross-border e-commerce. The current study aims to analyze the interaction of customer's personal traits, such as national culture, disposition to trust, and perceived trustworthiness, and their effect on the purchase intention within different e-commerce contexts. The contexts are chosen based on the country-of-origin parameter and serve as the moderator in the research model. Both direct and indirect effects of cultural dimensions on trustworthiness and purchase intention are analyzed within the research framework. The data for the analysis are randomly collected among the Russian population and assessed using structural equation modeling (SEM). The analysis results prove the marketplace context moderates the interaction of customers' personal traits among each other and their effect on the purchase intention. The study shows that dimensions of national culture have a more substantial effect on perceived trustworthiness and purchase intention in the Chinese marketplace context. The current study contributes to the analysis of customer behavior patterns within context, expanding context-related research direction. It increases the specificity of the culture and trustworthiness research and deepens the understanding of country-of-origin moderating effect in e-commerce. Moreover, addressing a high-level uncertainty avoidance culture within the research framework, the study diversifies the existing set of analyzed cultures in the e-commerce environment. The current study is applicable both in domestic and in cross-border e-commerce practice, broadening the understanding of consumer behavior patterns. The research model is relevant for the analysis of trust-effected behavioral outcomes.

Keywords: consumer behavior, purchase intention, trustworthiness, culture, e-commerce, context, country-of-origin

INTRODUCTION

In the globalized world, e-commerce is a dynamically developing business direction whose activities have erased borders, giving customers unlimited consumption opportunities. Countries with a developed e-commerce system are targeting overseas customers. With the shift of e-commerce from local to cross-border, it is essential not only to develop e-commerce inside the country but also to facilitate the development of ≪international online outshopping (IOO)≫ (Ramkumar and Jin, 2019). To fulfill this task, it is vital for the platforms expanding their business overseas to understand their potential customers' personal traits, which, on the one hand, will make consumption easy and attractive for customers and, on the other hand, will boost the overseas expansion of the marketplace.

Despite growing cross-border e-commerce, the customer perception of the foreign marketplaces has scarcely been analyzed. Some studies underline the importance of context and its effect on customers' behavioral outcomes. Ramaswamy (2013) advocates the importance of context and comprehension of customers as the fundamental principles of forward-looking businesses. Bansal et al. (2016) refer to the context and personality in relation to privacy concerns. The current study aims to fill the gap in the existing online context-related literature analyzing the influence of customer attributes, namely, the dimensions of the national culture following Hofstede's cultural dimension theory (Hofstede, 1980) and perceived trustworthiness (Mayer and Davis, 1995) in the context of marketplaces of different country-of-origin.

Russian consumers and their online purchase behavior are chosen as a subject for the analysis for several reasons. First, Russia is a country with a developing e-commerce infrastructure, while the analysis of consumer purchase intention in this kind of country is limited. Second, due to its size, population, and the growing number of Internet users, Russia is an attractive target for international e-commerce platforms. Third, Russian culture is characterized by an extremely high level of uncertainty avoidance (Hofstede, 1980). Uncertainty is a crucial point in the acceptance of e-commerce practices.

Based on the recent analytical data, three major groups of e-commerce platforms are dominating the market based on the country-of-origin: Russian, Chinese, and English speaking. The share of Chinese platforms has increased dramatically, from 25% in 2013 to 73% in 2019, while English-speaking platforms remain more or less stable, accounting for 21% in 2013 and 29% in 2019[1]. Despite having unlimited purchasing opportunities, customers still tend to refer to the local platforms, and the majority of purchases are made on Russia-based platforms. From each overseas group, the most popular platform is chosen for the analysis. AliExpress is taken as a representative of the Chinese e-commerce platform. In March 2021, the average daily number of local orders on the platform reached 64 thousand per day. The total number of unique buyers for the fiscal year exceeded 26.2 million people. The monthly audience of AliExpress is 29.1 million people. The daily audience is 8.8 million people[2]. E-bay is chosen as an example English-speaking platform. It started operating in Russia in 2010, launching a Russian language site in the attempt to expand its global presence. In the period from 2017 to 2018, the number of unique customers reached 850 thousand people[3].

Obviously, as online consumption is not a common practice for the majority of the local population, consumers face a range of uncertainty issues. Among the most common issues are the inability to touch or try on the product and doubts about the product quality. Many customers prefer to pay for the goods on delivery, although overseas platforms mostly use a prepayment method. It is not straightforward for customers whom they should refer to in the case of a problem. They consider it is uneasy to return a product.

The research model is developed based on the existing theoretical literature. It assesses national culture on the individual level and customers' trustworthiness toward marketplaces of various country-of-origin. The study subjects customers' purchase intention of the goods online to the analysis, assessing the effect of the national culture and trustworthiness on it. The study attempts to answer the question of whether the effect of customer culture on trustworthiness dimensions, and the effect of perceived trustworthiness and cultural dimensions on purchase intention, differs throughout the context of foreign marketplaces.

Following originated by Bansal's et al. (2016) context-related research, the current study contributes to the research direction, increasing specificity of the culture and trustworthiness research. It addresses the country-of-origin concept, which is poorly analyzed in the e-commerce environment. Moreover, addressing a high-level uncertainty avoidance culture within the research framework, the study diversifies the existing set of analyzed cultures in the e-commerce environment.

LITERATURE AND HYPOTHESES

The effect of the national culture on the consumers' behavior in general and e-commerce consumers, in particular, is difficult to argue (Lynch and Beck, 2001; Kacen and Lee, 2002; Gefen and Heart, 2006; Hallikainen and Laukkanen, 2018). Although the range of studies employing national culture is rather extensive, they are mainly concentrated on the particular group of cultures for the analysis majoring in the US and China. Park et al. (2012) add South Korea to the analyzed cultures. Chen et al. (2008) conduct a comparative analysis of virtual community members in China, Hong Kong, and Taiwan, which did not show any significant difference among the cultures. Capece et al. (2013) subject the Italian sample to the analysis. Hallikainen and Laukkanen (2018) uses the dimensionality of trust and trust-related constructs and their relationship to culture using China and Finland as samples. As can be seen, all the research works have been conducted in counties with well-developed e-commerce infrastructure. The current study aims to fill this

[1]https://yandex.ru/company/researches/?type=researches&tag=ecommerce [accessed June 5, 2020].

[2]https://press.aliexpress.ru/page18635284.html [accessed May 25, 2021].

[3]https://www.ebayinc.com/stories/news/ebay-expands-global-presence-new-russian-language-site-and-first-ever-ad-campaig-1/ [accessed May 25, 2021].

research gap by analyzing the Russian customer, where e-commerce is still in the development stage and brings up many trust and uncertainty issues among the customers.

Several studies (Hofstede, 1980; Fukuyama, 1995; Doney et al., 1998) propose a close relationship between trust and culture. For example, Doney's et al. (1998) model incorporates cultural effects on trust-building processes. Even though Gefen and Heart (2006) advocates the necessity to use culture as a critical element in the analysis of e-commerce trust beliefs (trustworthiness), the US and Israel are chosen as the cultures for the analysis, which does not change the diversity of analyzed cultural sets in the e-commerce environment dramatically. Analyses of different cultural dimensions in the e-commerce environment have been conducted by Yoon and Kim (2009), Hwang and Lee (2012), Capece et al. (2013), Shiu et al. (2015), Shiu et al. (2015), and Hallikainen and Laukkanen (2018).

Taking Hofstede's cultural dimension theory, which initially consists of five dimensions, as the basis to assess culture on the individual level, the current study does not seek to employ all the cultural dimensions described in the theory as not all of them are considered to affect the trustworthiness dimensions of the customers in the online environment. Therefore, uncertainty avoidance and long-term orientation dimensions are subjected to the analysis.

Uncertainty avoidance (UAI), in which Russia scores exceptionally high (95) in general, refers to the tendency to avoid uncertain and new situations by members of a society (Hofstede and Hofstede, 2005). The second dimension subjected to the analysis is long-term orientation (LO), where Russia scores high as well (93) (Hofstede Insights).

It is supposed that the disposition to trust is not based on previous experience or hence on personal traits (Rotter, 1967; Kee and Knox, 1970). The range of studies advocates that representatives of different countries vary in their disposition to trust (Downes et al., 2002; Kirs and Bagchi, 2012). Some researchers suggest that disposition to trust, as a trust antecedent, mediates the relationship between personal characteristics, such as national culture and trusting behavior (Schoorman et al., 2007). The effect of the dimensions of the national culture on the disposition to trust has been assessed for Chinese and Finnish samples, where long-term orientation showed a statistically significant effect on disposition to trust, while uncertainty avoidance did not (Hallikainen and Laukkanen, 2018). Based on the previous findings, and supposing that culture subjected to the analysis in the current study differs from previously analyzed, it is hypothesized that:

H1: U*ncertainty avoidance affects disposition to trust online*
H2: L*ong-term orientation affects disposition to trust online*

Trust and its constructs are fundamental concepts of social interaction and have been thoroughly analyzed by scholars of different disciplines. In the e-commerce context, it plays a vital role and has been analyzed based on various aspects: disposition to trust as a factor of trust formation (Fukuyama, 1995; Gefen, 2000); perceived risk (Corbitt et al., 2003; Kim et al., 2008); perceived security (Bart et al., 2005; Casalo et al., 2007); perceived privacy (Bart et al., 2005; Casalo et al., 2007); perceived reputation (Doney and Cannon, 1997; Casalo et al., 2007); perceived usefulness (Davis, 1989; Pavlou, 2003); perceived system quality (Aladwani and Palvia, 2002; Yoon and Kim, 2009); perceived information quality (Cyr, 2008); perceived service quality (Parasuraman et al., 1988; Brown and Jayakody, 2009); design quality (Garrett, 2003; Bart et al., 2005); satisfaction (Anderson and Srinivasan, 2003, Chen and Chou, 2012); attitude (Fishbein and Ajzen, 1975; Teo and Liu, 2007); purchase intention (Kim et al., 2009); repeat purchase intention (Chiu et al., 2012); intention to use website (Gefen et al., 2003); and loyalty (Dick and Basu, 1994; Cyr, 2008).

Trust is considered to be a concept that develops over a long period of time, and as has already been mentioned, the research subjects to the analysis customers whose online experience is relatively new. Therefore, it seems necessary to address trustworthiness as a precedent of trust in the research framework.

Mayer and Davis (1995) is one of the first to differentiate two concepts: trust and trustworthiness. He refers to trust as the ≪willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party≫ (Mayer and Davis, 1995, p. 712). Trustworthiness, according to Mayer and Davis (1995), is a characteristic of the trustee. It is the condition that leads to trust and consists of three dimensions. Later on, this classification was accepted and applied by a range of researchers (McKnight et al., 2002; Gefen and Heart, 2006; Lu et al., 2010; Bansal et al., 2016; Oliveira et al., 2017; Hallikainen and Laukkanen, 2018). Following Mayer's approach, the current study adopts three dimensions of trustworthiness: ability, benevolence, and integrity, and assesses customers' perception of the dimensions related to a particular platform. Ability is generally understood as the competence of the trustee to perform a task as supposed. Benevolence is the capability of the trustee to prioritize the truster's interests, putting aside his egocentric profit motives. Integrity supposes that the trustee acts according to a set of principles acceptable for the trustor (Mayer and Davis, 1995; Chen and Dhillon, 2003). In the e-commerce literature, customers' perception of the trustworthiness dimensions is subjected to the analysis.

Disposition to trust is a well-established influencer on trustworthiness dimensions. Previously, several studies subjected the disposition to trust to the analysis in the online environment and found a positive correlation between it and trustworthiness dimensions (Gefen et al., 2003; Teo and Liu, 2007; Kim et al., 2008; Lu et al., 2010; Hallikainen and Laukkanen, 2018).

H3: Disposition to trust affects consumers' belief in the ability of the platform
H4: Disposition to trust affects consumers' belief in the integrity of the platform
H5: Disposition to trust affects consumers' belief in the benevolence of the platform

The relationship of the national culture and perceived dimensions of trustworthiness has been analyzed in a range

of research works (Gefen and Heart, 2006; Yoon and Kim, 2009; Hwang and Lee, 2012; Hallikainen and Laukkanen, 2018).

For the online environment, UAI is crucial, having a significant impact on trustworthiness (Hwang and Lee, 2012; Shiu et al., 2015). Hwang and Lee (2012) found a moderating effect of UAI on integrity and ability, while benevolence did not show any relation with national culture or purchasing intention. Yoon and Kim (2009) claims that UAI is the most significant dimension of the national culture, which not only affects the acceptance of new technology, particularly e-commerce activities, but also shows a significant effect on behavioral outcomes as well as trustworthiness. Hallikainen and Laukkanen (2018) confirm these findings.

H6: *Uncertainty avoidance affects consumers' belief in the ability of the platform*
H7: *Uncertainty avoidance affects consumers' belief in the integrity of the platform*
H8: *Uncertainty avoidance affects consumers' belief in the benevolence of the platform*

It is believed that in the e-commerce environment, members of a high long-term-oriented society require a deep level of trust. It is essential for them to be familiar with the online platform before purchasing (Harris and Dibben, 1999). Hallikainen and Laukkanen (2018) found out that LO affects the disposition to trust and demonstrates a complementary mediating effect on all the dimensions of trustworthiness.

H9: *Long-term orientation affects consumers' belief in the ability of the platform*
H10: *Long-term orientation affects consumers' belief in the integrity of the platform*
H11: *Long-term orientation affects consumers' belief in the benevolence of the platform*

All the dimensions of trustworthiness may differ independently and are considered a dynamic phenomenon. In their models, Mayer and Davis (1995) and Rousseau et al. (1998) use trust as a mediator to explain the relationship between trustworthiness and behavioral outcome (purchasing intention in the context of the current study). Colquitt et al. (2007) suggests that trustworthiness may be significant without the mediating role of trust. All the elements are proven to have a significant effect on the behavioral outcome and are used as predictors of affective commitment as well as trust. Following previous studies, trustworthiness dimensions are adopted and used in the research framework without the mediating role of trust. It has been assumed that trustworthiness dimensions can potentially diminish the level of uncertainty that is crucial for online purchase intention (Gefen and Straub, 2004). Prior studies show that dimensions of trustworthiness affect different online behavior (Gefen, 2002).

In the online environment, Gefen and Heart (2006) indicate that integrity primarily affects intentions to make a purchase, while ability primarily affects intentions to inquire about the product without actually purchasing it. Pavlou and Dimoka (2006) analyze the effect of trustworthiness on price. The current study assesses whether dimensions of perceived trustworthiness affect purchasing intention in the different contexts of online platforms.

The correlation between the perceived ability and purchase intention was found prior in e-commerce-related research literature (Gefen, 2000; Colquitt et al., 2007; Lu et al., 2010; Hwang and Lee, 2012). Therefore, it is hypothesized that:

H12: Consumers' belief in the ability of the platform affects purchase intention

Hwang and Lee (2012) claim that there is no relationship between benevolence and purchase intention. However, Colquitt et al. (2007) argue that there is a minor unique relationship between benevolence and behavioral outcome.

H13: Consumers' belief in the benevolence of the platform affects purchase intention

Several scholars found a positive effect of integrity on purchasing intention (Gefen, 2000; Colquitt et al., 2007; Hwang and Lee, 2012)

H14*: Consumers' belief in the integrity of the platform affects purchase intention*

According to Gefen and Heart (2006), disposition to trust, along with other trust-related measurements, affects actions within the e-commerce platform, including purchase intention.

H15: Disposition to trust affects customers' purchase intention.

A comprehensive literature analysis has shown that the majority of studies devoted to trustworthiness and culture in the e-commerce environment mostly ignore the context, assuming that trust always positively affects the behavioral outcome (Gefen and Heart, 2006). The study follows Pavlou and Gefen (2005) suggestion that e-commerce context moderates the effect of trust, which, in its case, affects the behavioral outcome. The current research compares two e-commerce contexts: Aliexpress and eBay, supposing that trustworthiness in these contexts may vary. The study differentiates context based on the country-of-origin. The concept of country-of-origin in its application to the purchasing intention and customer preferences has been widely analyzed in an offline environment. Dichter (1962) states that the concept "Made in.." significantly affects the consumers' acceptance of the product. Elliot and Cameron (1994) claim that country-of-origin influences the perception of the product by the consumer, placing it as one of the influential factors affecting consumer purchase intention. Hong and Wayer (1989) advocate that the country of origin indirectly affects customers' procession of information about the product. The application of this concept in e-commerce is relatively limited. Ramkumar and Jin (2019) analyze pre-purchase intention and post-purchase consequences of IOO using the effect of E-tailer's country image as a moderator factor, proving that country image moderates the relationship between transaction utility and IOO intention.

The current study suggests that country-of-origin moderates the effect of the national culture on the dimensions of trustworthiness toward the e-commerce marketplace and purchase intention in two marketplaces.

Based on the geography of the IOO of the customers subjected to the analysis, two online platforms were chosen as examples. The first one, Aliexpress, is a global e-commerce platform that provides goods produced mainly in China. It started operating in 2010 and can currently be considered a B2C and C2C platform. Today, the platform operates in English, Russian, Spanish, Arabic, and several other languages, alleviating language barriers and easing uncertainty issues. For Russian online customers, Chinese platforms are occupying the second favored place. Among Chinese platforms presented on the Russian market, Aliexpress is the most popular, while Russia is the largest market for AliExpress. From a customer perspective, trust issues on this platform can be related to machine translation errors, difficulty in communication with suppliers, quality issues, long delivery period, and country-of-origin image.

The second platform is eBay. It is an American-based company providing services in the area of online auction and online stores. From 2010, eBay started its international operation, and customers were able to use it in the Russian language. In 2012, it opened its branch in Russia. Despite the ability to use the website in the Russian language, where machine translation was not particularly accurate, there are two main drawbacks for the expansion of eBay in Russia, specifically the usage of PayPal, which Russian users are not familiar with, and logistics problems.

MATERIALS AND METHODS

Research Model

Based on the analysis of the existing theoretical literature, the following research model is developed. It consists of four parts. Two dimensions of the national culture measured at the individual level, adopted from Hofstede's cultural dimension theory, are used as independent variables; three constructs of trustworthiness adapted from Mayer and Davis (1995) are mediator factors in the model. It is supposed that disposition to trust mediates the relationship between the cultural dimensions and trustworthiness, nevertheless not excluding the possibility of direct effect between cultural dimensions and trustworthiness. Purchase intention is taken as a dependent variable. It is hypothesized that e-commerce platforms moderate the effect of the national culture and trustworthiness on purchase intention, so the platform is used as a moderator in the research model presented in **Figure 1**.

Research Methodology

Based on the existing research literature, the following approach is developed. In order to comprehend customers' culture at the individual level, Hofstede's cultural dimension theory is used as the basis. The theory assessed national culture in five dimensions. Meanwhile, the current research adopts two dimensions for the analysis: uncertainty avoidance and long-term orientation, as the most relevant to the trustworthiness issue. The rest are excluded as irrelevant for the current study.

As trustworthiness is used as a mediator factor in the conceptual model of the research, three dimensions of trustworthiness are assessed: ability, integrity, and benevolence as the most commonly used in trust-related research works (Serva et al., 2005; Colquitt et al., 2007). Disposition to trust, perceived trustworthiness, and purchase intention are measured for each online platform separately. Two groups of data set undergo further analysis.

Data Collection

The study is based on quantitative data analysis. The questionnaire survey is used as the primary tool of data collection. It was developed based on the previous studies and consisted of four parts following the conceptual model of the research: the first part covers the demographic information of the respondents, the second is related to the cultural dimensions (Hofstede, 1980), the third deals with trustworthiness dimensions (McKnight et al., 2002), and the fourth one is assessing the purchase intention online. The measurement of cultural dimensions on the individual level was applied to the analysis of both online platforms, while disposition to trust trustworthiness and purchase intention were measured separately for each online platform. A 5-point Likert scale was used in the questionnaire, ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was created in English and later translated into Russian. The pilot version of the questionnaire was presented to a group of respondents to ensure all the questions were easy to comprehend. All their comments and remarks were taken into consideration. After this, the modified version of the questionnaire was presented to the respondents.

The data for the analysis were collected through both an online survey platform and an offline distributed questionnaire to ensure sample representativeness and to cover different population groups. To collect the survey online, first, the questionnaire was compiled on the online platform Yandex.forms, and then the link to the questionnaire was randomly distributed using various social media platforms. The respondents who filled out the offline questionnaire were presented with the paper version. The data were collected from August 2019 to January 2020 and were further summarized and analyzed using AMOS SPSS 24. In total, 510 questionnaires were collected, and later, 46 were deleted as incomplete.

RESULTS

Descriptive Statistics

Participants of the survey are Russian citizens of different age groups, which ensures the sample's representativeness compared to the majority of the surveys using students as a sample. However, in the e-commerce environment, it arguably reflects the overall tendency as the younger population generally demonstrates a higher ability to adjust to changes and accept new technologies. In the current sample, 57.3% of the respondents are older than 40 years. The summary of the descriptive statistics is presented in **Table 1**.

Data Validation

Further data underwent multistep analysis. The measurement model was created in AMOS 24.0. In total, five measurements with low factor loading were removed. The re-specified model showed an acceptable model fit for two data sets subjected to the

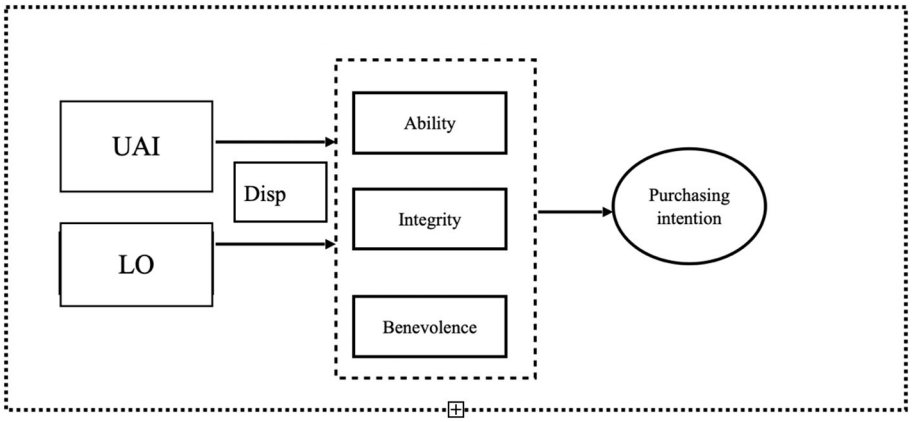


FIGURE 1 | Research model.

TABLE 1 | Descriptive statistics.

Variable	Items	Frequency	Percent, %
Gender	Male	234	52.7
	Female	210	47.3
Age	18–25	135	30.4
	26–30	69	15.5
	31–40	54	12.1
	41–50	70	15.7
	51+	116	26.1
Frequency of online purchase	Daily	13	3
	Several times/week	34	7.6
	Several times/month	124	27.9
	Several times/year	137	30.9
	Less than once a year	136	30.6
Educational background	High school	72	16.2
	College	86	19.3
	Specialist (5 years)	149	33.5
	Undergraduate	56	12.6
	Postgraduate	81	18.2

Source: Calculated by the authors.

TABLE 2 | Model fit.

	Aliexpress	Ebay	Acceptable model (Schumacker and Lomax, 2004: 82)
CMIN/DF	1.560	1.960	≤2
GFI	0.942	0.0.927	≥0.90
RMR	0.033	0.034	Closer to 0
CFI	0.978	0.966	≥0.90
RMSEA	0.036	0.047	≤0.05

CMIN, Contrast Media-Induced Nephropathy; DF, Degree of Freedom; GFI, goodness of fit index; CFI, Comparative fit index; RMR, Root Mean Square Residual; RMSEA, Root Mean Squared Error of Approximation. Source: Calculated by the authors using AMOS 24.0.

analysis. In order to validate the model, several indexes should be taken into consideration. Jaccard and Wan (1996, p. 87) recommend using at least three different tests to reflect different criteria. The model fit is presented in **Table 2**.

After the assessment of model fit, another important indicator, statistical power, was measured. Measurement of the statistical power is necessary to estimate the possibility of employing good and bad theory-implied constraints and specifications (Cohen, 1988, 1992). The study employs Structural equation modeling (SEM) for the analysis; therefore, to calculate statistical power, root mean square error approximation (RMSEA) index of the overall model fit is used (MacCallum et al., 1996). An online code generator was used to compute statistical power. Both models show relatively high indicators: 0.999 for the Aliexpress dataset and 0.996 for the eBay dataset (Preacher and Coffman, 2006).

At the preliminary stage of the analysis, constructs validity, and reliability were assessed (**Table 3**). Composite reliability (CR) was used to estimate the construct reliability (Brunner and Suss, 2005). The CR indicators of the constructs fall within the acceptable threshold of >0.60. Factor loadings of the constructs were assessed, demonstrating numbers of >0.50. Following Anderson and Gerbing and Anderson (1988), this demonstrates convergent validity. To further ensure validity, average variance extracted (AVE) was computed as well. Obtained values were higher than 0.50, which, according to Hair et al., 2010, indicates good construct validity. Discriminant validity is presented in **Table 4** with squared AVE higher than the squared correlation of the variables.

In order to assess the likelihood of common method bias, a common latent factor method was used (Serrano et al., 2018). There were no significant variances observed during the comparison of the standardized regression weight with and without common latent factor.

Hypotheses Testing

Structural equation modeling is used to assess the hypotheses. The study uses path analysis to evaluate the casual paths as well as

TABLE 3 | Construct validity and reliability.

	Aliexpress		eBAy	
	CR	AVE	CR	AVE
UAI	0.8598	0.6205	0.8596	0.6205
LO	0.9318	0.5287	0.9322	0.5286
DT	0.8377	0.5363	0.8927	0.6164
AB	0.9341	0.7002	0.9444	0.7058
INT	0.9266	0.7295	0.8882	0.5903
BEN	0.9017	0.6595	0.8891	0.7396
PI	0.8667	0.6471	0.9307	0.6443

UAI, uncertainty avoidance; LO, long-term orientation; DT, trust disposition; AB, ability; INT, integrity; BEN, benevolence; PI, purchase intention; CR, composite reliability; AVE, average variance extracted.
Source: calculated by the authors.

TABLE 4 | Discriminant validity.

	UAI	LO	DISP	AB	INT	BEN	PI
Aliexpress							
UAI	**0.7877**						
LO	0.0102	**0.7271**					
DISP	0.0279	0.0193	**0.7322**				
AB	0.0190	0.0018	0.0713	**0.8367**			
INT	0.0077	0.0021	0.0702	0.1624	**0.8541**		
BEN	0.0001	0.0094	0.0202	0.1176	0.4356	**0.843**	
PI	0.0028	0.0002	0.0202	0.0007	0.0276	0.0369	**0.8120**
eBay							
UAI	**0.7877**						
LO	0.0102	**0.78**					
DISP	0.0246	0.0292	**0.7851**				
AB	0.0077	0.0044	0.0086	**0.8401**			
INT	0.0008	0.0010	0.0576	0.1832	**0.7683**		
BEN	0.0036	0.0022	0.0038	0.2088	0.7225	**0.8026**	
PI	0.0014	0.0066	0.0038	0.0059	0.1018	0.0835	**0.8599**

UAI, uncertainty avoidance; LO, long-term orientation; DT, trust disposition; AB, ability; INT, integrity; BEN, benevolence; PI, purchase intention; CR, composite reliability; AVE, average variance extracted.
Square root of AVE on diagonal, correlation of constructs are in columns under AVE.
Source: calculated by the authors.
Bold values are statistically significant indicators.

to identify the mediation effect in the model. The model analyzes two data sets to test the hypotheses. **Table 5** demonstrates the results of the hypothesized effect for the Aliexpress and eBay datasets. The results show a significant effect of UAI ($p < 0.01$) on trust disposition, confirming H1 for both data sets. A statistically significant effect of long-term orientation on trust disposition is observed in the Aliexpress (Std. $\beta = 0.128$, $p < 0.05$) and eBay data sets (Std. $\beta = 0.158$, $p < 0.01$). Therefore, H2 is confirmed for both sets of data. H3 stating the relationship between trust disposition and ability is confirmed for Aliexpress (Std. $\beta = 0.301$, $p < 0.001$), while for eBay, this relationship does not show statistical significance, rejecting the hypothesis. The effect of trust disposition on benevolence was found to be statistically significant for both data sets: Aliexpress (Std. $\beta = 0.294$, $p < 0.001$) and eBay (Std. $\beta = 0.148$, $p < 0.01$). H4 is supported. H5 assessing the relationship between trust disposition and integrity is supported for both Aliexpress (Std. $\beta = 0.297$, $p < 0.001$) and eBay (Std. $\beta = 0.148$, $p < 0.001$). The effect of uncertainty avoidance on ability, assessed in H6, shows statistical significance for both Aliexpress (Std. $\beta = 0.193$, $p < 0.001$) and eBay (Std. $\beta = 0.117$, $p < 0.05$). H7 is supported only for Aliexpress (Std. $\beta = 0.142$, $p < 0.01$). The effect of uncertainty avoidance on benevolence does not show statistical significance in either data set. Therefore, H8 is rejected. The effect of long-term orientation on the dimensions of trustworthiness is not significant in any analyzed data sets. H9–H11 are rejected. Ability does not show a statistically significant effect on purchase intention for Aliexpress or eBay. Consequently, H12 is rejected. A statistically significant effect of integrity on purchase intention is observed for eBay (Std. $\beta = 0.418$, $p < 0.01$), supporting H13 for eBay. H14, assessing the effect of benevolence on purchase intention, is supported for Aliexpress (Std. $\beta = 0.190$, $p < 0.05$). The effect of trust disposition on purchase intention is significant both for Aliexpress (Std. $\beta = -0.233$, $p < 0.001$) and for eBay (Std. $\beta = -0.153$, $p < 0.05$). H15 is supported for both sets of data.

Mediating Effect of Disposition to Trust and Trustworthiness

As the primary goal of the current study is to analyze the interaction between the personal traits and their effect on purchase intention, for a deeper assessment, the datasets are tested for the direct, indirect, and total effects for each context. Bootstrap analysis is performed with bootstrap samples set to 2,000 and a bias-corrected confidence interval set at 95 to assess the direct, indirect, and total effects of the constructs on each other within the context. The bias-correlated percentile method is used to obtain bias-correlated confidence interval and significance test. Estimands presented in **Table 6** were defined to assess specific mediation effects.

No statistically significant effect of the dimensions of the national culture on purchase intention mediated by the dimensions of trustworthiness is observed in either of the two data sets. The effect of uncertainty avoidance on ability mediated by the disposition to trust (UAI->DIS->AB) shows statistical significance for Aliexpress (-0.040; $p < 0.01$). Following Zhao et al. (2010) mediator effect classification, the mediator effect of uncertainty avoidance on ability can be classified as competitive mediation. The effect of the uncertainty avoidance on integrity mediated by the disposition to trust (UAI->DIS->INT) is found to be significant for both data sets, with a stronger negative effect for Aliexpress (-0.039, $p < 0.01$) when compared to eBay (-0.028, $p < 0.01$). For Aliexpress, it can be classified as competitive mediation; both direct and indirect effects exist, although pointing at different directions (Zhao et al., 2010). However, for eBay, indirect-only mediation is observed. The effect of the uncertainty avoidance on benevolence mediated by the disposition to trust (UAI->DIS->BEN) showed significance for both data sets, with a stronger negative effect for Aliexpress (-0.039, $p < 0.01$) when compared to eBay (-0.016, $p < 0.05$).

TABLE 5 | Results of hypothesized effect.

		Aliexpress			eBay		
Hypothesis	**Path**	**Std. β**	**C.R.**	***P***	**Std. β**	**C.R.**	***P***
H1	DISP<–UAI	−0.166	−3.080	**0.002****	−0.150	−2.899	**0.004****
H2	DISP<–LO	0.128	2.184	**0.029***	0.158	2.781	**0.005****
H3	AB<–DIS	0.301	5.375	***	0.088	1.623	0.105
H4	BEN<–DIS	0.294	5.155	***	0.148	2.741	**0.006****
H5	INT<–DIS	0.297	5.194	***	0.270	4.604	***
H6	AB<–UAI	0.193	3.758	***	0.117	2.239	**0.025***
H7	INT<–UAI	0.142	2.734	**0.006****	0.055	0.987	0.324
H8	BEN<–UAI	0.047	0.905	0.365	0.085	1.629	0.103
H9	AB<–LO	−0.071	−1.288	0.198	0.060	1.053	0.292
H10	INT<–LO	−0.074	−1.333	0.183	−0.007	−0.121	0.904
H11	BEN<–LO	0.058	1.027	0.305	0.029	0.518	0.605
H12	PI<–AB	−0.023	−0.379	0.704	−0.096	−1.574	0.115
H13	PI<–INT	0.110	1.358	0.174	0.418	2.654	**0.008****
H14	PI<–BEN	0.190	2.345	**0.019***	−0.003	−0.022	0.983
H15	PI<–DISP	−0.233	−3.702	***	−0.153	−2.512	**0.012***

*Significant at *p < 0.05, **p < 0.01, ***p < 0.001.*
UAI, uncertainty avoidance; LO, long-term orientation; DT, trust disposition; AB, ability; INT, integrity; BEN, benevolence; PI, purchase intention.
Source: Calculated by authors by using AMOS 24.
Bold values are statistically significant indicators.

TABLE 6 | Mediating effect.

	Aliexpress		eBay	
	Estimate	***P***	**Estimate**	***P***
UAI->BEN->PI	0.007	0.236	0.000	0.972
UAI->AB->PI	−0.003	0.683	−0.007	0.109
UAI->INT->PI	0.011	0.267	0.015	0.224
LO->BEN->PI	0.013	0.209	0.000	0.995
LO->AB->PI	0.002	0.461	−0.006	0.240
LO->INT->PI	−0.010	0.230	−0.003	0.819
UAI->DIS->BEN	**−0.039**	**0.004****	**−0.016**	**0.025***
UAI->DIS->AB	**−0.040**	**0.005****	−0.010	0.151
UAI->DIS->INT	**−0.039**	**0.005****	**−0.028**	**0.005****
UAI->DIS->PI	**0.028**	**0.006****	**0.015**	**0.021***
LO->DIS->BEN	**0.048**	**0.017***	**0.027**	**0.022***
LO->DIS->AB	**0.050**	**0.016***	0.016	0.136
LO->DIS->INT	**0.048**	**0.018***	**0.047**	**0.004****
LO->DIS->PI	**−0.035**	**0.011***	**−0.025**	**0.018***

*Significant at *p < 0.05, **p < 0.01.*
UAI, uncertainty avoidance; LO, long-term orientation; DT, trust disposition; AB, ability; INT, integrity; BEN, benevolence; PI, purchase intention.
Source: Calculated by authors by using AMOS 24.
Bold values are statistically significant indicators.

Indirect-only mediation is observed for both sets of data. The effect of uncertainty avoidance on purchase intention mediated by the disposition to trust (UAI->DIS->PI) shows a positive statistically significant effect in both data sets, where the effect for Aliexpress (0.028, $p < 0.01$) is stronger when compared to eBay (0.015, $p < 0.05$). The effect of uncertainty avoidance on purchase intention is indirect-only.

The long-term orientation shows a positive significant effect on ability (LO->DIS->AB) for Aliexpress (0.05, $p < 0.05$). Indirect-only mediation is observed in the data set. The effect of long-term orientation on integrity (LO->DIS->INT) shows statistical significance for both Aliexpress data set (0.048, $p < 0.05$) and eBay (0.047, $p < 0.01$) with indirect-only mediation. The positive effect of long-term orientation on benevolence mediated by the disposition to trust (LO->DIS->BEN) is observed in both data sets, with a stronger effect for Aliexpress (0.048, $p < 0.05$) when compared to eBay (0.027, $p < 0.05$). Indirect-only mediation is observed for both Aliexpress and eBay. Negative effect of long-term orientation on purchase intention (LO->DIS->PI) is observed in both data sets, with stronger negative effect in Aliexpress (-0.035, $p < 0.05$) when compared to eBay (−0.025, $p < 0.01$). An indirect-only type of mediation is observed for both sets of data.

DISCUSSION AND CONCLUSION

The study attempts to assess the interaction of the customer's personal traits and their effect on purchase intention in different contexts. Two dimensions of the national culture measured at the individual level, disposition to trust e-commerce platforms, perceived trustworthiness related to particular platforms, and purchase intention are assessed to answer the research question. Based on the geography of the consumption and the country-of-origin factor, disposition to trust, trustworthiness dimensions, and purchase intention are measured regarding Aliexpress (Chinese) and eBay (the US) data sets.

A comparison of the assessed hypotheses gives a clear understanding of the fact that the personal traits of the customers

act differently within the context of the platforms. Their influence on purchase intention across platforms varies. The assessed effect of the dimensions of national culture toward the trust disposition was found to be different for the two marketplaces. So, the direct effect of uncertainty avoidance has a stronger negative effect on the trust disposition for the Aliexpress sample. On the contrary, the positive direct effect of long-term orientation on trust disposition is stronger for eBay. Both findings can be explained by a stronger country-of-origin image of eBay and confirmed by the existing analytical data signifying that customers tend to purchase more expensive and durable goods from the western platforms. Confirming previous findings (Gefen and Straub, 2004; Teo and Liu, 2007; Kim et al., 2008; Hallikainen and Laukkanen, 2018), trust disposition showed a positive effect on trustworthiness dimensions, except the effect of trust disposition on ability for eBay, which did not show statistical significance. Meanwhile, the effect of trust disposition on trustworthiness dimensions was stronger for Aliexpress. The effect of uncertainty avoidance on ability showed significance, confirming previous findings (Hwang and Lee, 2012; Hallikainen and Laukkanen, 2018). Proving the research supposition that personal traits interact differently depending on the context, the Aliexpress dataset shows direct and mediated effects, while only direct effect is observed for eBay. Both direct and mediated effects of uncertainty avoidance on integrity are observed for Aliexpress, while only indirect effect is observed for eBay, confirming previous findings (Hwang and Lee, 2012). The mediated effect is foun to be negative for both sets of data, with a stronger indicator for Aliexpress. This finding may signify that customers are less assured that Aliexpress would act according to the agreement than eBay. The hypothesis related to the effect of uncertainty avoidance on benevolence is not confirmed, proving previous findings. However, a mediated effect between uncertainty avoidance and benevolence is found for both marketplaces. The relationship has a negative nature with a stronger negative effect for Aliexpress. This finding may reflect that consumers' doubts about Aliexpress acting in their interests are higher than for eBay. The effect of long-term orientation on trustworthiness dimensions showed indirect-only mediation. Confirming previous findings (Hallikainen and Laukkanen, 2018), it is found that long-term orientation has the strongest effect on ability (confirmed in Aliexpress data set), followed by integrity and benevolence. The mediated effect of long-term orientation on benevolence is much higher for Aliexpress than for eBay, while the difference in the effect of long-term orientation on integrity is small.

Although some studies show that ability significantly affects purchase intention (Gefen, 2000; Colquitt et al., 2007; Lu et al., 2010; Hwang and Lee, 2012), current research did not find a statistically significant relationship between ability and purchase intention. The effect of benevolence on purchase intention is observed only for Aliexpress, proving some previous findings (Colquitt et al., 2007). The effect of integrity on purchase intention is observed only for the eBay data set, supporting previous findings (Gefen, 2000; Colquitt et al., 2007; Hwang and Lee, 2012). The direct effect of disposition to trust is observed for both data sets confirming previous findings (Gefen and Heart, 2006). The findings show that this relationship has negative nature with stronger indicators for Aliexpress.

Based on the analysis conducted, it can be concluded that purchase intention is affected by various factors. It is proven that in a different context, the effect of these factors varies. After assessing direct and mediated effects of the constructs, it can be concluded that context moderates the interaction of variables and affects the customers' behavioral outcome. The difference in the analyzed cultures can explain the mismatch with the previous findings. The research findings point out the significance of the customers' personal traits, which cannot be generalized in application to a specific context.

CONTRIBUTION AND IMPLICATION

The current study contributes to the existing literature on consumers' online behavior in several ways. First, it adds to the cultural research in the e-commerce environment, which is limited to a specific group of countries, the majority of which do not obtain a high level of UAI, which diminishes the significance of trust in the acceptance and usage of e-commerce. Second, it addresses a country with a developing e-commerce infrastructure where the acceptance of e-commerce practices is at a critical stage. Meanwhile, the analysis of e-commerce practices in such countries is limited.

The study advocates that the behavioral outcome differs in various contexts. Consequently, in e-commerce environments, purchasing intention varies depending on the platform. It also contributes to the theoretical knowledge about the Russian e-commerce environment and can be used for a similar analysis in other countries and expanded for a more comprehensive analysis.

The research benefits the practitioners operating in the international e-commerce environment, facilitating cross-border e-commerce by providing a more extensive image of customers' personal traits and their effect on purchase behavior. To date, the significance of trust in the development of e-commerce is crucial. A detailed understanding of which dimension of trust can affect the potential purchase intention ensures possible success or failure. Thus, e-commerce is closely related to a high level of uncertainty, particularly for the countries where e-commerce is a comparatively new practice In order to minimize its level, managers and marketers should understand their customers' fears and preferences. The effect of perceived integrity on purchase intention, in the case of the current study relevant for eBay, may trigger such issues as doubts about the quality of the product. The effect of perceived benevolence is related to such issues as the disbelief that the platform operates in their interest, consequently, affecting payment intention. Perceived ability defines customers' skill to believe that the shop or platform can fulfill their duty and, consequently, can reduce the level of uncertainty, which is crucial for trust building (Gefen,

2002). Cross-border e-commerce practitioners should be able to incorporate the understanding of their customers in their praxis. Skillful operation with the customers' culture and trustworthiness dimensions may facilitate long-term trust, reducing the level of uncertainty and transforming potential buyers into loyal customers.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the study involving human participants was reviewed by the Research Ethics Committee of China University of Geosciences(Wuhan). The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

AT and SC: research design. AT, DK, MK, and HA: data collection. AT theoretical framework development. JH and AT: data analysis. SC and DK: manuscript revision. All authors discussed the results and contributed to the final manuscript.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.746467/full#supplementary-material

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How to Make Students Happy During Periods of Online Learning: The Effect of Playfulness on University Students' Study Outcomes

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University students' study outcomes, their psychological wellbeing in particular, have been considered closely by both education researchers and practitioners. It is worth exploring ways to improve the quality of life of students, especially during the pandemic period when millions of students around the world have taken online courses at home. This paper tests the influence of playfulness on the levels of life satisfaction and school burnout of college students. To examine our hypotheses, we distributed our survey to 353 Chinese university students (mean age 20.10 years) in their online learning semester in 2020 due to the outbreak of COVID-19. Correlation analysis and path analysis were applied to analyze the data. The results show that playfulness positively relates to life satisfaction and negatively correlates to school burnout. Moreover, a sense of control mediates these relationships. Both theoretical and practical implications are discussed.

Keywords: playfulness, sense of control, life satisfaction, school burnout, university students

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INTRODUCTION

Various studies have revealed a growing interest in the mental health of university students (Hunt and Eisenberg, 2010; Kraft, 2011; Gulliver et al., 2019). Attending university from late adolescence to adulthood is a big change for young people (Arnett, 2000; Wintre and Yaffe, 2000; Lin, 2010). In this period in their lives, university students may feel negative emotions, like depression, anxiety (Mahmoud et al., 2012), loneliness, stress, and learning burnout (Lin and Huang, 2012; Stoliker and Lafreniere, 2015), which may have a negative impact on their school lives, such as decreased learning abilities, poor academic achievement (Benner, 2011), and even school dropout (Eicher et al., 2014). According to the National Center for Education Statistics (U.S. Department of Education, National Center for Education Statistics, 2018), only 60% of all college students in the United States complete their undergraduate studies. Moreover, university students are likely to suffer from mental problems (Russell et al., 2019), such as sleeping difficulties (Becker et al., 2018), deliberate self-harm (Gratz and Roemer, 2008), and even suicidal thoughts and behaviors (Mortier et al., 2018). Thus, the issue of university students' life quality has become significant (Benjamin and Hollings, 1995), and studies focusing on the quality of life have greatly increased in the past two decades (Rapley, 2003; Sirgy, 2012; Murgaš, 2016). This seems more important since the beginning of 2020 after the outbreak of COVID-19. During the pandemic period, millions of students around the world were unable to study on college campuses. Instead, they had to take online courses, which

may lead to negative impacts on their psychological wellbeing. It has become meaningful to explore ways to improve their quality of life and alleviate negative consequences during this hard time.

Wrosch and Scheier (2003) found that personality can influence life satisfaction through the way people deal with life circumstances. As a personality trait (Shen et al., 2014), playfulness refers to "the predisposition to frame (or reframe) a situation in such a way as to provide oneself (and possibly others) with amusement, humor, and/or entertainment" (Barnett, 2007, p. 955). Early playfulness research mainly focused on children (Bundy, 1997). Although adults and adolescents also like to play (Sutton-Smith, 1966; Guitard et al., 2005), it is less socially acceptable among adults (Lieberman, 2014) because playfulness does not meet the increasingly rational and pragmatic image expected of adults by the public, and it can appear to be unattractive and useless (Piaget, 1962; Olsen, 1981). However, in the past three decades, a great number of researchers have paid attention to the functions and benefits of playfulness in adults through health or productivity indicators, like tension release and improved performance in the workplace (Martocchio and Webster, 1992). Some studies show that playfulness enables adults to keep an open mind, find solutions to problems more easily, and accept failure (Guitard et al., 2005). It is helpful to establish a persistently fun and pleasant internal environment, called the playfulness climate (Zhou et al., 2019). Moreover, researchers have found a positive relationship between adults' playfulness and quality of life (Proyer et al., 2010). The playfulness of university students has been discussed far less frequently and in less depth than in children. Therefore, it is worth exploring whether playfulness could promote the quality of life of university students.

Previous studies of the quality of life have mainly focused on adults, whereas research on the psychological wellbeing of youngsters, including general life satisfaction and reactions to schooling, is scarce (Epstein and McPartland, 1976). For university students, the time spent in school occupies a large part of their lives. We take life satisfaction (Peterson et al., 2005) and school burnout (Salmela-Aro and Tynkkynen, 2012) as two indicators of the quality of life of university students. Specifically, life satisfaction is a summary view of the individuals' overall lives (Hofmann et al., 2014). Life satisfaction has become an important issue during the schooling of university students (Diener and Larsen, 1993). Therefore, life satisfaction is used as the first indicator of the quality of university students' daily lives. Furthermore, it is demonstrated that playfulness not only has a positive relation with psychological health (Staempfli, 2007), but also influences an individual's emotions (Fredrickson, 1998, 2001). Students may experience feelings of strain and chronic fatigue in school (Raiziene et al., 2014). School burnout is regarded as the manifestation of maladjusted behavior at school (Fiorilli et al., 2017). Therefore, school burnout is used as another indicator to evaluate the quality of life of students in school. Furthermore, these two indicators could measure the university students' quality of life from positive and negative aspects. In conclusion, life satisfaction and school burnout could help to assess university students' quality of life.

We also noticed the term "sense of control" is used to refer to the extent to which an individual can control his or her own actions and govern external events through these actions (Chambon and Haggard, 2012). A sense of control can generate positive psychological and behavioral consequences (Seligman, 1975; Skinner, 1995), and social psychologists make efforts to explore how individuals manage themselves to achieve a subjective sense of control in unpredictable circumstances (Landau et al., 2015). Obtaining a sense of control is considered an essential element of wellbeing (Leotti et al., 2010). It is a critical social issue (Thompson and Spacapan, 1991), and we especially need to pay close attention to the sense of control in university students. Prior research has proven that the greater an individual's sense of internal control, the lower their depression (Pearlin et al., 1981; Benassi et al., 1988). Therefore, sense of control may have an impact on university students' quality of life.

In summary, the previous literature has the following gaps: (1) as an important group for the future, university students' life quality deserves more attention; (2) playfulness seems like a bad quality and the positive role it could play on the university students' life quality has been neglected; (3) although several proxies of quality of life have been suggested, there is a lack of measures applicable to the specific situation of university students' life quality; and (4) a sense of control has not been explored as a possible link between university students' personality and quality of life. Therefore, the present study explores improvements to university students' life quality by analyzing the interactions among playfulness, life satisfaction, and school burnout, as well as examining the mediation effect of the sense of control.

Playfulness and Life Satisfaction

Playful individuals can transform virtually any environment to make it entertaining and joyful (Barnett, 2007). Fredrickson (1998) argues that playfulness can facilitate experiencing joy and has the capability of building one's intellectual, physical, and social skills. It is evidenced that playfulness positively relates to wellbeing across all age groups (Proyer, 2014b). Specifically, playfulness can facilitate positive emotions. Proyer and Ruch (2011) find positive relationships between adult playfulness and positive characteristics, such as creativity, humor, and the appreciation of beauty and excellence. In particular, some researchers discovered that adult playfulness is positively associated with life satisfaction and quality of life (Proyer et al., 2010; Seligman, 2011; Proyer, 2012, 2013).

Playfulness and School Burnout

School burnout can lead to mental health issues, such as low self-esteem, depression, and a higher risk of suicide (Costello et al., 2006; Orth et al., 2008; Jiang et al., 2010). This is more obvious for adolescents. Schaufeli et al. (2002) note that school burnout negatively affects several dimensions of schoolwork and later has an impact on an individual's health. Luckily, playing could be an effective strategy employed against boredom (Bowman, 1987; Barnett, 2011). It is believed that playfulness at work can facilitate socializing and release tension among colleagues (Yu et al., 2007). Ping (2006) proves that playfulness has a positive

relationship with tension reduction and cheerful climate in the workplace. Playfulness also positively relates to job satisfaction (Glynn and Webster, 1992). In their study, Guitard et al. (2005) qualitatively conducted interviews with 15 adults and identified that playfulness is an important function for burnout prevention. However, the question is raised whether the same relevance between playfulness and burnout appears in different areas of life (Proyer, 2014a). Based on the above literature, this paper infers that specifically in educational situations, playfulness is negatively related to school burnout.

Playfulness and Sense of Control

Bundy (1997) suggests that playfulness includes four factors: internal control, intrinsic motivation, freedom to suspend reality, and framing, which means internal control appears as a component of playfulness. However, Knox (1996) believes that internal control is a consequence of play. Even being somewhat different, the above two opinions both suggest that there is a certain connection between playfulness and internal control. Guitard et al. (2005) believe that a sense of control results from playfulness, which is consistent with Knox's (1996) opinion. Proyer (2014a) proposes that playfulness has seven functions, including mastery orientation, wellbeing, and others. This shows playfulness can help to master one's life orientation, which connotes a sense of control (Chambon and Haggard, 2012).

H1: Playfulness is positively related to a sense of control.

Sense of Control and Life Satisfaction

A sense of control plays a critical role in physiological and psychological health and has been a focal research topic for several decades (e.g., White, 1959; Mittal and Griskevicius, 2014). Thompson and Spacapan (1991) conclude that the knowledge of control has a theoretical and practical contribution to understanding the sense of wellbeing in many different areas of life. Empirical research has demonstrated that the sense of control could be used to predict happiness and life satisfaction (Creed and Bartrum, 2008). Prior research shows that upper class people acquire positive health outcomes due to their high sense of control levels (Johnson and Krueger, 2005). Those with a low sense of control are shown to be psychologically aversive (Pennebaker and Stone, 2004) in ways that could further erode the quality of life.

H2: Sense of control is positively related to life satisfaction.

Sense of Control and School Burnout

A sense of control not only influences students' life satisfaction, but also their school burnout. Job burnout is a common occurrence in professional situations (Maslach et al., 2001), and there are also many studies describing school burnout among high school and college students (Schaufeli et al., 2002). For instance, Salmela-Aro et al. (2008) observe that burnout happens during the transition from comprehensive school to senior high school. Kiuru et al. (2008) consider that school-related burnout is possibly caused by personal expectations of school results or expectations held by teachers or parents. In other words, school burnout occurs when students' performance-related outcomes fail to meet the expectations of teachers, parents, or themselves. Walburg (2014) concludes that exposure to high levels of chronic stress can engender burnout through an emotional state of exhaustion, cynicism, and depersonalization; this means that stress is a major reason of burnout that often appears when demands exceed the internal and external resources of individuals (Folkman, 2013) when a sense of control is lacking. Silvar (2001) attributes school burnout to a group of factors, such as lack of control, excessive school demands, and absence of interpersonal relationships. Spector (2002) considered that a lack of control generates anxiety and leads to negative health consequences.

H3: Sense of control is negatively related to school burnout.

Playfulness, Sense of Control, Life Satisfaction, and School Burnout

According to control theory, two primary elements help describe human behavior: a cognitive and an affective element (Carver and Scheier, 1981). For the cognitive element, when people acquire a high sense of control by being playful, they may feel satisfied about life because they perceive that their performance levels conform to goal standards. For the affective element, when students lose their sense of control in school without enough playfulness, they may feel different about their desired and actual performances, leading to the potential generation of school burnout. Therefore, we believe a sense of control may play a mediating role in the relationship between playfulness and life satisfaction/school burnout.

H4: Sense of control mediates the relationships between both (a) playfulness and life satisfaction and (b) playfulness and school burnout.

MATERIALS AND METHODS

Participants and Procedures

Data used in this study were collected among the students from a national university in East China during the first semester of 2020. At that time, all the students were required to take online courses at home because of the outbreak of COVID-19. The translation and back-translation methods were used to make a questionnaire (Brislin et al., 1973). All questionnaire items were rated with a 7-point Likert scale.

We distributed our questionnaires and collected data online. Six research assistants initiated snowball sampling through their personal contacts, who were asked to distribute the survey link to encourage more students to participate in this research. This sampling strategy is widely applied in data collection and has been proven to be reliable and effective (Meyerson and Tryon, 2003; Madrid and Patterson, 2016). Eventually, 353 samples were collected.

The demographic information of the sample is as follows: 125 participants are male (35.5%) and 228 are female (64.5%); age ranges from 17 to 26, and they are 20.10 years old on average

TABLE 1 | Descriptive statistics and correlations of all study variables.

	Mean	*SD*	1	2	3	4	5	6	7	8
1. Playfulness	5.02	1.03	–							
2. Sense of control	4.41	0.82	0.25**	–						
3. Life satisfaction	4.16	1.30	0.28**	0.24**	–					
4. School burnout	3.83	1.47	–0.14**	–0.54**	–0.15**	–				
5. Gender	1.65	0.48	–0.08	–0.09	–0.04	–0.08	–			
6. Age	20.10	1.84	–0.06	0.09	0.00	0.00	0.13*	–		
7. Grade	2.21	1.47	–0.07	0.07	–0.00	0.02	0.20**	0.89**	–	
8. Income	2.14	0.93	0.11*	0.04	0.12*	0.06	–0.11*	–0.01	0.01	–

*N = 353. Gender: 1 = male, 2 = female. Grade: 1 = freshman, 2 = sophomore, 3 = junior, 4 = senior, 5 = postgraduate or others. Income (per month): 1 = under 1,000 yuan, 2 = from 1,001 to 2,000 yuan, 3 = from 2,001 to 3,000 yuan, 4 = from 3,001 to 5,000 yuan, 5 = more than 5,000 yuan. *p < 0.05; **p <0 .01.*

(*SD* = 1.84); most participants are freshman (46.7%); and income of most participants was from 1,001 to 2,000 yuan (62.9%).

Measures

Playfulness

We adopted 9 items from the International Personality Item Pool (IPIP) version of the playfulness subscale of VIA-IS to assess participants' playfulness. An example item is "Try to tease my friends out of their gloomy moods." The Cronbach's alpha of the scale is 0.88.

Sense of Control

Lachman and Weaver's (1998) 12-item scale was used to measure participants' sense of control by assessing two aspects (personal mastery and perceived constraints). Sample items include "I can do just about anything that I really set my mind to" and "Other people determine most of what I can and cannot do." The utility and psychometric properties of the instrument have been validated in several studies (e.g., Prenda and Lachman, 2001; Jang et al., 2008; Duffy, 2010) and had good reliability and validity in the Chinese context (e.g., Chou and Chi, 2001). The Cronbach's alpha of the scale is 0.82.

Life Satisfaction

Five items were used to measure the participants' life satisfaction from the Satisfaction with Life Scale (SWLS) (Diener et al., 1985). A sample item is "In most ways my life is close to my ideal." The scale has achieved good reliability and validity in different cultural contexts, including Chinese (Liang and Zhu, 2015), German (Glaesmer et al., 2011), and Brazilian (Gouveia et al., 2009). The Cronbach's alpha of the scale in this study is 0.90.

School Burnout

A five-item exhaustion subscale from the Maslach Burnout Inventory—Student Survey (MBI-SS) (Schaufeli et al., 2002) were applied to measure school burnout. An example item is "I feel emotionally drained by my studies." The scale has been used among Chinese college students (Zhang et al., 2007). The Cronbach's alpha of the scale is 0.89.

Control Variables

Mirowsky (1995) discovered that age exerts influence on the sense of control. In addition, age, gender (Fugl-Meyer et al., 2002), and income (Boyce et al., 2010) affect life satisfaction. Beer and Beer (1992) maintain that grades have an impact on school burnout. Therefore, to alleviate the impact of exogenous variables, several control variables are included in this research, including gender, age, grades, and monthly income.

Analytical Strategy

To test the hypotheses, we first computed descriptive statistics of all measures and then conducted correlation analysis followed by a path analysis with R.

RESULTS

Descriptive Statistics and Correlations

The descriptive statistics and correlations results among playfulness, sense of control, and life satisfaction are listed in **Table 1**. Specifically, playfulness positively relates to sense of control ($r = 0.25$, $p < 0.01$) and life satisfaction ($r = 0.28$, $p < 0.01$), but negatively relates to school burnout ($r = -0.14$, $p < 0.01$). The correlation between sense of control and life satisfaction is positive ($r = 0.24$, $p < 0.01$). However, the correlation between sense of control and school burnout is negative ($r = -0.54$, $p < 0.01$). Moreover, school burnout is negatively correlated with life satisfaction ($r = -0.15$, $p < 0.01$).

Path Analysis

Path analysis was conducted with the "lavaan" package in R to test the hypothesized relationships between playfulness, sense of control, life satisfaction, and school burnout. According to Browne and Cudeck (1993) and Kline (1998), the hypothesized model indicates a very good fit to the data. Specifically, the fit indices, chi-square (χ^2) was 24.15, degree of freedom (df) was 6 ($\chi^2/df < 5$), Comparative Fit Index (CFI) was 0.90 ($\geq$0.90), Incremental Fit Index (IFI) was 0.91 (>0.90), Goodness-of-fit Index (GFI) was 0.96 (>0.90), and Standardized Root Mean Square Residual (SRMR) was 0.05 (< 0.08).

Figure 1 illustrates the path coefficients of the hypothesized model. The results show that the path from playfulness to sense of control is significant ($\beta = 0.25$, $p < 0.01$), which supports Hypothesis 1. The paths from sense of control to both life satisfaction ($\beta = 0.23$, $p < 0.01$) and school burnout ($\beta = -0.54$,

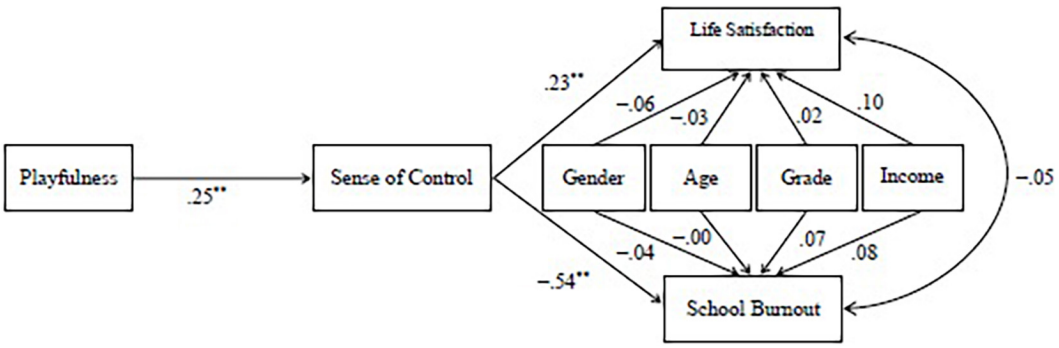


FIGURE 1 | Path coefficients of the hypothesized model. $N = 353$. Standardized path coefficients are reported here. $^{**}p < 0.01$.

TABLE 2 | The direct and indirect effects of playfulness on life satisfaction and school burnout and 95% confidence intervals.

	Estimated effect (SE)	95% CI[a]
Direct effects		
Playfulness → Sense of control	0.25** (0.05)	[0.17, 0.33]
Sense of control → Life satisfaction	0.23** (0.05)	[0.08, 0.39]
Sense of control → School burnout	–0.54** (0.04)	[–0.70, –0.39]
Gender → Life satisfaction	–0.06 (0.05)	[–0.34, 0.22]
Gender → School burnout	–0.04 (0.05)	[–0.31, 0.24]
Age → Life satisfaction	–0.03 (0.11)	[–0.19, 0.13]
Age → School burnout	–0.00 (0.10)	[–0.16, 0.15]
Grade → Life satisfaction	0.02 (0.11)	[–0.18, 0.21]
Grade → School burnout	0.07 (0.10)	[–0.22, 0.26]
Income → Life satisfaction	0.10 (0.05)	[–0.04, 0.24]
Income → School burnout	0.08 (0.05)	[–0.06,0.21]
Indirect effects		
Playfulness → Sense of control → Life satisfaction	0.06** (0.02)	[0.01,0.10]
Playfulness → Sense of control → School burnout	–0.13** (0.03)	[–0.22, –0.05]

N = 353.
[a]*CI, confidence interval (1,000 bootstrap sample).*
*$p < 0.05$; **$p < 0.01$.*

$p < 0.01$) are significant, so Hypotheses 2 and 3 are validated. In addition, according to Bond and Bunce (2003), the coefficients from playfulness to sense of control and from sense of control to life satisfaction are medium, and the coefficient from sense of control to school burnout is large.

Moreover, the results in **Figure 1** also initially validate the mediating effect of a sense of control (H4) in the relationships between playfulness and life satisfaction/school burnout. The results described in **Table 2** further illustrate the direct effect of playfulness on life satisfaction and school burnout and the indirect influences via sense of control. All the relationships are significant, which further supports Hypothesis 4.

As for control variables, the results indicate that the paths from gender to life satisfaction (β = –0.06, n.s.) and school burnout (β = –0.04, n.s.), from age to life satisfaction (β = –0.03, n.s.) and school burnout (β = –0.00, n.s.), from grade to life satisfaction (β = 0.02, n.s.) and school burnout (β = 0.07, n.s.), and from income to life satisfaction (β = 0.10, n.s.) and school burnout (β = 0.08, n.s.) are non-significant.

DISCUSSION

This study uncovers the role of playfulness in enhancing university students' quality of life during periods of online learning. In early 2020, a sample of 353 Chinese university students was selected for the study to examine the proposed hypotheses. The correlation analysis results show that students high in playfulness are likely to endorse a high sense of control. This study also reveals that a sense of control positively relates to life satisfaction and negatively relates to school burnout. In addition, the results of path analysis illustrate that a sense of control partially mediates the relationships between playfulness and life satisfaction and between playfulness and school burnout. Thus, our findings indicate that college students high in playfulness tend to possess a high sense of control, which can further enhance their life satisfaction and shield them from school burnout.

Theoretical and Practical Implications

This research makes several theoretical and practical contributions. Theoretically, we identified the positive role that playfulness has on college students. Previously, playfulness was not regarded as a good quality (Lieberman, 2014), but rather a waste of time. Although a few prior studies recognized the contribution that playfulness can have on the wellbeing of individuals (Fredrickson, 2001), specific research aimed at university students is still scarce. This paper discovered that playfulness enhances the quality of life of university students, both physically and mentally. Second, this study proposes that life satisfaction and school burnout impact the quality of life of university students. These two indicators can be used in future research for measuring students' quality of life. Third, this paper interprets the mechanism underlying the relationships between students' playfulness and their life satisfaction/school burnout. Moreover, this study fills gaps by discovering the mediation effect

of a sense of control. Hence, it provides a more detailed and specific framework to demonstrate how playfulness influences university students' quality of life.

This study also has practical implications given that university students are an important cohort in society. We propose that society pay more attention to the spiritual qualities of university students' lives, especially during the pandemic when students are taking online courses. This paper suggests that playfulness can enhance students' sense of control to both enrich their life satisfaction and prevent school burnout; this indicates that developing playfulness could be meaningful in promoting the quality of life of university students. Therefore, the results from this study provide some guidance and advice for education practitioners. First, it is beneficial for schools to cultivate students who are psychologically happy and healthy. By promoting initiatives to help students train their sense of playfulness, universities could develop positive characteristics in the students. For example, schools can hold activities, such as meetings for sports or other games. Second, it benefits university students to know themselves to better manage their emotions and mentality. This paper suggests that university students should consciously strengthen their abilities to overcome difficulties to improve their quality of life. For instance, when experiencing setbacks, students need to learn to take advantage of playfulness (e.g., watching comedy movies) to adjust themselves. Moreover, students should cultivate their playfulness proactively in daily life, such as engaging in outdoor activities with friends.

Limitations and Directions for Future Research

This study has several limitations. First, as a cross-sectional design study, the causal relationship between playfulness and quality of life cannot be validated. In the future, scholars should conduct longitudinal or experimental research to verify the findings. Second, all variable data were collected from the university students in a self-reported survey, which may give rise to improper conclusions. Hence, future researchers should collect data by other methods, such as interviews, behavioral observations, and experiments. Third, the source of the current sample was limited to students in one Chinese university, which leads to low generalizability. Future research should involve more diverse samples to generalize the current findings. Last, although the sample size of the current study is enough, it is suggested that a larger sample in future studies will further enhance the validity of empirical findings.

This research contributes to the literature in three ways. First, it makes great advances toward exploring the relationship among playfulness, sense of control, life satisfaction, and school burnout. Second, it provides a new thread for future research to regard the sense of control as a possible mediator when examining student-university relationships. Third, it digs into the relevance of individual personality and organizational environment to construct a foundation for future research of the interaction between individuals and different organizational environments. Obviously, university students are a dominant sector for the future of every country and finding effective ways to improve their quality of life is imperative.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The ethics committee waived the requirement of written informed consent for participation.

AUTHOR CONTRIBUTIONS

YL and FH developed the theoretical framework and worked on literature review and manuscript writing. XH developed the theoretical framework and worked on data collection and analysis. All authors contributed to the article and approved the submitted version.

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The Influence of Self-Regulation on Learner's Behavioral Intention to Reuse E-Learning Systems: A Moderated Mediation Model

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Learners' behavioral intention to reuse e-learning is of great significance to the implementation and management of e-learning in higher education. This study examined the relationship between self-regulation and behavioral intention to reuse by focusing on the mediating role of study engagement and the moderating role of peer collaboration. Based on a sample of 379 undergraduates from central China, we found that self-regulation positively influences behavioral intention to reuse *via* study engagement. In addition, moderated path analysis indicated that peer collaboration strengthened the direct effect of self-regulation on study engagement and its indirect effect on behavioral intention to reuse. Theoretical and practical implications of these findings are discussed as well.

Keywords: self-regulation, behavioral intention to reuse, study engagement, peer collaboration, conservation of resource theory

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INTRODUCTION

Electronic learning (or e-learning) has gained increased attention during the COVID-19 lockdown. It has facilitated student learning and well-being by providing Internet access to teaching and learning programs (Radha et al., 2020) and psychological assistance (Zhao et al., 2020) in universities and schools. However, in many developing countries, e-learning is currently underused and still in its infant phase. A lack of use is resulting in resource wastage and the failure of e-learning systems generally (Almaiah et al., 2020). Therefore, improving learners' behavioral intention to reuse e-learning systems is a major challenge for many universities (Alqahtani and Rajkhan, 2020; Radha et al., 2020).

During the past decades, scholars have identified several factors affecting learners' adoption of the e-learning systems: performance expectancy, effort expectancy, social influence, and facilitating conditions (Zhang et al., 2020). Indeed, learning environment and learning expectations are associated with higher behavioral intention to reuse. However, e-learning might require a set of different strategies and skills to attain learning resources. Therefore, we focus on one specific learning strategy, namely, self-regulation. Self-regulated learning refers to a series of active and volitional behaviors that individual uses to accomplish a learning goal (Zimmerman, 1986; Panadero, 2017). Several studies have indicated that self-regulation can help the learner to control, manage, and plan their e-learning (Panadero, 2017; van Alten et al., 2020a). Nevertheless, the link between self-regulation and behavioral intention to reuse has rarely been investigated.

Thus, it is crucial to explore the impacts of self-regulation on behavioral intention to reuse in the online environment.

The present study aimed to examine the effect of self-regulation on learners' behavioral intention to reuse using the conservation of resource theory (Hobfoll, 1989). We proposed that when learners have the self-generated ability to control, manage, and plan the learning process, they show a greater behavioral intention to reuse e-learning systems. Moreover, we posited that self-regulation may be positively related to behavioral intention to reuse *via* study engagement. Wolters and Taylor (2012) suggested that there is a positive association between self-regulation and study engagement. Faisal et al. (2020) corroborated a positive relationship between cognitive and affective engagement and continued intention to use. Therefore, the present study chose study engagement as a mediator to understand how self-regulation affects positively the behavioral intention of learners to reuse.

The relationship between self-regulation, study engagement, and behavioral intention to reuse was also tested. Previous research has suggested that, when exploring the efficiency of e-learning, collaboration should also be considered (Papanikolaou and Boubouka, 2010; Cheng et al., 2011). Peer collaboration is defined as online support by group members to reach a common learning goal (Cheng et al., 2011). It has been uniformly regarded as a valuable resource that contributes to desired outcomes and should therefore be studied in most e-learning settings (Papanikolaou and Boubouka, 2010). It may contribute to learners' motivation toward reusing e-learning systems, and so, its moderating role concerning the effects of self-regulation on behavioral intention to reuse was examined.

The present study complements the e-learning literature in several ways. First, it fills a critical research gap in the research on the relationship between self-regulation and behavioral intention to reuse. Previous studies of behavioral intention to reuse focused primarily on the institutional environment beyond individual factors (Cheng et al., 2011). Exploring the relationship between self-regulation and behavioral intention to reuse will help us have a more comprehensive understanding in terms of behavioral intention to reuse as self-regulation is an important indicator of effective learning and relates to outcomes such as academic motivation and self-efficacy (Lavasani et al., 2011).

Second, the present study contributes to the literature by showing why self-regulation affected behavioral intention to reuse. Although researchers have identified potential mediators, the motivational aspect (e.g., study engagement) of the influence of self-regulation has been neglected. Study engagement is worthy of investigation because motivation shapes learners' reuse intention, and it is critical that educators understand how to enhance learners' behavioral intention to reuse e-learning by encouraging them more. The other is that in the COVID-19 context, universities and schools should now always require that students give their full attention and energy to their e-learning tasks. Study engagement could be a possible mediator that transmits the influence of self-regulation on learners' behavioral intention to reuse e-learning.

Third, we identified an important environment resource (i.e., peer collaboration) as a key boundary condition in enhancing the positive effect of self-regulation on study engagement and behavioral intention to reuse. Previous studies have demonstrated the positive effects of self-regulation but not of potential boundary conditions (e.g., Yeh et al., 2019). Scholars should pay attention to how they might enhance the positive effects of self-regulation in e-learning. Our study wants to make a further step to identify a context factor in accelerating the positive effect of self-regulation. In particular, it introduced a moderated mediation model (**Figure 1**) positing study engagement as a mediator of the self-regulation's effects on behavioral intention to reuse, with peer collaboration as a moderator of such effects.

THEORETICAL BACKGROUND AND HYPOTHESES

Conservation of Resource Theory

As has been noted, the present study builds on the conservation of resource theory (Hobfoll, 1989) to understand the link between self-regulation and behavioral intention to reuse. Conservation of resource theory assumes that individuals tend to protect and retain the resources they value. The resource could be anything that people think is valuable (Hobfoll, 1989). It suggests that when individuals lack resources, they tend to withdraw behavioral intention to minimize their loss. By contrast, individuals are interested in investing in more resources when such an investment generates returns. Because behavioral intention to reuse is considered a type of behavioral attitude toward acceptance and satisfaction (Chiu et al., 2005), which reflects a subjective expectation of how many resources learners can obtain by using e-learning systems, we hypothesized that self-regulation is positively related to behavioral intention to reuse.

Self-Regulation and Behavioral Intention to Reuse

Behavioral intention refers to the degree to which an individual intends to perform some specific future behavior (Davis and Warshaw, 1992). In the context of e-learning, behavioral intention to reuse has been defined as the likelihood that learners will use an e-learning system again when it is made available to them (Budu et al., 2018). As learners' willingness to adopt an e-learning system determines the success of any e-learning system (Li et al., 2012; Almaiah, 2018), understanding the factors that influence behavioral intention to reuse has been the focus of numerous e-learning studies (Al-Emran and Teo, 2020; Zhang et al., 2020). Previous research has identified several variables influencing learners' decisions to use e-learning systems. These include perceived usefulness and perceived ease of use (Liaw, 2008); self-efficacy and attitudes toward use (Amin et al., 2015); the experience of e-learning (Mailizar et al., 2021); and social influence (Liaw, 2008).

Self-regulation is an important factor in effective learning and is widely used to explain learning outcomes in e-learning research. Self-regulated behaviors include but are not limited to environment structuring, goal setting, time management, help-seeking, task strategies, and self-evaluation (Barnard et al., 2009). According to the conservation of resource theory, the

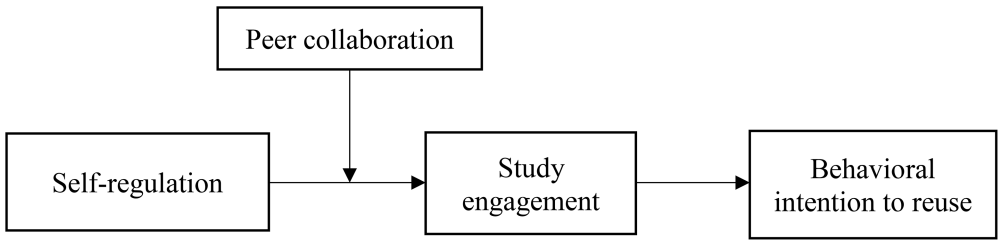


FIGURE 1 | The proposed model.

more learners perceive e-learning systems to be beneficial, the more they will use them. Because self-regulation enables learners to identify e-learning resources to achieve their goals (Wong et al., 2019), it can be assumed that it will increase their desire and belief to reuse them. Broadbent and Poon (2015) carried out a comprehensive analysis of self-regulation and concluded that self-regulation can help learners to achieve academic success in higher education settings. Various self-regulation outcomes have also been examined in previous studies (Panadero, 2017; van Alten et al., 2020a), for instance, satisfaction (van Alten et al., 2020b), learning performance (Zheng and Zhang, 2020), and academic achievement (Broadbent and Poon, 2015). Based on the above literature, we proposed the following hypothesis:

> *Hypothesis* 1: Self-regulation is positively related to students' behavioral intention to reuse e-learning systems.

The Mediating Role of Study Engagement

The concept of study engagement has received increased attention in the e-learning literature (Rodgers, 2008; Moubayed et al., 2020). Study engagement is a psychological state of vigor, absorption, and dedication toward learning tasks (Lamborn et al., 1992) and reflects "the amount of effort dedicated to educational activities that bring out ideal performance" (Hu and Kuh, 2002, p. 555). Individual resources are an essential component of an individual's engagement in their studies (Ryan, 2005). Previous literature has identified several resources that facilitate student engagement, such as interest in learning, belongingness (Hu and Kuh, 2002), deep learning, and relationship with others (Gunuc and Kuzu, 2015). Also, study engagement is associated with achievement in the academy and psychological well-being (Deakin Crick and Goldspink, 2014). Engagement in this study acts as a mediator that links self-regulation to behavioral intention to reuse. More explicitly, learners who can apply self-regulation strategies and skills will perceive a more positive state of passion and energy, which, in turn, leads to continuous use of e-learning systems.

The conservation of resource theory is a renowned paradigm for understanding study engagement (Gunuc and Kuzu, 2015). According to this theory (Hobfoll, 1989), engagement consumes energy, so individuals need to replenish their resources to maintain a high level (Xu et al., 2019a,b). The e-learning literature has also suggested that the e-learning environment is characterized by self-control, autonomy, and independence (Lynch and Dembo, 2004; Chiu et al., 2005); engagement in learning heavily relies on a student's ability to control, manage, and plan learning programs (Ally, 2004). We assumed that self-regulation may help learners actively engage in their studies by adding their resources. First, self-regulation strategies could help learners acquire cognitive resources. For example, rehearsal and metacognitive strategies have been shown to be positively related to the acquisition and retention of knowledge (Yukselturk and Bulut, 2007). Second, self-regulation enables learners to manage their emotions in the pursuit of studying goals, which provides emotional resources for student engagement. Studies have shown that strategies of regulating emotions, such as situation selection, situation modification, attentional deployment, and response modulation, are linked to learners' positive emotions (Webster and Hadwin, 2015). Therefore, it can be seen that self-regulation may facilitate student engagement.

Furthermore, study engagement can affect students' behavioral intention to reuse e-learning systems. Engagement is characterized by dedication, absorption, and vigor. Dedication reflects individuals' desire to invest effort in studying. Absorption refers to the state individuals enter when they are completely immersed in a task. Vigor emphasizes one's excitement and interest in study (Schaufeli et al., 2002a; Axelson and Flick, 2010). Study engagement involves a series of activities, including behavioral engagement (e.g., concentration), emotional engagement (e.g., belonging and excitement), and cognitive engagement (e.g., mental effort; Webster and Hadwin, 2015). In terms of the conservation of resource theory, learners tend to reuse e-learning systems when they perceive them to have value. Close engagement will make learners more persistent in their e-learning. Previous research has suggested that study engagement leads to a higher return in terms of satisfaction (Webster and Hadwin, 2015); academic performance (Carini et al., 2006); student success; and retention (Wyatt, 2011). In light of the above, we proposed the following hypotheses:

> *Hypothesis* 2: Study engagement mediates the relationship between self-regulation and behavioral intention to reuse e-learning systems.

The Moderating Role of Peer Collaboration

Although we expected that self-regulation would positively influence study engagement, which in turn impacts behavioral intention to reuse, the conservation of resource theory (Hobfoll, 1989) indicates that environmental factors influence how learners

manage and make use of self-regulation strategies and skills and obtain new resources. In e-learning settings, peer collaboration is regarded as a form of learner support where students are encouraged to exchange ideas with other students (Biasutti, 2011). It is also an important influence on mental health (Kim et al., 2020). Drawing on these insights, we proposed that peer collaboration presents an environmental resource that may strengthen the positive impact of self-regulation on study engagement.

Learners with high levels of peer collaboration tend to possess greater learning resources and are subsequently more capable of engaging with their studies. Scholars have suggested that peer collaboration facilitates both academic and social integration (Papanikolaou and Boubouka, 2010; Al-Abri et al., 2017). Learners with high levels of peer collaboration are more likely than learners with low levels of peer collaboration to perceive their self-regulation strategies and skills as an effective way to acquire more resources. Logically, learners who employ self-regulation already have the effective learning ability to obtain resources with which to invest in study engagement. If learners also receive a high level of peer support, they will become more confident in participating in e-learning activities. Peer collaboration not only helps learners transfer information and ideas to improve their self-regulation but also helps them to cooperate, improve learning climates, and enhance learning satisfaction. As a result, the relationship between self-regulation and study engagement should be stronger for learners with high levels of peer collaboration. By contrast, learners with low levels of peer collaboration should be more vulnerable to insufficient learning-related resources and less capable of investing their resources to enhance the outcomes of self-regulation, thus decreasing the effectiveness of self-regulation for integrating personal and contextual resources. Accordingly, we proposed the following hypothesis:

> *Hypothesis* 3: Peer collaboration moderates the relationship between self-regulation and study engagement; this relationship is more positive when peer collaboration is high rather than low.

Given that peer collaboration moderates the relation between self-regulation and study engagement and considering that study engagement is positively associated with behavioral intention to reuse, it is logical to suggest that peer collaboration also moderates the strength of the mediating mechanism for study engagement in the relationship between self-regulation and behavioral intention to reuse, which presents a moderated mediation model (Edwards and Lambert, 2007). As previously mentioned, a stronger relation between self-regulation and behavioral intention to reuse will appear among learners with high levels of peer collaboration. Hence, the indirect effect of self-regulation on behavioral intention to reuse *via* study engagement may be stronger for a learner who collaborates with their peers. In particular, when a student has a high level of peer collaboration, the indirect effect of self-regulation on behavioral intention to reuse should be stronger. However, when a student is lacking such a high level of collaboration, self-regulation is less influential in promoting study engagement; consequently, the indirect effect of self-regulation on behavioral intention to reuse should be weaker. In light of the above, we proposed the following hypothesis:

> *Hypothesis* 4: Peer collaboration moderates the mediating effect of study engagement on the relationship between self-regulation and behavioral intention to reuse such that the indirect effect of self-regulation on behavioral intention to reuse *via* study engagement is stronger for learners with a high level of peer collaboration than for learners with a low level of peer collaboration.

MATERIALS AND METHODS

Respondents and Procedures

We drew our sample from one large university in central China. The e-learning programs were part of the students' regular school curriculum. The questionnaires were distributed among undergraduates within the e-learning system. They were asked to complete a self-assessment of their self-regulation, study engagement, peer collaboration, and behavioral intention to reuse the e-learning system. All participants were assured that all data would be anonymous. They signed an electronic consent form agreeing to their participation in the survey.

With the help of their professors, 400 students who engaged in e-learning activities were invited to take part. From this sample, 379 valid samples were retained a response rate of 94.75%. The average age was 20.72 years ($SD = 2.17$); 67.81% were male, and 32.19% were female. In terms of grades, 19.90% were freshmen, 33.25% were sophomores, 24.01% were juniors, 14.77% were seniors, and 8.97% were students in the fifth year. Their majors were as follows: 8.18%, humanities; 33.25%, economics and management; 15.57%, science; 54.35%, engineering; 1.85%, law; 3.96%, medicine; and 3.69%, education.

Measurement

Self-Regulation

Self-regulation was measured, using a 24-item scale from Barnard et al. (2009). Example items include the following: goal setting – "I set standards for my assignments in online courses"; environment structuring – "I know where I can study most efficiently for online courses"; task strategies – "I work extra problems in my online courses in addition to the assigned ones to master the course content"; time management – "I allocate extra studying time for my online courses because I know it is time-demanding"; help-seeking – "I find someone who is knowledgeable in course content so that I can consult with him or her when I need help"; and self-evaluation – "I summarize my learning in online courses to examine my understanding of what I have learned." Participants were asked to respond on a seven-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) at Time 1. The internal consistency is $\alpha = 0.96$.

Study Engagement

We used a 17-item scale developed by Schaufeli et al. (2002b) to measure the study engagement of learners. It has three dimensions, including vigor, dedication, and absorption. Example items include the following: vigor – "When I study, I feel like I am bursting with energy"; dedication – "I am enthusiastic about my studies"; and absorption – "I feel happy when I am studying intensively." Participants were asked to respond on a seven-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The internal consistency of the study engagement scale is $\alpha = 0.97$.

Behavioral Intention to Reuse

We measured behavioral intention to reuse with Li et al. (2012) three-item scale. Example items include "Assuming that I had access to the e-learning system, I intend to reuse it." Participants were asked to respond on a seven-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The internal consistency of the scale is $\alpha = 0.89$.

Peer Collaboration

Peer collaboration was measure through a five-item scale developed by Zhang et al. (2014). An example item is "My group members and I actively work together to help each other understand the learning task." Participants were asked to respond on a seven-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The internal consistency of the scale is $\alpha = 0.94$.

Control Variables

Socio-demographics were considered these variables as potential control variables. Demographic variables included age, gender (1 = *male*, 2 = *female*), grade (1 = *first year*, 2 = *second year*, 3 = *third year*, 4 = *fourth year*, 5 = *fifth year*), and major (1 = *humanity*, 2 = *economy and management*, 3 = *science*, 4 = *engineer*, 5 = *law*, 6 = *medicine*, 7 = *education*).

RESULTS

Preliminary Analyses

First, the confirmatory factor analysis with Mplus7.0 was used to examine the distinctiveness of the latent variables. The results showed that a theorized four-factor model distinguishing between self-regulation, study engagement, behavioral intention to reuse, and peer collaboration was a better fit to the data ($\chi^2 = 482.34$, $df = 113$, $p < 0.001$; $CFI = 0.94$; $TLI = 0.93$; $RMSEA = 0.09$; $SRMR = 0.04$) than alternative models: (a) a four-factor model in which self-regulation and study engagement were combined into one factor ($\chi^2 = 1211.41$, $df = 116$, $p < 0.001$; $CFI = 0.83$; $TLI = 0.81$; $RMSEA = 0.16$; $SRMR = 0.07$); (b) a three-factor model in which self-regulation and behavioral intention to reuse were combined into one factor ($\chi^2 = 973.54$, $df = 116$, $p < 0.001$; $CFI = 0.87$; $TLI = 0.85$; $RMSEA = 0.14$; $SRMR = 0.07$); (c) a two-factor model in which self-regulation, study engagement, and behavioral intention to reuse were combined into one factor ($\chi^2 = 1542.61$, $df = 118$, $p < 0.001$; $CFI = 0.78$; $TLI = 0.75$; $RMSEA = 0.18$; $SRMR = 0.08$); and (d) a one-factor model in which all latent variables were combined into one factor ($\chi^2 = 2152.89$, $df = 119$, $p < 0.001$; $CFI = 0.69$; $TLI = 0.65$; $RMSEA = 0.21$; $SRMR = 0.09$). The results illustrated that the participants were able to distinguish the studied variables.

Finally, we used the unmeasured latent method factor to examine the presence of common method variance (CMV; Podsakoff et al., 2003). Compared with the theorized four-factor model ($\chi^2 = 482.34$, $df = 113$, $p < 0.001$; $CFI = 0.94$; $TLI = 0.93$; $RMSEA = 0.09$; $SRMR = 0.04$), the indices of the five-factor model with all items loading on a latent common method ($\chi^2 = 320.04$, $df = 97$, $p < 0.001$; $CFI = 0.96$; $TLI = 0.95$; $RMSEA = 0.08$; $SRMR = 0.03$) were not significantly improved. The findings indicated that the data were not inflated with CMV.

Descriptive Statistics and Correlations

The means, SDs, and correlations of the variables are provided in **Table 1**.

Hypothesis Testing

Hypothesis 1 stated that self-regulation was positively associated with behavioral intention to reuse e-learning. Hypothesis 2 further argued that study engagement mediated the relationship. The hierarchical regression analysis run by the Statistical Package for the Social Sciences (SPSS) was used to test Hypothesis 1. The mediation procedure macro developed by Preacher and Hayes (2008) was used to test Hypothesis 2. The results of hypothesis tests are summarized in **Figure 2**.

The direct pathway in **Figure 2** shows that self-regulation was positively associated with behavioral intention to reuse ($B = 0.57$, $SE = 0.05$, $p < 0.001$), controlling for socio-demographic variables. Thus, Hypothesis 1 was supported. The indirect pathway in **Figure 2** further shows that self-regulation was positively related to study engagement ($B = 0.81$, $SE = 0.04$, $p < 0.001$), which in turn was positively associated with behavioral intention to reuse ($B = 0.52$, $SE = 0.05$, $p < 0.001$). The 95% CI for the indirect effect was [0.32, 0.52], with an average of 0.42, and did not include 0. Thus, Hypothesis 2 was supported. Additionally, **Figure 2** shows that the direct effect of

TABLE 1 | Descriptive statistics and inter-correlations among variable.

	M	*SD*	1	2	3	4
1. Self-regulation	5.05	1.15	NA			
2. Peer collaboration	4.99	1.30	0.73***	NA		
3. Study engagement	4.81	1.30	0.72***	0.67***	NA	
4. Behavioral intentions to reuse	5.42	1.20	0.56***	0.56***	0.67***	NA

*N = 379. NA, not applicable. ***p < 0.001.*

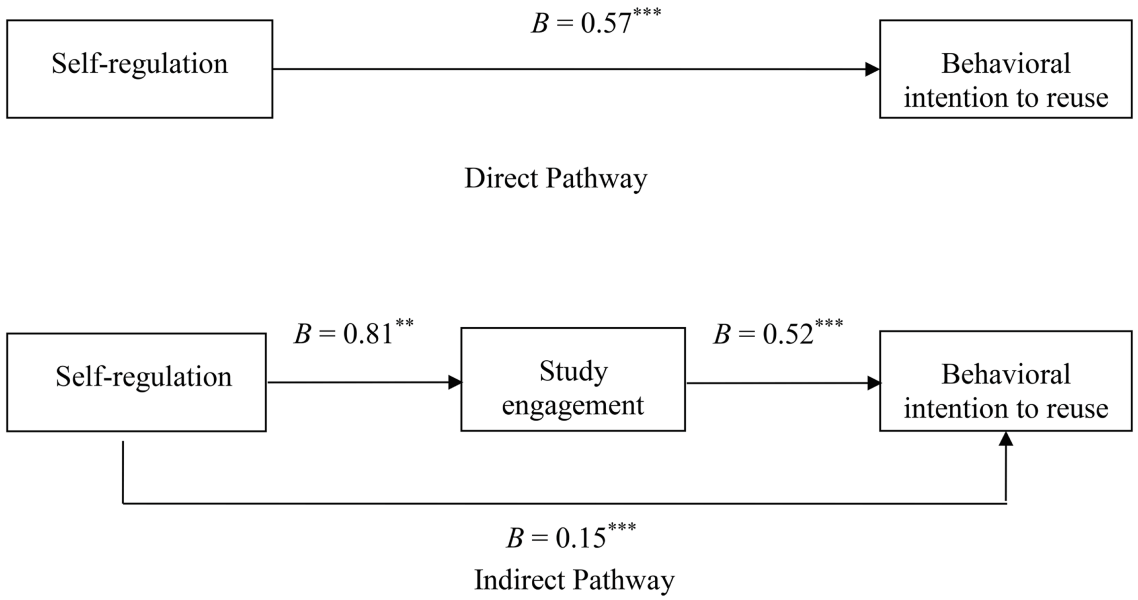


FIGURE 2 | The mediating role of study engagement. Unstandardized path coefficients were reported; ***$p < 0.001$ and **$p < 0.01$.

self-regulation on behavioral intention to reuse was still significant ($B = 0.15$, $SE = 0.06$, $p < 0.001$). According to Baron and Kenny (1986), study engagement partially mediated the positive relationship between self-regulation and behavioral intention to reuse.

Hypothesis 3 stated that peer collaboration moderated the effect of self-regulation on study engagement. Hypothesis 4 further stated that peer collaboration moderated the indirect effect of self-regulation on behavioral intention to reuse *via* study engagement. The moderation and moderated mediation procedure macro developed by Preacher and Hayes (2008) was used to test Hypothesis 3–4. The results of hypothesis tests are summarized in **Table 2**.

The moderation analysis shows that the interaction of self-regulation and peer collaboration positively predicted study engagement ($B = 0.08$, $SE = 0.02$, $p < 0.01$) when the controls are controlled. **Table 2** shows that the simple slope test showed that simple slope was 0.44 ($SE = 0.06$, $p < 0.001$) at low level of peer collaboration ($-1sd = -1.30$), and it was 0.63 ($SE = 0.06$, $p < 0.001$) at high level of peer collaboration ($+1sd = 1.30$). **Figure 3** clearly illustrates the moderating role of peer collaboration in the self-regulation-study engagement association. Thus, Hypothesis 3 was supported.

Table 2 also shows that the indirect effects of self-regulation on behavioral intention to reuse *via* study engagement varied significantly across different levels of peer collaboration. The indirect effect of self-regulation on behavioral intention to reuse was more significant when peer collaboration was high ($B = 0.33$, $SE = 0.05$, $p < 0.001$) than those when peer collaboration was low ($B = 0.23$, $SE = 0.05$, $p < 0.001$). **Figure 4** clearly illustrates the moderating role of peer collaboration in the indirect effect of self-regulation on behavioral intention to reuse *via* study engagement. Hypothesis 4 was therefore supported.

TABLE 2 | The results of examining Hypothesis 3 and 4.

Model	Conditional effect	95% LL	95% UL
Moderated model (H3)			
Low (−1sd)	0.44*** (0.06)	0.31	0.56
High (+1sd)	0.63*** (0.06)	0.51	0.75
Moderated mediation model (H4)			
Low (−1sd)	0.23*** (0.05)	0.15	0.32
High (+1sd)	0.33*** (0.05)	0.24	0.42

*Demographical variables are controlled; Bootstrap sample size = 5,000; the numbers in the parentheses are standard errors; +1sd = 1.30 and −1sd = −1.30 for centered peer collaboration; tests were based on bias-corrected confidence intervals. ***$p < 0.001$.*

DISCUSSION

All the hypotheses proposed in this research have been verified, and the results include the following points. First, self-regulation influenced students' behavioral intention to reuse. Second, study engagement plays a mediating role between self-regulation and behavioral intention to reuse. Third, peer collaboration moderates the positive effect of self-regulation on study engagement and behavioral intention to reuse. Specifically, learners with high peer collaboration will perceive higher study engagement and thus enhance behavioral intention to reuse.

Theoretical Implications

First, our research contributes to the e-learning literature by proposing and confirming the effect of self-regulation on behavioral intention to reuse an e-learning system. E-learning research has highlighted the importance of considering self-regulation strategies and skills because they influence how learners manage, plan, and reflect learning process (Jansen et al., 2019, 2020). These studies appear particularly valuable

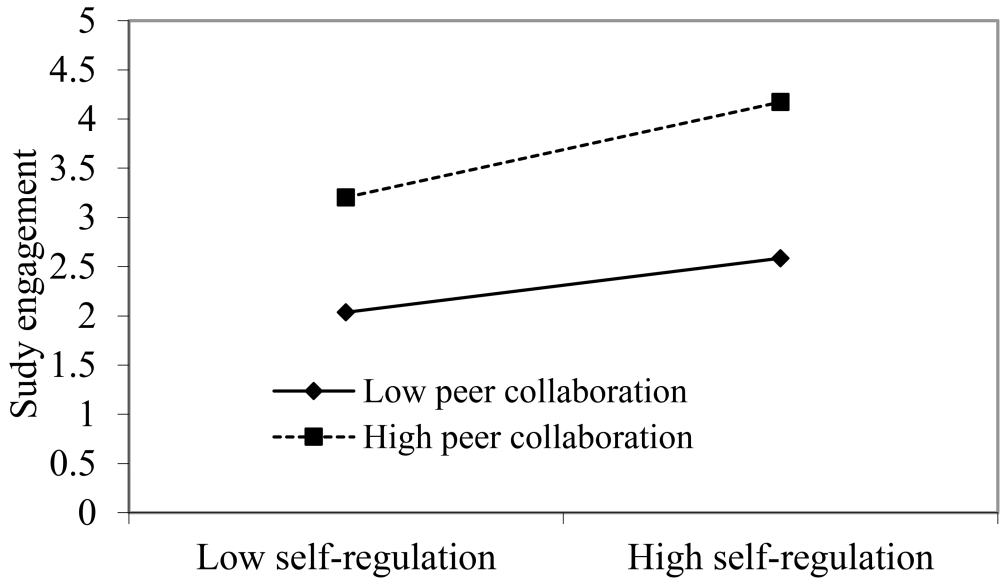


FIGURE 3 | The moderating role of peer collaboration on the relationship between self-regulation and study engagement.

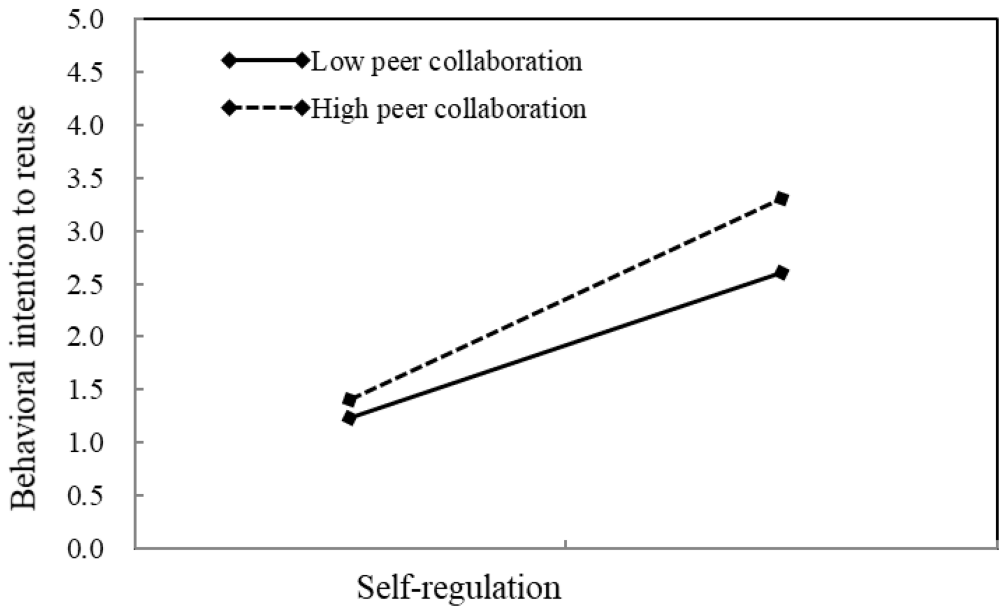


FIGURE 4 | The moderating role of peer collaboration on the indirect effect.

for identifying ways to improve the success of e-learning. However, in many cases, learners' continuance usage of e-learning, such as behavioral intention to reuse, are of limited study for the outcomes of self-regulation. The current study, enriching the effects of self-regulation, indicates that self-regulation would influence behavioral intention to reuse e-learning. This is one of the limited studies that establish the relationship between self-regulation and behavioral intention to reuse.

Second, our study further contributes to the research on e-learning by identifying study engagement as a mediator linking self-regulation and behavioral intention to reuse. Given the importance of behavioral intention to reuse for e-learning success, previous studies have mostly focused on several important influencing factors (e.g., performance expectancy, effort expectancy, and social influence; Zhang et al., 2020), and what has been missing from research is study engagement. This construct represents learners' passion and dedication to spend their time and energy on their study work. Consequently, a better understanding of the role of study engagement in influencing behavioral intention to reuse is needed. Drawing

on conservation of resource theory (Hobfoll, 1989), we find that learners who can employ self-regulation strategies tend to experience emotional, cognitive, and physical engagement, and hence, it is more likely for them to reuse e-learning.

Third, by applying a moderated mediation framework, we revealed the moderating role of peer collaboration, supporting the applicability of the conservation of resource perspective in explaining the link between self-regulation and behavioral intention to reuse through study engagement. This study extends the self-regulation literature by answering the call to examine boundary conditions for the effectiveness of self-regulation. Self-regulation has been established as a strong predictor of positive outcomes of e-learning (El-Adl and Alkharusi, 2020; Jivet et al., 2020). Yet, very little research has focused on the potential boundary conditions that either promote or hinder the positive effects of self-regulation. This study suggests that high peer collaboration strengthens the positive effect of self-regulation on behavioral intention to reuse and study engagement. Learners who learn in an environment that provides peer collaboration have highly positive learning support. Thus, we can view high peer collaboration as part of a positive external environment. Our findings provide insights into how peer collaboration, as a contextual factor to facilitate self-regulation, can boost the increased intention to adopt e-learning systems.

Practical Implications

First, for educators, more attention should be paid to self-regulation. Learners' self-regulation has always been regarded as an essential goal perused by e-learning. Self-regulation undoubtedly increases the outcomes of e-learning; moreover, the results of this study showed that self-regulation has a positive effect on the behavioral intention to reuse of the learners. This indicates that if educators cultivate learners' self-regulation strategies and skills, learners' adoption of e-learning will be increased. Therefore, educators should focus on how to improve self-regulation ability among students when they want to increase their enthusiasm for reusing the e-learning system. Specifically, mental effort (van Gog et al., 2020) may be an effective way to help students to improve self-regulation in higher education.

Second, appropriate ways should be chosen to improve the study engagement of the learners. Activities can be held to increase the contextual resources of learners to make more resources, which is beneficial to the study engagement of learners. Universities are expected to increase students' psychological influences, such as teachers and teaching practice, feeling part of a learning community, curriculum, and assessment, which greatly benefits the generation of study engagement (Kahu, 2013).

Finally, the different levels of peer collaboration of learners should be fully explored and the collaborative learning activities (Laal and Ghodsi, 2012; El Mhouti et al., 2017) and the social integration process (Blau, 1960; Severiens and Schmidt, 2009) should be taken. For example, more consideration should be given to social and psychological support (Li et al., 2018), such as the contacts between peers, cooperative work, a cooperative learning environment, and quality of teacher-student, which could increase environmental resources for learners.

LIMITATION AND FUTURE RESEARCH

With all research, this study has several limitations. First, the data of this study were collected at the same time point, which may only reflect the current self-regulation, peer collaboration, study engagement, and behavioral intention to reuse. Although it reflects the relationship among the variables, it cannot fully reflect the causal relationship among self-regulation, study engagement, and behavioral intention to reuse. In addition, the data were collected in the metropolitan area of central China, which may limit the generalization of our findings to far-away places or other cultures. It is suggested future research test our results in other contexts. Third, we relied on undergraduates' self-reports on all variables, which may raise concerns about CMV (Lindell and Whitney, 2001). We thus encourage future research to focus on teacher rating of behavioral intention to reuse to reduce CMV. Last, this study discusses the relationship between self-regulation and the behavioral intention to reuse of learners based on conservation of resource theory, without considering the role of the theory of social integration (Blau, 1960) in explaining this issue. Theories, such as self-determination theory (Ryan and Deci, 2000), also can help researchers explain the effect of self-regulation. So, future research can combine other theories to more fully reflect the influence of self-regulation and study engagement on behavioral intention to reuse.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

JX developed the study design and drafted the manuscript. XQ collected the data and performed the statistical analysis. All authors contributed to the article and approved the submitted version.

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Factors Affecting Consumers' Online Choice Intention: A Study Based on Bayesian Network

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In China, the mature development of online retail channels provides consumers with multiple consumption choices, and the factors that affect whether consumers choose to search or purchase online are numerous and complex. In this context, this paper reports on experimental research regarding consumers' willingness to choose channels based on the two-stage decision-making theory. Using structural equation modeling, the factors influencing consumers' online search intention and purchase willingness and the relationship between them are studied. In particular, the perceived benefits, channel trust, and channel transfer costs are explored. Furthermore, a Bayesian network is used in order to analyze the degree of influence of each factor quantitatively. It is found that online trust is an important factor affecting consumers' online search intention, and the most important factor for consumers' online purchase intention is their perceived benefits of online shopping. At the same time, there is a positive relationship between online search intention and purchase intention. This study can provide management decision support for online retail enterprises and help to promote the healthy development of online shopping.

Keywords: two-stage decision-making theory, search intention, purchase intention, structural equation model, Bayesian network

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INTRODUCTION

The recent emergence of multiple retail channels has made consumers' choice of shopping channels more complex, causing consumers to rethink their choice of shopping channels. This phenomenon has attracted the attention of scholars, who have examined product pricing and channel choice willingness. Many scholars have analyzed channel choice willingness from the theoretical perspective of consumer perception, as consumer behavior is motivated by consumers' psychological assessment of the results that will be achieved by the specific attributes of products or services, such as perceived benefit (Khan et al., 2015), perceived value (Zhao and Chen, 2021), and perceived usefulness (Wang et al., 2021). However, the above-mentioned researches are one-sided, because they only analyze the choice of shopping channels from the perspective of consumer perception. Trust is the attitude and cognition of consumer toward shopping channels. It is believed by some scholars that perceived benefits are based on trust toward the shopping channels (Costa e Silva et al., 2020). Both online and offline channels boast their own advantages, and consumers can choose different channels at different purchasing stages.

But current researches can hardly clarify the complexity on studying consumer channel choice in a theoretical way.

Consumer channel choice is the study of consumer behavior with unique features, because it is based on analyzing real problems and giving choices. The early researches are dominated by theoretical analysis. For example, Huang et al. (2016) analyzed the impact exerted by the emergence of mobile retail channels on online consumption behavior. Based on qualitative research, some scholars try to adopt statistical methods and models to study consumer shopping channels, such as using correlation analysis to analyze factors influencing consumers in online shopping decision-making (Elida et al., 2019). However, the relationship between variables cannot be well explained and the latent variable measurement error remains unresolved by the mentioned methods. With the development of statistical theory, some more rigorous and sound statistical techniques and model analysis methods have been introduced into the research on factors affecting online shopping, such as research on impulsive consumption in online retail (Gupta and Shukla, 2019) and the influence of brand experience on consumer behavior (Chen-ran, 2020). Most of the above researches are carried out around the structural equation model (simply called SEM). SEM is a multivariable statistical analysis method for testing the hypothetical relationships between observed variables and latent variables and among latent variables. It has good processing ability in proving the authenticity of hypotheses (Akbarzadeh et al., 2019). In the behavior research of online consumer, latent variables, such as cognition, attitude, behavior, and willingness, are often unmeasurable, which need to be represented by observed variables. By combining the characteristics of the online consumer behavior, the SEM pre-selects several factors that affect the consumption behavior, sets up the relevant observation and latent variables, and builds the path analysis model. In the research, it is positive to observe the multiple relationships between different variables by considering the significance, coefficient, and mediation or moderating effects to determine the variables correlation. However, building the entire path analysis framework relies on subjective assumptions and judgments. Setting different paths will correspondingly produce different results, therefore, and it is difficult to ensure its stability. Such research is the confirmatory research and highly related to research hypotheses, which greatly limits how this method is applied in investigating online consumer behavior. At the same time, the SEM lacks the ability to predict and diagnose the relationship between variables (Song and Lee, 2008). A Bayesian network is a statistical method for expressing the causality between variables and the relationship between prediction and diagnosis variables (Chickering, 2002). Due to its good prediction and diagnosis ability, it can be used to accurately analyze consumers' purchasing behavior (Song et al., 2013). However, it lacks the empirical ability of examining variable relationships (Song et al., 2011). Therefore, this paper proposes to combine SEN and Bayesian network, which not only adopts SEM in the empirical research to fit non-standard models, but also uses Bayesian network to make diagnosis and prediction. Based on two-stage decision-making theory, we take into account the online channel searching and purchasing intention of consumers in this paper and accurately analyze the factors that affect how consumers make choices online and their complex relationships. It can provide references for online retail companies to formulate reasonable marketing strategies.

THEORY AND HYPOTHESES

Two-Stage Decision-Making Theory

Once consumers generate a shopping desire, searching for information and buying products are the most two important stages of their shopping decision-making process. Haubl and Trifts (2000) presented a two-stage decision-making theory based on the study of consumer shopping behavior. In the search stage, consumers search for a large amount of relevant information about the product. In the purchase stage, they make an in-depth comparison and evaluation of the options, and then, they make the final purchase decision. Two-stage decision-making theory has been applied by many scholars in the choice of consumption channels. Schneider and Zielke (2020) used two-stage decision-making theory to study the consumer Showrooming behavior. Meanwhile, Balladares et al. (2016) studied the factors that affect consumers in the information search stage based on two-stage decision-making theory. Singh and Jang (2020) studied the impact of consumer's perception on choosing searching and purchasing channels and the satisfaction.

Due to the coexistence of online and offline retail channels, consumers have more choices in purchasing channels, and channel choice willingness is the main factor for measuring consumers' channel choice behavior, because consumers have different channel selection behaviors when they are in different purchase decision-making stages. Hence, we can get four consumers' channel choice models: search online–purchase online, search online–purchase offline, search offline–purchase online, and search offline-purchase offline. Based on this, this paper discusses the factors that affect consumers' online search and purchase intention and the complex relationship between these intentions based on two-stage decision-making theory.

Bayesian Network

A Bayesian network shows the relationship between latent variables in the form of a causality graph, which is composed of a network structure S and parameter set θ. The network structure S is used to represent the independent and conditional independent relationship between the sets of classified random variable $x=\{x_1, x_2,\ldots, x_n\}$, and the network structure S is composed of nodes and directed arcs, which is a directed acyclic graph. The parent node of the node x_i is represented by pa_i, and the value set of the parent node is represented by the value set of the parent node: $pa_i = \left\{ pa_i^1, pa_i^2, \ldots, pa_i^{r_{pai}} \right\}$.

The parameter set θ is the local probability corresponding to each variable, and it is the conditional probability set under a given parent node. The parameter set of the variable X_i is as follows: $\theta_{x_i} = \left\{ P\left(x_i^1 | pa_i^j\right), P\left(x_i^2 | pa_i^j\right), \ldots, P\left(x_i^{r_i} | pa_i^j\right) \right\}$. $j = 1, 2, \ldots, r_{pa_i}$. **Figure 1** shows the Bayesian network structure.

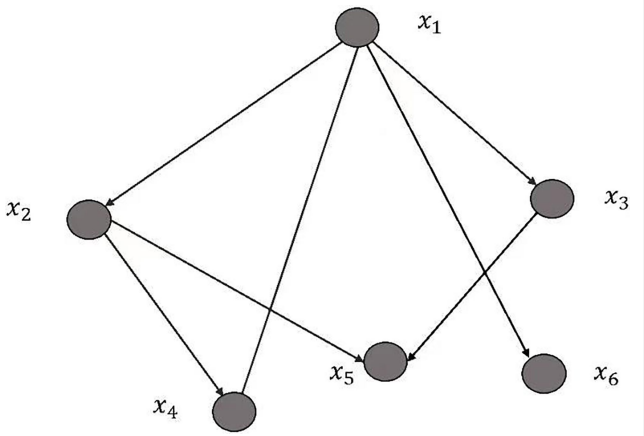


FIGURE 1 | Bayesian network structure.

There are many Bayesian network algorithms. The TAN (Tree-Augmented-Naive) Bayesian network proposed by Friedman et al. relaxes the application conditions of the classic Bayesian network and allows complex correlations between variables. TAN Bayesian networks are trained by constantly training the sample sets to find the best parameters S, θ, which is also the analysis method used in this article. TAN Bayes is an extension of the classic Bayesian network model. It can handle variables that have correlations and have good predictive power for high-dimensional data. The basic idea of the TAN Bayesian network is to use the Bayesian network to express the dependency relationship and to connect the relationship between attribute variables with a directed arc from the parent node to the child node. TAN Bayesian networks are widely used in data mining in the fields of computer, business and communication.

The Bayesian model involves the causal prediction and inference of the observed variables, while the SEM involves empirical analysis of the path relationship of the latent variables. Therefore, the key to combining the SEM and Bayesian network is to obtain the sample data of each node of the Bayesian network through the observation variables to make predictions and diagnostic analysis. The main design ideas of this paper are as follows:

First, we identify the factors influencing consumers' online choice, as shown in **Table 1**, collect data through a questionnaire survey, and then construct the relationship between the observed variables of the SEM.

Second, based on the SEM, we lay the foundation for the construction of the Bayesian network by calculating the score of each latent variable in the SEM.

Third, based on the relationship between latent variables in the SEM and the score of latent variables, in order to draw better research conclusions, the Bayesian network is used to further predict and diagnose the relationship between variables.

TABLE 1 | List of variables, measure items, and literature sources.

Variable	Items	Sources
Perceived benefit (PB)	Online channels can provide detailed product information. Online channels can provide a wide range of products to meet my diverse needs. Online channel can easily compare the same type of products. I can get product information quickly through online channels. The online channel purchase process is easy to operate and easy to purchase. There are many discounts in online channels.	Verhoef et al., 2007
Channel trust (CT)	Other consumers' evaluations of the product are reliable. The seller's reputation is trustworthy. The quality of the product is reliable. Merchant service is trustworthy.	Kuan and Bock, 2007
Switching cost (SC)	I need to spend extra money. I need to spend extra time. I need to spend extra energy. It will bring me inconvenience.	Burnham et al., 2003
Online search intention (OSI)	I will recommend to the people around me to search for products through online channels. I browse the shopping website every day. I rely on shopping websites to search for products. It is attractive for me to search for products through online channels.	Holloway et al., 2005
Online purchase intention (OPI)	I will shop online in the future. Online shopping is my first way of shopping. I am willing to buy more products through the shopping website. I would like to recommend to the people around me to use the shopping website to buy products.	Holloway et al., 2005

Hypotheses

Search Intention

Searching is an important part of consumers' purchase decision-making stage; the more abundant product information consumers have, the more likely they are to make satisfactory purchase decisions, but their willingness to engage in the information search is limited by the cost of the channel search (Tien and Kiureghian, 2016). From the perspective of utility maximization, consumers will choose the lowest-cost way to search for product information. Compared with completing purchases through multiple channels, consumers will spend less in a channel to search for information and buy the products. It is indicated by Singh and Swait (2017) that online channels provide greater searching or purchasing benefits. Ngwe et al. (2019) found that guiding consumers to search for products will increase the overall expected purchasing probability of sold products. Zhai et al. (2019) showed that the channel searching and purchasing behavior of consumers can influence each other.

Trust transfer theory is widely used in the study of consumer behavior when multiple retail channels coexist. Scholars divide trust transfer into intra-channel and inter-channel trust transfer (Stewart and Qin, 2013). Intra-channel trust transfer refers to consumers' trust transfer between different shopping stages in

the same channel (online or offline; Lee et al., 2011). Path dependence theory points out that once economic, social, or technological systems enter a certain path, for better or worse, they will constantly strengthen themselves under the action of inertia (Thietart, 2015). In other words, people's past choices determine their possible choices now. When consumers enter the online retail environment, the impact of search willingness on purchase intention is also a manifestation of path dependence. Based on the theories of trust transfer and path dependence within the channel, consumers' willingness to search in one channel affects their willingness to buy in the same channel. Therefore, the first hypothesis is proposed:

> *H1*: There is a positive relationship between online search intention and purchase intention, and purchase intention can have a reverse impact on search intention.

Perceived Benefit

Both online and offline channels have the functions of information search and product sales (Balasubramanian et al., 2010). However, because different channels have different characteristics, consumers have different perceived benefits of product selection, product quality, service quality, and so on, which will affect their choice of channels. According to Lee et al. (2018), perceived benefit is the customers' evaluation of the overall utility of using a certain channel based on their own needs, which has a direct impact on their purchase decisions. Due to the particularity of online channels, consumers cannot personally experience the utility of products when shopping through such channels. When consumers make an evaluation, one of the most direct factors to consider is the benefits that the channels can bring; the greater the perceived benefits, the stronger the consumers' willingness to buy the products (Martin et al., 2015). van der Lans et al. (2016) pointed out that perceived benefits are most important in determining purchase intentions. The perceived benefits of channels not only affect consumers' willingness to purchase but also attract consumers' willingness to search. Based on the above analyses, the degree of consumers' perceived benefits of retail channels reflect their willingness to choose search information or purchase products. Building on this discussion, the study suggests the following hypotheses:

> *H2*: There is a positive relationship between perceived benefits and online search intention, and search willingness can have a reverse impact on perceived interests.
> *H3*: There is a positive relationship between perceived benefits and online purchase intention, and purchase intention can have a reverse impact on channel trust.

Channel Trust

Many scholars have proved that trust is one of the main factors affecting consumers' intention to purchase, especially when they cannot touch the transaction object as in the online retail environment, consumers will rely on trust to reduce the uncertainty of their purchase decisions, hence increasing the probability of interaction between consumers and retail channels. Channel trust is a reliable way for consumers to search for information. Consumers will trust the channel more because of its reliability and the high-quality information it provides. Trust will increase consumers' goodwill toward businesses and reduce their perceived risks (Zhao et al., 2017). In a study of consumer behavior, Martin et al. (2015) found that consumer trust has a positive impact on channel choice intention. Reimer and Benkenstein (2016) studied the impact of the credibility of other online consumers' comments on consumers' channel choices. They found that the higher the consumers' trust in the channel, the more likely they are to think that online reviews are more credible. Hajli (2015) argued that consumers' trust and purchase willingness are affected significantly by online retailers' ratings and comments, recommendations and introductions, and forums and communities. King et al. (2014) showed that consumers' trust for a certain brand or product significantly affects their purchase willingness. Hence, the following hypotheses are presented:

> *H4*: There is a positive relationship between channel trust and online search intention, and search intention can have a reverse impact on channel trust.
> *H5*: There is a positive relationship between channel trust and online purchase intention, and purchase intention can have a reverse impact on channel trust.

Switching Cost

In the multi-channel retail environment, consumers' consumption behaviors are different online and offline, and the switching cost is the additional cost that consumers must pay for switching services. It includes the economic, psychological, and even emotional cognitive costs of stopping the use of current services and changing to new ones. The switching cost is the multi-channel consumers' perception of the time and energy spent on the conversion between offline and online channels, and it is a part of their assessment of the total shopping cost. Some scholars (Anderson and Simester, 2013; Stan et al., 2013) have shown that the switching cost has a significant impact on the choice of consumer information search channel and purchase channel in the multi-retail channel environment. Specifically, the higher the switching cost, the less easy it is for consumers to make cross-channel purchases. It is discovered by the research of Chang et al. (2017) that the switching cost prevents free-riding behavior. In this paper, the switching cost is set as the perceived cost caused by consumers transferring from the online channel to the offline channel. Building on this discussion, the next set hypotheses are stated as follows:

> *H6*: There is a positive relationship between switching cost and online search intention, and search intention can have a reverse impact on switching cost.
> *H7*: There is a positive relationship between switching cost and online purchase intention, and purchase intention can have a reverse impact on switching cost.

Based on the above assumptions, the conceptual model is shown in **Figure 2**.

METHODS AND RESULTS

Data Collection and Sample

A five-level Likert scale is used, with options of "very much agree," "agree," "generally agree," "disagree," and "very much disagree," corresponding to values of 5, 4, 3, 2, and 1. The higher the degree of identity, the higher the score.

Before the formal survey, we conducted a pre-survey on the questionnaire with college students who have online shopping experience (100 students in total) and revised the questionnaire based on the suggestions made by them and experts. In order to ensure the randomness of the collected data, questionnaires are distributed through Internet after revised, targeting at consumers in China who have both online and offline shopping experience.

It takes a week to collect questionnaires. A total of 591 questionnaires are collected in total, 30 of which are invalid and thus excluded, reasons for invalidity included as: (1) answer time is not normal (e.g., answer time less than 30 s), (2) have missing data on their questionnaires (e.g., the question "compared with offline channels, other consumers' evaluation of the product is trustworthy" is not answered), and (3) have no obvious regular answers (e.g., choosing the same option for 10 or more successive questions). Finally, 561 questionnaires were actually processed, and the validity rate was 94.92%. There were more female participants (60.1%) than male participants (39.9%), including students (23.5%), office workers (7.0%), clerks (56.1%), and others (13.4%), and the possible explanation for imbalanced sex ratio is that women are more interested and enthusiastic in online shopping. Overall, 89.1% of the respondents were aged between 20 and 39 years, and most were highly educated, including graduate (20.1%), undergraduate (65.2%), college degree (10.2%), and high school (4.5%). More detailed characteristics of the sample are shown in **Table 2**.

Reliability and Validity Test

We evaluated the reliability and internal consistency of the measure with SPSS 23.0. Cronbach's alpha was calculated for the construct and ranged from 0.654 and 0.789, indicating that the reliability of each variable of the scale is acceptable and can be analyzed later. The reliability analysis results are shown as **Table 3**. In order to test the validity of the measured data, SPSS 23.0 was used to conduct an exploratory factor analysis. Principal component factor analysis of the data was carried out using the maximum variance method, and the results showed that the overall KMO (Kaiser-Meyer-Olkin) value of the factor analysis was 0.827 and the significance was 0.000, indicating that the data were suitable for factor analysis. According to the principle that the eigenvalue was greater than 1, five principal components were extracted, and the factor load of each measurement item was greater than 0.5, indicating that the measurement items of the unified construction variables were loaded on the same factor, and the scale had good convergence validity.

In order to verify the scientific rationality of the model, it is necessary to test whether each fitting index meets the fitting standard. Take PB, OT, SC, SI, and PI as endogenous variables, and use Amos 23.0 to build the SEM shown as **Figure 3**. As shown in **Table 4**, the results of the fitting indexes in this

TABLE 2 | Sample characteristics ($n = 561$).

Item	Category	Percentage
Gender	Male	39.9
	Female	60.1
Age	<19 years	3.0
	20–29 years	59.7
	30–39 years	29.4
	>40 years	7.8
Education	High school	4.5
	College degree	10.2
	Undergraduate	65.2
	Graduate	20.1
Job	Student	23.5
	Office worker	7.0
	Clerk	56.1
	Others	13.4

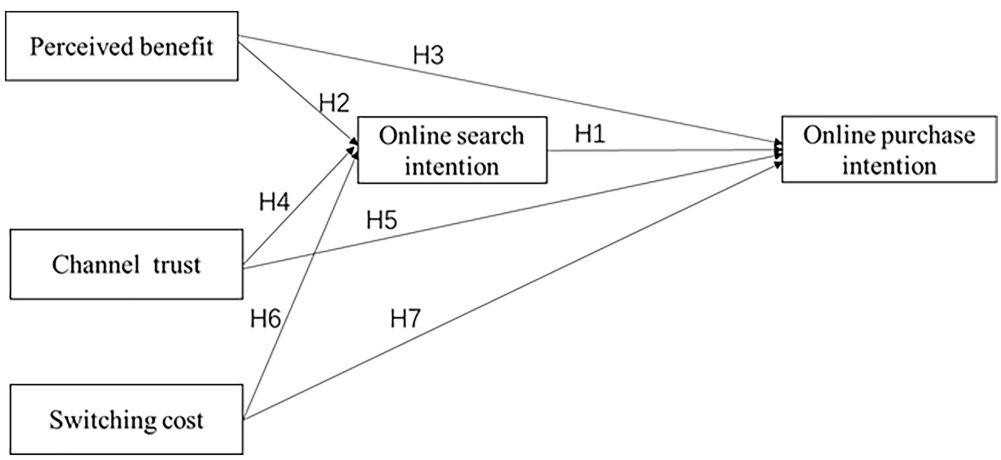


FIGURE 2 | Conceptual model of consumers' intention to choose channels.

study show a GFI (goodness of fit index) of model-fit of 0.969, CFI (comparative fit index) of 0.977, RMR (root mean square residual) of 0.029, X2/DF of 1.103, AGFI (adjust goodness of fit index) of 0.955, and RESEA (root mean square error of approximation) of 0.014. The fitting indexes meet the acceptance standard level.

Data Analysis With SEM

With the help of Amos 23.0, we used the maximum likelihood estimation method to verify the hypotheses proposed in this paper. It can be seen from the SEM that the influence of the variables is obvious. We can see that: (1) The path coefficients of the perceived benefit on online search intention and online purchase intention are 0.16 and 0.49, respectively, indicating that perceived benefit has a positive impact on search intention and purchase intention, and from the path coefficient, we can see that the perceived benefit has a greater influence on the purchase intention. (2) The path coefficients of channel trust on online search intention and purchase intention are 0.38 and 0.26, respectively, indicating that channel trust has a positive impact on search intention and purchase intention. (3) The path coefficients of switching cost on online search intention and purchase intention are 0.16 and 0.21, respectively, indicating that switching cost has a positive effect on search intention and purchase intention, and the influence on purchase intention is slightly greater than that on search intention. (4) The path coefficient of search intention on purchase intention is 0.26, indicating that search intention will also have a positive impact on purchase intention. Therefore, H1, H2, H3, H4, H5, H6, and H7 are supported.

TABLE 3 | Reliability analysis.

Variables	Items	Corrected item-total correlation	α if item deleted	Cronbach's α
PI	PB1	0.522	0.775	0.798
	PB2	0.634	0.749	
	PB3	0.573	0.763	
	PB4	0.537	0.770	
	PB5	0.537	0.771	
	PB6	0.538	0.774	
CT	CT1	0.574	0.741	0.785
	CT2	0.609	0.723	
	CT3	0.643	0.705	
	CT4	0.542	0.757	
SC	CTC1	0.472	0.687	0.723
	CTC2	0.587	0.619	
	CTC3	0.577	0.630	
	CTC4	0.437	0.712	
OSI	OSI1	0.400	0.681	0.698
	OSI2	0.551	0.588	
	OSI3	0.566	0.577	
	OSI4	0.425	0.668	
OPI	OPI1	0.439	0.585	0.654
	OPI2	0.489	0.547	
	OPI3	0.458	0.572	
	OPI4	0.363	0.641	

Data Analysis With Bayesian Network

The average score of each latent variable was analyzed by K-means cluster analysis with SPSS 23.0. In order to reduce

TABLE 4 | Index table of main fitting effects of SEM.

Fit Index	Statistics results	Standard line	Evaluation
RMR	0.029	<0.05	Meet the standard
X^2/DF	1.103	<2.00	Meet the standard
GFI	0.969	>0.9	Meet the standard
AGFI	0.955	>0.9	Meet the standard
CFI	0.977	>0.9	Meet the standard
RMSEA	0.014	<0.05	Meet the standard

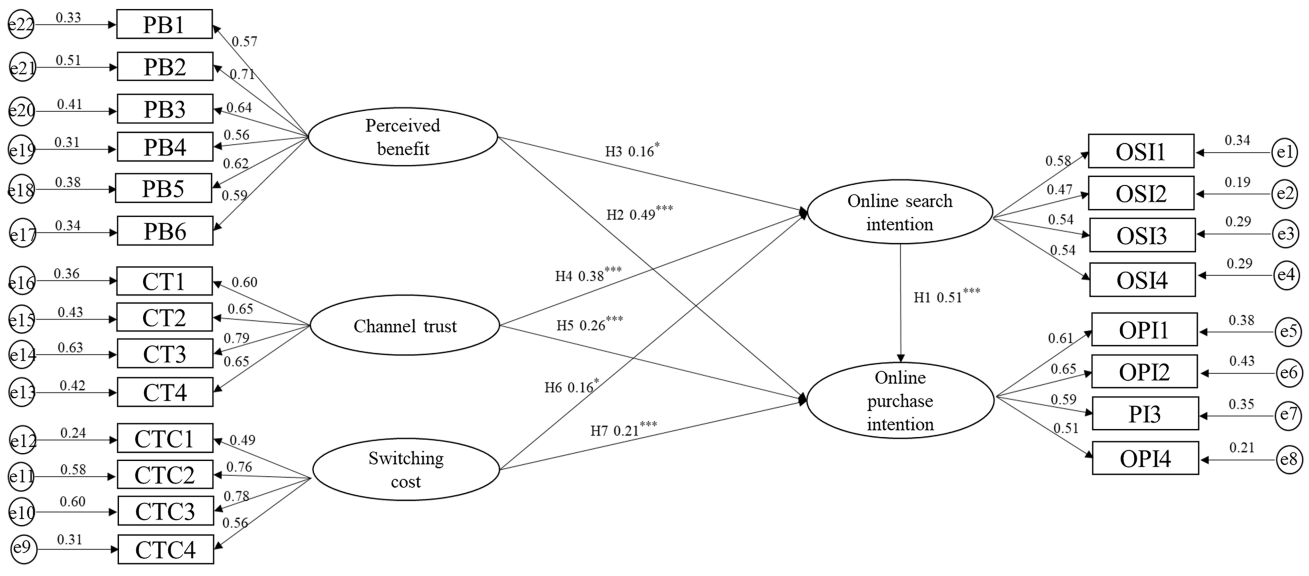


FIGURE 3 | Path coefficient diagram of structural equation model.

the complexity of the operation and increase the identifiability of the judgment results, each latent variable was clustered into three states: high, medium, and low. Before clustering, in order to ensure the quality of the data, the box diagram of the sample data was drawn to deal with abnormal values, and the "minimum and maximum" abnormal data far away from the whole were eliminated; hence, a total of 42 outliers were removed, and 519 valid data were analyzed. In this study, an SPSS analysis of variance (ANOVA) was used to verify the differences in the latent variables in each dimension and to verify the significance of the classification to the dimension scores. The specific results are shown in **Table 5**. The ANOVA results show that it is reasonable to cluster sample data into high, medium, and low dimensions.

We used SPSS modeler 18.0 to construct the TAN Bayesian network based on clustering data with the maximum likelihood method, as shown in **Figure 4**. We can see that purchase intention is the parent node of transfer cost, perceived benefit, search intention, and channel trust, indicating that purchase intention is affected by these four latent variables from the constructed Bayesian network structure. In addition, online search intention is the parent node of transfer cost, perceived benefit, and channel trust, indicating that online search intention is also affected by these three variables. The influence of online search intention on online purchase intention depends not only on itself but also on the perceived benefits of online purchase, channel trust, and channel transfer cost.

TABLE 5 | Analysis of variance.

	Clustering		Error		*F*	Sig.
	Mean square	Df.	Mean square	Df.		
PB	4.789	2	0.146	516	32.696	0.000
CT	27.853	2	0.237	516	117.385	0.000
OSI	43.844	2	0.246	516	178.546	0.000
SC	19.638	2	0.409	516	48.019	0.000
OPI	9.428	2	0.140	516	67.262	0.000

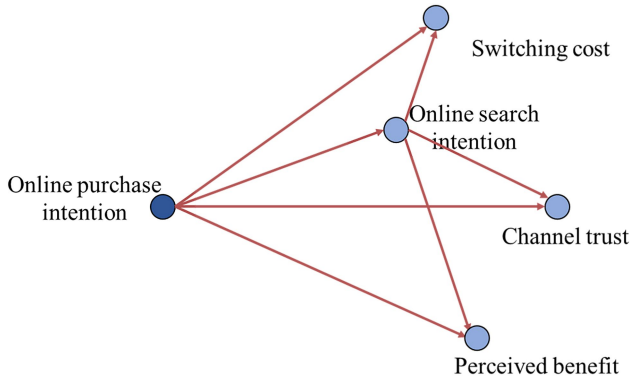


FIGURE 4 | Bayesian network model of consumers' willingness to choose channels.

Bayesian Prediction

According to the constructed Bayesian network, the prediction of online search intention and purchase intention in different states can be obtained from switching costs, channel trust, and perceived benefit, as shown in **Table 6**. As can be seen from the tables, with the changes in switching costs, channel trust, and perceived benefit along the high-medium-low (simply called H-M-L), online search and purchase intentions change positively. Due to the low search cost of online channels, consumers tend to search for product information online after generating a shopping demand. **Table 6A** shows that the higher the perceived cost caused by the transfer of online search to offline purchase, the stronger consumers' intention to choose purchase, indicating that the switching costs plays a positive role in the locking of online channels. From **Table 6B**, we can see that the state of "high" search intention and purchase intention changes positively with the change of channel trust from high to middle to low. Meanwhile, from **Table 6C**, it can be seen that, with the decrease of consumers' perception of purchase benefit, the decreasing probability of high purchase intention is more obvious than that of high search intention, indicating that purchase benefit has a greater impact on online purchase intention. **Table 6D** shows that, when consumers' willingness to search online is low, their willingness to buy online is also very low, indicating that consumers are less likely to choose the path of offline search–online direct purchase.

Bayesian Diagnosis

Bayesian diagnosis is the reverse operation of Bayesian reasoning; that is, the state of the independent variables is obtained through the state of the dependent variables. The following tables show the Bayesian diagnosis of search intention, purchase

TABLE 6 | **(A)** Bayesian inference of switching cost in different state, **(B)** Bayesian inference of channel trust in different states, **(C)** Bayesian inference of perceived interests in different states, and **(D)** Bayesian inference of search intention in different states.

(A)

States	OSI			OPI		
	H	M	L	H	M	L
H	0.503	0.392	0.105	0.421	0.467	0.113
M	0.396	0.422	0.182	0.353	0.451	0.196
L	0.308	0.453	0.239	0.223	0.574	0.203

(B)

H	0.574	0.383	0.043	0.458	0.485	0.057
M	0.455	0.437	0.108	0.241	0.551	0.209
L	0.248	0.545	0.207	0.157	0.471	0.373

(C)

H	0.403	0.466	0.131	0.611	0.269	0.119
M	0.296	0.486	0.218	0.355	0.558	0.087
L	0.285	0.439	0.277	0.077	0.807	0.115

(D)

States	OPI		
	H	M	L
H	0.436	0.482	0.082
M	0.221	0.581	0.198
L	0.039	0.269	0.629

benefit, online trust, and switching costs given the purchase intention of the parent node. **Table 7A** shows the conditional probability set of search intention under the condition of a given parent node of purchase intention. It can be seen from **Table 7A** that search intention changes positively with the change in the H-M-L intention, and when the online purchase intention is clear, consumers have a high probability of choosing online search product information, indicating that online channels have a certain channel lock.

Table 7B shows the set of conditional probabilities of switching costs, perceived benefit, and channel trust under the conditions of search intention and purchase intention. It can be seen from **Table 7B** that, with the H-M-L change of search intention and purchase intention, the probability of switching costs, perceived benefit, and channel trust gradually decreases. When the search intention is in the state of "high," with the change of H-M-L purchase intention, the probability of a "high" perceived benefit is not obvious, which indicates that perceived benefit is an important reason to attract consumers to choose an online channel to buy products, while the probability of perceived benefit, transfer cost, and channel trust being "medium" and "low" decreases at first and then increases. When the search intention is in the "middle" state, with the change of purchase intention from high to low, the change of channel trust to "high" is more obvious. This shows that whether consumers choose to buy products directly online depends to a large extent on the degree of trust of they have in the channel, and enterprises that carry out online retail business can attract consumers to online channels by improving consumers' trust in online channels.

DISCUSSION

Combining the empirical ability of SEM and the predictive and diagnostic ability of Bayesian networks, we analyzed the factors influencing consumers' online search and purchase intention in multi-retail channels as well as the relationship between these factors. The results showed that as: (1) Consumers' perceived benefits, channel trust, and switching cost have a positive impact on search intention, and consumers' trust in online channels is the main factor driving their choice of online search, this result is consistent with the results found in the previous studies (e.g., Hajli, 2015; Martin et al., 2015; Reimer and Benkenstein, 2016; Zhao et al., 2017). (2) Consumers' perceived benefits, channel trust, and switching cost have a positive impact on purchase intention, and the main factor for attracting consumers to choose online product purchasing is the perceived benefit factor, the greater the perceived benefits, the stronger the consumers' willingness to buy the products (e.g., Martin et al., 2015; van der Lans et al., 2016). (3) Consumers' willingness to search online also affects their willingness to buy online, and this result is consistent with the results found in the previous studies (e.g., Ngwe et al., 2019; Zhai et al., 2019); therefore, guiding consumers to search for products will increase purchasing probability of sold products. (4) When channel trust reaches a certain level, online channels have a certain channel lock, that is, consumers will choose the path of online search–online purchase, and channel switching cost also has a positive effect on the online channel lock, this is because the higher the perception of switching cost, the less likely it is for consumers to search for product information in one channel and purchase products in another channel (e.g., Anderson and Simester, 2013; Stan et al., 2013). (5) According to the Bayesian network diagnosis, search intention can adversely affect consumers' perceived benefit, channel trust, and switching cost, and purchase intention can adversely affect consumers' perceived benefit, channel trust, switching cost, and search intention.

This research provides new ideas on the research methods of consumer channel selection. The existing research on consumer channel choice is mostly qualitatively based on theory or empirical analysis of the causal relationship between variables

TABLE 7 | **(A)** Conditional probability table of search intention and **(B)** conditional probability of search intention and purchase intention.

(A)

Parent node	Probability		
OPI	**H**	**M**	**L**
H	0.683	0.311	0.006
M	0.469	0.507	0.024
L	0.253	0.549	0.198

(B)

Parent node		PB			SC			CT		
OSI	**OPI**	**H**	**M**	**L**	**H**	**M**	**L**	**H**	**M**	**L**
H	H	0.784	0.198	0.018	0.602	0.293	0.106	0.609	0.366	0.024
H	M	0.721	0.265	0.015	0.449	0.449	0.103	0.427	0.507	0.066
H	L	0.646	0.302	0.052	0.391	0.435	0.174	0.131	0.826	0.044
M	H	0.482	0.429	0.089	0.304	0.536	0.161	0.518	0.411	0.071
M	M	0.341	0.599	0.061	0.319	0.605	0.075	0.347	0.558	0.095
M	L	0.335	0.574	0.071	0.417	0.558	0.025	0.175	0.617	0.208
L	H	0.201	0.687	0.111	0.432	0.312	0.256	0.341	0.406	0.253
L	M	0.143	0.843	0.014	0.286	0.571	0.143	0.143	0.714	0.143
L	L	0.056	0.833	0.111	0.222	0.722	0.056	0.057	0.499	0.444

with the help of statistical software (e.g., Huang et al., 2016; Elida et al., 2019), while ignoring the in-depth discussion of the complex interrelationships between variables. This article proposes a combination of structural equation modeling and Bayesian network research methods to explore the variables and complex relationships that affect consumers' willingness to choose online shopping channels, and in-depth analysis of the attributes of online channels, with a view to further enriching consumer channel choice behaviors related research.

For retailers carrying out online retail business, analyzing the influencing factors of consumers' online choice under multiple channels helps to better satisfy consumers' channel preference, thus increasing the probability of interaction between retailers and consumers, improving consumers' channel stickiness, and reducing enterprise service costs. Therefore, this study has important practical implication for solving the problem of ineffective online channel operation after traditional retail enterprises adopt multi-channel retail strategy.

SUGGESTIONS

According to the above research conclusions, we provide the following marketing suggestions for online retailers and company with an online business.

First, it is important to give attention to value marketing and strengthen customer stickiness. Online retailing as an important part of the new retail environment, and the continuous low-price strategy has been unable to retain consumers over the long term. Retailers need to balance the relationship between price and cost. Improving the price-to-performance ratio of products and the quality of distribution service is crucial to enhance the customer experience and maintain brand image. In addition, retailers can promote product updates, discount activities, brand value images and other information to customers through official accounts, well-known bloggers, and other ways to improve consumer loyalty.

Second, online retailers should focus on content marketing and improving customer attention. In the multi-channel retail environment, consumers have more independent choice of information search, and more vivid content is very important when consumers search and make purchase decisions. In addition to the e-commerce platforms, retailers could also make use of the emerging business infrastructure to provide convenient and quick product search channels, such as Mini Programs, official accounts or life accounts, to present products or brands in the form of text, pictures, short videos, and live broadcasts to attract consumers through multiple channels and increase consumer attention through multiple means. In addition, for different consumer groups, differentiated content marketing according to the positioning of the brand can also yield twice the results with half the effort in terms of attracting consumers' attention.

Third, online retailers must engage in honest marketing and enhance the reputation of their brands. Trust is the key factor that supports the success of online retailing. The more consumers trust in the channel, the more likely they are to have positive search and shopping intention. Retailers can improve their credibility through the evaluation and certification of third-party sellers or with the help of consumers' trust in well-known brands. Moreover, they can use credit mechanisms, such as "commitment + guarantee," to allay consumers' shopping concerns. This will impact the shopping procedures of consumers and help to win their trust.

LIMITATION

In studying consumers' willingness to choose channels under multiple retail channels, we considered their willingness to search and purchase through online channels, but we did not further compare online channels with offline channels. Future research will further refine channel selection factors, such as channel attributes. In addition, when analyzing consumers' channel choice willingness in this study, we did not consider specific product types, because different product categories will affect consumers' channel choice intention in the two-stage decision-making of searching information and purchasing products, future research could consider dividing different product categories or introducing other factors that affect consumer preferences to conduct research on consumers' willingness to choose channels.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements. Written informed consent was implied *via* completion of the survey.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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The Impact of the Interactivity of Internet Celebrity Anchors on Consumers' Purchase Intention

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The current study focuses on a novel and recently popular internet phenomenon – celebrity livestreaming marketing. As one of the primary advantages of livestreaming marketing by Internet celebrities, we propose that the timely interactivity of Internet celebrities plays an important role in consumers' purchase intention. Based on stimulus-organism-response theory, this paper further identifies social presence and flow experience as mediators and the consistency of Internet celebrities' image and product image as a moderator and constructs an influence model of Internet celebrities' interactivity on consumers' purchase intention. The responses of a sample of 277 participants were collected by a questionnaire survey. SPSS and Amos were used to analyse the data. The results show that consumers' social presence and flow experience mediate the positive impact of the interactivity of Internet celebrity anchors on influencing consumers' purchase intention. However, there is no significant moderating effect of the consistency of Internet celebrities' image and product image on the relationship between social presence or flow experience and purchase intention. A discussion and implications are offered.

Keywords: internet celebrities, interactivity, social presence, flow experience, livestreaming marketing

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INTRODUCTION

With the maturity of live broadcasting technology and the development of online sales platforms, Internet celebrity livestreaming has become a novel sales mode. Through the live broadcasting platform, product information is presented more vividly in the form of trial and experience sharing in order to urge consumers to buy products (Lee and Overby, 2004). As a new marketing mode, Internet celebrity livestreaming not only provides consumers with good shopping experiences, but also brings a new profit model and cash channel to Internet celebrity anchors. Therefore, a practical question is worth further exploration: why do consumers purchase items in the live broadcasting room? In celebrity livestreaming marketing, the factors that affect consumers' purchase intention have changed. The mechanism is also different from that in traditional e-commerce marketing. However, there is little research that notices this issue.

In psychology area, stimulation-organism-response (SOR) theory is often used to analyse the impact of external environment stimulation on an individual's emotion and behaviour. Mehrabian and Russell (1974) believe that people are vulnerable to the stimulus and influence of external factors. When environmental factors (S) such as visual images and sounds are received by people, they will initially affect individuals' internal state (O), and then psychological

changes are generated, which further influence their behaviour (R). With the development of e-commerce, SOR theory has been widely applied in the field of online shopping. This study applies it to analyze a novel marketing phenomenon – online celebrity livestreaming. The intense interaction between celebrity anchors and consumers is a kind of stimulus to consumers, which will change their moods and inner states, and then ultimately influence purchase intention. This process is consistent with the SOR model.

The most significant feature of online live broadcasting is the real-time interaction between consumers and anchors (Fang, 2012). It may create novel consumer decision-making process different from that in traditional online shopping. Specifically, livestreaming anchors become shopping guides who introduce the product in detail by displaying the functions (Chen and Lin, 2018). The multichannel, real-time, dynamic and two-way interaction between anchors and consumers arouse consumers' desire to purchase (Saffer et al., 2013; Liu et al., 2020). Thus, an anchor's interactivity seems quite important in celebrity livestreaming marketing (Kelleher, 2009; Fang, 2012). The current study explores the mechanism by which the interactivity of Internet celebrity anchors affects consumer purchase intention.

In addition, live broadcasting can help consumers get access to information rapidly. A prominent feature of livestreaming marketing is that each consumer is not separate from other buyers but is at the presence of others (Greenleaf and Lehmann, 1995; Xie et al., 2016; Park et al., 2018). In offline retail stores, consumers perceive products through viewing, touching and direct interactions with salesmen. This effect also exists for online shopping, even more important than before. Social presence reflects the extent to which the anchor can produce a kind of intimacy to their audiences (Short et al., 1976). Anchors can create a subtle emotional experience for consumers through skilled interactions, which may enhance consumers' sense of social preference (Shin and Shin, 2011). The audiences' inner self can be aroused, which makes them completely immersed in live broadcasting and then stimulate their purchase intention for the products recommended.

Moreover, flow experience refers to the process that one acquires pleasure and well-being through participating in specific activities (Hoffman and Novak, 2009). In live broadcasting, anchors communicate with consumers through timely feedback or on-site displays, which may generate flow experience. This process helps audiences acquire product information and reduce risk perception. Consumers may also obtain a positive emotional experience of enjoyment and pleasure, which will promote their attachment and loyalty to the Internet celebrity anchor and then further stimulate their purchase intention. Chen and Lin (2018) examine the positive influence of flow experience livestreaming usage intention. The current research includes both social presence and flow experience in the consumer decision-making process model and examines their mediating roles in the relationship between interactivity of Internet celebrity anchors on consumer purchase intention.

Moreover, when celebrity image is consistent with product image, consumers will better trust the products that celebrities recommend. Thus, this paper introduces the variable of the consistency of Internet celebrity image and product image as a moderator in the model, which may explore the boundary of the prior proposed model.

In summary, this study has several contributions. Firstly, based on the SOR model, this study identifies the role of the interactivity of Internet celebrity anchors in Internet livestreaming marketing, which applies the model to explain new marketing phenomenon. Secondly, this paper explores the mediation effects of social presence and flow experience in the relationship between the interactivity of celebrity anchors and consumer purchase intention in order to help scholars and managers comprehensively understand the 'black box' when consumers make purchase decisions in live broadcasting. Thirdly, this paper tests the moderating role of consistency of Internet celebrities' image and product image in consumer decision-making process, which helps both scholars and practitioners understand in what circumstances the model is more robust.

HYPOTHESES DEVELOPMENT

Previous studies propose that compared to traditional media, online activities provide a unique experience in interaction for the Internet users (Skadberg and Kimmel, 2004; Hassanein et al., 2009; Mollen and Wilson, 2010). This experience can help consumer easily perceive product information and build consumer trust and engagement toward sellers, and finally influence purchase intention (Wongkitrungrueng and Assarut, 2020). In live broadcasting, anchors introduce product information and respond to online consumers' enquiries in a timely manner, which effectively urges consumers' participation. Therefore, the interaction between anchors and consumers is the key factor that enhances purchase intention. Moreover, the interactivity between Internet celebrity anchors and consumers creates social presence, which reflects the feeling on being together in the virtual environment. Social presence shortens the psychological distance between anchors and online buyers. The high perceptions of social presence will lead to perceived satisfaction with the anchor, and then affect purchase intention. In another aspect, the fast and timely two-way interactions help consumers indulge themselves in live broadcasting – flow experience that often exists in online activities. Flow experience generates consumers' attachment and loyalty to the anchors and enhances their willingness to buy the products recommended by the anchors (Ling et al., 2011).

INTERACTIVITY OF INTERNET CELEBRITY AND SOCIAL PRESENCE

Social presence refers to the degree to which an individual is regarded as a "real person" and the perceived degree of contact with others in the process of using media to communicate (Parker et al., 1976). Previous studies have focused on which social business technology factors and practices affect individual social presence, such as rich social information, virtual agents, three-dimensional displays, human-computer interactions, and

remote presentations (Pavlou and Xue, 2007; Wang et al., 2016; Algharabat et al., 2018). The above research not only effectively explains the ability of communication media to transmit social signals but also demonstrates that computer media communications—such as chat boxes and online customer support centers—can become the media of social telepresence communication (Qiu and Benbasat, 2005). Social presence plays an important role in the online shopping environment, especially when there is a lack of face-to-face interaction between consumers and businesses.

In the context of e-commerce, it is difficult for consumers to feel the enthusiasm and warmth brought by face-to-face communication, which weakens consumers' purchase intentions to a certain extent (Wang and Emurian, 2005). However, with the support of a variety of communication technologies, live broadcasting can quickly spread sound and images, and online consumers can send instant messages to interact with Internet celebrity anchors; thus, consumers will have a sense of being on the scene (Chen and Lin, 2018), which improves consumers' perceptions of social interaction (Hu et al., 2017). Live broadcasting enables consumers to interact with the anchor and feel the active participation of other buyers, which can convey emotional elements in real life through scene construction, and anchors can provide consumers with a more authentic purchase experience through real expressions, actions and other body language and professional product demonstrations. This immersive experience is the sense of social presence. The real-time communication and the interaction between consumers and anchors can increase their familiarity with each other and shorten the psychological distance between them (Gunawardena and Zittle, 1997). This will help consumers feel the enthusiasm and existence of the anchors and in turn improve consumers' social presence.

H1: The interactivity of Internet celebrity anchors is positively related to consumers' social presence.

INTERACTIVITY OF INTERNET CELEBRITY AND FLOW EXPERIENCE

Flow experience refers to the psychological state in which an individual is immersed in a certain activity (Ha et al., 2007). When individuals have flow experiences, they have a high sense of excitement and fulfillment, and they lose their perception of the passage of time and changes in the real world (Su et al., 2016). Concentration and enjoyment are two important parts of the immersion experience. Flow experiences not only entail personal concentration and enjoyment but also exploration and entertainment. That is, immersion experiences encourage consumers to participate in activities and have fun, and will continue to strengthen their participation due to the improvement of their subjective experiences (Skadberg and Kimmel, 2004; Lu and Wang, 2008).

With the development of the mobile Internet, flow experiences have been introduced into online consumer behavior research. Early studies have found that interactive technology enables more users to experience flow. When consumers are in a flow experience, the brand guides consumers in the interactive process and motivates consumers to create value for the brand, for example, spread brand reputation. (Hamilton et al., 2016). Effective social interaction can make consumers feel happy and in turn generate a flow experience (Animesh et al., 2011). In the process of live broadcasting, Internet celebrity anchors effectively convey product information. Consumers can interact with Internet celebrities through bullet screens, gifts, and other methods. When people perceive the interaction, they will participate in the interaction more actively, leading to a better emotional experience and the immersion state of flow (Gao et al., 2017). Therefore, interaction with Internet celebrity anchors improves consumer participation and immersion, causing consumers to forget the passage of time and enter a flow state.

H2: The interactivity of Internet celebrity anchors is positively related to consumer flow experience.

SOCIAL PRESENCE AND PURCHASE INTENTION

Research on social presence is mostly based on the context of traditional web shopping platforms (Botha and Reyneke, 2016; Keng et al., 2016), and the live broadcast, a real-time "social situation," is rarely taken into account in the interpretation of consumption behavior (Animesh et al., 2011). Consumers' emotional responses to goods are the internal driving force of their purchase intentions. Social presence makes consumers experience positive emotions, such as pleasure, which positively affects consumer attitudes and loyalty (Hassanein and Herd, 2007). Positive emotion can establish a bond between consumers and commodities, stimulate consumers to actively participate in commodity marketing, help consumers develop a sense of social presence in the virtual network, and finally form consumers' purchase intentions.

In livestreaming marketing, the continuous, in-depth interactions between the anchor and the consumer can improve consumers' sense of social presence, inspire positive emotions in consumers, and reduce consumers' uncertainties and concerns about products, thus improving their willingness to purchase (Dawes and Nenycz-Thiel, 2014; Li et al., 2020). At the same time, pleasant emotions improve the perceived alignment between products and consumer needs, shorten the psychological distance between consumers and online merchants, and promote consumer purchase intention (Gefen and Straub, 2004; Gao et al., 2018). Therefore, this paper puts forward the following hypothesis:

H3: Social presence is positively related to purchase intention.

FLOW EXPERIENCE AND PURCHASE INTENTION

Flow experience can affect consumers' purchase intentions *via* pleasure and satisfaction. When consumers are in the state of

flow, they have a great sense of pleasure and psychological satisfaction, and these positive emotional reactions may promote purchase behavior (Hausman and Siekpe, 2009; Kim et al., 2017). When online consumers are in the state of flow experience, they develop purchase intentions to extend the positive emotions associated with the flow state (Animesh et al., 2011). For example, consumer flow experiences on brand websites promote positive emotions and in turn inspire positive effects, such as increased brand loyalty, which can then be transformed into purchasing behaviors (Shim et al., 2015).

In live broadcast marketing, the live broadcast platform provides consumers with a panoramic interactive experience of vision and hearing and creates a realistic shopping experience. This immersive experience can stimulate consumers' desire to buy. Moreover, the real-time interaction, natural language, and personalized attention of network media contribute to consumers' flow experiences. The flow experience immerses consumers in the communications of the Internet celebrity anchor, encouraging them to ignore surrounding visual information that is irrelevant to the live broadcast and promoting their understanding and acceptance of the information conveyed by the Internet celebrity anchor (Webster et al., 1993; van Noort et al., 2012). Therefore, this paper puts forward the following hypothesis:

H4: Flow experience is positively related to purchase intention.

THE MEDIATING ROLES OF SOCIAL PRESENCE AND FLOW EXPERIENCE

Stimulation-organism-response theory is widely used in online shopping research. This theoretical model proposes that the stimulation of environmental factors ultimately affects people's reactions by influencing their internal psychological states (Akerlof, 1970). The stimulus is the factor that promotes individual behavior in the external environment. The organism is a psychological transformation mechanism by which individuals internalize stimulating factors into information as the basis for the final behavior. The response is the final psychological or behavioral reaction of the stimulated object. For example, Eroglu et al. (2003) applies SOR theory to the research in the field of online shopping, the atmosphere cues of shopping websites are operationalized as the "stimulus," the user's internal emotional state (such as perceived pleasure, arousal) as the "organism" and user satisfaction and approach or avoidance behaviours as the "response," thus a research model of online shopping atmosphere was constructed, which proposed that the atmospheric cues of the online store influence shoppers' emotional and cognitive states, which then affect their shopping outcomes.

In Internet celebrity livestreaming marketing, the interaction between the anchor and consumers in the live broadcast room is an external stimulus to consumers that promotes positive emotions. Continuous, frequent interactions allow consumers to experience a high level of social presence and a strong flow state. The resulting positive emotions encourage consumers to have positive attitudes toward Internet celebrities and products. At the same time, a good immersion experience can promote information processing and thus improve consumer memory of product information (Webster et al., 1993; van Noort et al., 2012). For example, in TV programs, the higher the audience's investment level, the easier it is for the audience to recall the brands implanted in the program (Balasubramanian et al., 2006). Therefore, based on SOR theory, positive interaction promotes consumer social presence and flow experiences, which may improve consumers' acceptance of product information and finally stimulate consumer purchase intention. Therefore, this paper puts forward the following hypotheses:

H5: Social presence plays a mediating role in the relationship between the interactivity of Internet celebrity anchors and purchase intention.

H6: Flow experience plays a mediating role in the relationship between the interactivity of Internet celebrity anchors and purchase intention.

THE MODERATING ROLE OF THE CONSISTENCY BETWEEN INTERNET CELEBRITY IMAGE AND PRODUCT IMAGE

Consistency refers to the consistency of celebrity image and product at first, that is, the matching degree between celebrity and its products (Friedma, 1970), which is one of the decisive factors in the success of celebrity endorsement marketing. This consistency has a significant impact on the effects of advertising and consumer evaluation of products. When consumers perceive consistency between the celebrity image and the product image, they have more positive attitudes toward the celebrity image, find the celebrity more attractive and credible, and exhibit higher recognition and purchase willingness toward the products and brands the celebrity endorses (Jaideep et al., 1997). This study defines the consistency of Internet celebrity image and product image as follows: the degree of consistency between the image of Internet celebrity anchor and the image of products bought and sold in the live broadcast room (Liu et al., 2020).

The matching of Internet celebrities' image with products affects consumer psychology and behavior (Liu et al., 2020). When the consistency between an Internet celebrity image and a product image is high, consumers will consider that online celebrities have high attraction and credibility (Friedma, 1970; Koernig and Boyd, 2009), which improves consumer willingness to purchase. In this situation, the experiences of social presence and flow also stimulate consumer purchase intention. On the contrary, when the consistency between the Internet celebrity image and the product image is low, it is difficult for consumers to establish trust in online celebrities and products, and the perception of product uncertainty increases, which weakens purchase intention. Furthermore, the effects of

social presence and flow experience on consumers' purchase intentions are also weakened. Therefore, this paper puts forward the following hypotheses:

H7: The consistency between Internet celebrity image and product image plays a moderating role in the effect of social presence on purchase intention, such that the effect is stronger when the consistency between Internet celebrity image and product image is low.

H8: The consistency between Internet celebrity image and product image plays a moderating role in the effect of flow experience on purchase intention, such that the effect is stronger when the consistency between Internet celebrity image and product image is low.

MATERIALS AND METHODS

This study used a questionnaire to test the hypothesised model. The questionnaires were posted *via* Sojump,[1] a large-scale online survey platform in China that is widely used in behavioural and psychological research (Li et al., 2018). We distributed the survey link in a popular livestreaming shopping forum. The respondents were the groups who made livestreaming purchases recently. Participant were asked to recall his or her most recent livestreaming shopping experience before they completed the survey. Finally, 277 valid questionnaires were obtained, with an effective recovery rate of 92.3%. The sample size met Hair et al.'s (2009) recommendation. In terms of the demographic information, the proportions of men and women are balanced, with 58.1% men and 41.9% women. The majority of the respondents earn more than RMB 4000 a month (63.1%) and have a bachelor's degree (63.9%), while 53.4% of the respondents engage in Internet live broadcast shopping one to three times a month.

MEASURES

To ensure the reliability and validity of the questionnaire, the scales in this study are all derived from the established scales in the existing studies, and the scales are adapted according to the purpose of this study. Gender, age, education, occupation, income and purchase frequency in the live broadcasting room are included as the control variables. Interactivity (Cronbach's $\alpha = 0.743$) and the consistency of Internet celebrities' image and product image (Cronbach's $\alpha = 0.803$) are measured by three items, respectively, from Liu et al. (2020). Sample items are 'The celebrity anchor has good interactions with the audiences' and 'The celebrity image is well matched with the product image he/she recommends'. In addition, social presence (Cronbach's $\alpha = 0.779$) and flow experience (Cronbach's $\alpha = 0.747$) are measured by three items adapted from Hassanein et al. (2009) and Huang et al. (2017), respectively. Sample items are 'There is a sense of human contact in this livestreaming room' and 'I am experiencing flow in this livestreaming room'. Lastly, three items from Dodds et al. (1991) were used to measure purchase intention (Cronbach's $\alpha = 0.779$). A sample item is 'The likelihood of purchasing this product is: (very high to very low)'. All the constructs are measured with five-point Likert scales.

[1]http://www.sojump.com

RESULTS

Reliability and Validity

To ensure construct validity for each variable, exploratory factor analysis was conducted followed by the calculations of AVE and CR to assess the convergent validity of the measurement model. The factor loadings of each indicator exceed the accepted value of 0.5. The values of AVE of all the constructs exceed 0.5, indicating that the scales have good convergent validity (Fornell and Larcker, 1981). All the items' composite reliability values are above the benchmark of 0.60, showing that the measurement model has good internal consistency. Furthermore, **Table 1** reveals that the square root of AVE for each latent variable is greater than its correlation coefficient with other latent variables, which shows good discriminant validity (Barclay et al., 1995). The reliability coefficients for all the constructs are greater than 0.7 and are accepted based on George and Mallery's (2003) criterion. These results provide a basis for further analysis.

Hypothesis Testing

Amos 24.0 was used to test the path coefficient and hypothesis. The results ($\chi^2/df = 2.679$, RMSEA = 0.078, GFI = 0.908, IFI = 0.934, TLI = 0.912, CFI = 0.933) suggest that the theoretical model fits the data quite well according to the thresholds (Fornell and Larcker, 1981; Marsh et al., 1988; Kline, 2011).

Figure 1 shows the results of each standardized path coefficient in the model. Specifically, interactivity has significant positive impacts on both social presence and flow experience ($\beta = 0.830$, $p < 0.001$; $\beta = 0.410$, $p < 0.01$), adequately supporting Hypothesis 1 and Hypothesis 2. Meanwhile, both social presence and flow experience exert positive impacts on purchase intention ($\beta = 0.896$, $p < 0.001$; $\beta = 0.482$, $p < 0.01$). Hypothesis 3 and Hypothesis 4 are supported.

TABLE 1 | Descriptive statistics and correlation coefficients and discriminant validity model.

Variable	1	2	3	4	5
1. Interactivity	0.716				
2. Social presence	0.680**	0.766			
3. Purchase intention	0.586**	0.636**	0.741		
4. The consistency of Internet celebrities' image and product image	0.656**	0.556**	0.565**	0.759	
5. Flow experience	0.681**	0.655**	0.625**	0.589**	0.715

*N = 277. **p < 0.01. The value on the diagonal represents the square root of the AVE value.*

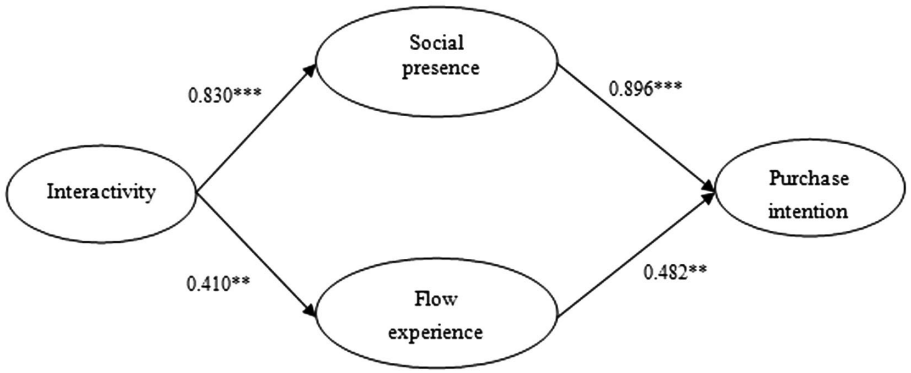


FIGURE 1 | Path coefficients of the hypothesized model. $^{**}p<0.01$, $^{***}p<0.001$.

To examine mediation effect, we adopted the bootstrap method proposed by Hayes (2013). The results are shown in **Table 2**. LLCI and ULCI are the lower and upper limits for the 95% confidence intervals, respectively, and the 95% CI does not contain 0. The results show that the mediating effects of social presence and flow experience on the relationship between interaction quality and purchase intention are significant. Thus, Hypothesis 5 and Hypothesis 6 are supported.

To further test the moderating effect, we conducted a series of hierarchical regression analyses with SPSS 25.0 (Hox, 2010). In order to verify the interactions between independent variables and moderating variables, we first centralized all the variables and calculated the interaction terms (Aiken and West, 1991). The regression results are shown in **Table 3**. In models 4 and 8, the interaction items have no significant effect on purchase intention ($\beta = -0.024$, $p > 0.05$; $\beta = -0.059$, $p > 0.05$). Thus, Hypothesis 7 and Hypothesis 8 are not supported.

TABLE 2 | Mediating effect test.

Effect	Estimated value	*P*	Standard Error	LLCI	ULCI
Interactivity → Social presence → Purchase intention	0.340	0.010	0.126	0.163	0.574
Interactivity → Flow experience → Purchase intention	0.431	0.004	0.141	0.215	0.673

DISCUSSION

Based on SOR theory, this study uses a situational questionnaire to collect data and examines the relationship between the interactivity of Internet celebrities and purchase intention. The conclusions are as follows: (1) the interactivity of Internet celebrities has a significant positive impact on consumer purchase intention; (2) social presence and flow experience mediate the impact of the interactivity of Internet celebrities on consumers' purchase intention; and (3) the consistency of Internet celebrities' image and product image has no moderating effect on the relationship between social presence or flow experience and consumer purchase intention. The reasons may be as follows: First, with the rapid development of the Internet celebrity economy, the types of goods recommended by Internet celebrities have become diversified and are no longer limited to a certain type of product. Take Mr. Li Jiaqi, the "No. 1 Best Livestreaming Seller in China" as an example: although he was originally famous for selling cosmetics, currently, the categories of products in his live broadcasting room range from food to daily necessities.

Therefore, when consumers buy products in livestreaming rooms, they no longer focus on the matching degree between the Internet celebrities' image and the product image but are more probably based on their trust on Internet celebrities. Second, with the prevalence of livestreaming marketing, most of the 'performance' is similar, which makes consumers inevitably have "aesthetic fatigue." They are more likely to buy multiple categories of products in their favourite live broadcasting rooms. Therefore, the consistency of Internet celebrities' image and product image on consumers is not that important.

THEORETICAL IMPLICATIONS

This research has the following theoretical contributions. First, theoretical research on Internet livestreaming marketing obviously lags behind practical development. The feature of livestreaming marketing is the two-way, real-time interaction between Internet celebrities and fans (Haimson and Tang, 2017). The exploration on how to make use of this advantage to stimulate purchase intention is scarce in the existing literature. Based on the SOR model, this study identifies

the interactivity of Internet celebrities as an independent variable and examines its influence on consumer purchase intention in livestreaming marketing.

Second, unlike the traditional face-to-face marketing model, it is believed that livestreaming marketing lacks a 'human touch'. To some extent, the shortage of effective social interaction weakens consumers' purchase intention (Wang and Emurian, 2005). How to improve consumers' perception of social interaction in online shopping is an important issue. This study identifies social presence and flow experience as the mediators and tests the mediation effect, which can help scholars and managers understand the 'black box' in livestreaming marketing.

Third, this paper finds the consistency of Internet celebrities' image and product image has no moderating effect on the relationships between social presence or flow experience and purchase intention, which is inconsistent with the conclusion in some previous research (e.g., Liu et al., 2020). A possible reason is that with the rapid development of Internet celebrity economy, a celebrity is no longer limited to specific categories of commodities. In order to save time, consumers tend to buy most of the products they need from a few familiar anchors.

PRACTICAL IMPLICATIONS

First, the Internet celebrity anchor should pay attention to the interaction with consumers in live broadcasting. Consumers' shopping experience is extremely important. A high-quality live interaction can effectively promote the participation of consumers so that consumers will have a positive emotional perception of the anchor, resulting in purchase intention. The key to live interaction is to mobilize consumers' enthusiasm. Internet celebrities should pay attention to language skills. They must actively provide timely feedback to consumers' problems, encourage consumers to participate in interactions and create a warm and pleasant atmosphere for consumers.

Second, the integration of social presence and flow experience can enhance purchase intention. In live broadcasting, consumers are encouraged to express their views or experiences related to the products. The social presence transfers personal consumption behaviour into social consumption behaviour. In addition, real-time interaction makes consumers not just an information receiver, but also the main part in live broadcasting. This process provides consumers with emotional belongingness and value identification (Pozharliev et al., 2017), which creates a flow experience for consumers to stimulate their purchase intention. The application of advanced technology, such as 5G and VR technology, will bring better sensory experience to consumers in the near future.

LIMITATIONS AND FUTURE RESEARCH

There are some limitations in the current research. Firstly, this paper explores the influence of Internet celebrity interactivity on purchase intention without considering consumer traits or product types. In the future study, these factors should be included to depict a more comprehensive decision-making process. Secondly, the sample is not large enough. In the future scholars should replicate the study with a larger sample to further validate the findings. Finally, this paper used a questionnaire survey to collect data. In the future, the experimental method can be used to examine the causal relationship between the variables. The findings generated with different research methods can provide deeper insights in this area.

TABLE 3 | Results of the moderated regression analyses.

Variables	Purchase intention						
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Age	−0.062	−0.060	−0.066	−0.067	−0.045	−0.054	−0.056
Gender	0.012	−0.022	0.000	−0.001	0.005	0.020	0.022
Education	0.129*	0.091	0.075	0.072	0.106*	0.087	0.078
Occupation	0.059	−0.026	−0.022	−0.019	0.019	0.013	0.017
Income	0.020	0.064	0.079	0.080	0.041	0.060	0.061
Purchase frequency	−0.331***	−0.168***	−0.127**	−0.126**	−0.180***	−0.141**	−0.136**
Social presence		0.599***	0.451***	0.451***			
Flow experience					0.580***	0.428***	0.426***
The consistency of Internet celebrities' image and product image			0.285***	0.290***		0.278***	0.293***
Social presence × The consistency of Internet celebrities' image and product image				−0.024			
Flow experience × The consistency of Internet celebrities' image and product image							−0.059
R^2	0.096	0.424	0.477	0.475	0.412	0.459	0.461
ΔR^2	0.115***	0.323***	0.054***	0.001	0.311***	0.048***	0.003
F	5.874	29.985	32.436	28.786	28.631	30.318	27.203

N = 277. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

WS and WG worked on the theory development, literature review, and paper writing. RG worked on paper writing, data collection, and analysis. All authors contributed to the manuscript and approved the submitted version.

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How Live Streaming Features Impact Consumers' Purchase Intention in the Context of Cross-Border E-Commerce? A Research Based on SOR Theory

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Given that "cross-border e-commerce + live streaming" has become an important driver of global trade but limited attention has been paid to this area, this study examines the impacts of live streaming features on the consumers' cross-border purchase intention from the perspectives of consumers' overall perceived value and overall perceived uncertainty based on the SOR theory. In addition, through investigating the moderating effects of saving money, this study reveals the impacts of amazing bargains in live streaming commerce. A total of 272 samples were collected by a questionnaire survey to test the proposed research model. The results show that live streaming features significantly increase consumers' overall perceived value and purchase intention, and significantly reduce consumers' overall perceived uncertainty; in addition, saving money further increases the impact of live streaming features on consumers' overall perceived value. This study provides a theoretical basis and reference for cross-border e-commerce platforms and merchants to effectively leverage live streaming to influence consumers' perception and purchase intention.

Keywords: live streaming shopping, cross-border e-commerce, consumers' purchase intention, saving money, SOR theory

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INTRODUCTION

According to the new released "Global Cross-Border B2C E-Commerce 2021" report (Research and Markets, 2021), cross-border online shopping is favored by a majority of consumers over the local online retail in 2020 because of its diverse products and attractive prices. Despite the COVID-19, the growth of cross-border e-commerce has maintained a relatively high speed. It is predicted that the overall cross-border e-commerce market value will surge by 30% from 2019 to 2026. For instant, in Italy, the majority of online shopping were performed across the borders, outweighing the domestic shopping in 2020. Due to the acceleration of cross-border e-commerce, it is necessary and important to understand consumers' purchase intention and behavior in such context.

Existing research on cross-border e-commerce mainly focuses on traditional e-commerce elements (Martin et al., 2015; Agrawal and Fox, 2017; Zhang, 2018; Steinhoff et al., 2019). Limited attention has been paid to live streaming e-commerce. Live streaming, as a new diversified, real-time interactive medium, has been rapidly developed and widely used in cross-border e-commerce.

Live streaming e-commerce refers to a marketing model in which streamers (sellers or their employees) rely on live streaming platforms to conduct online live streaming, and provide consumers with products descriptions and information through interpersonal communications and product trials, thereby promoting consumers' purchase intention (Hu et al., 2017). Prior studies have found that the immediacy, interactivity and immersiveness of live streaming makes it more attractive to consumers than traditional online shopping modes (Liang et al., 2011; Haimson and Tang, 2017; Cai et al., 2018).

Despite the arising of both cross-border e-commerce and live streaming e-commerce, it is still unclear about the influencing mechanism of "cross-border e-commerce + live streaming" on the consumers' purchase intention. Compared with traditional domestic e-commerce, "cross-border e-commerce + live streaming" has its own features. Firstly, given the complexity of cross-border transaction, the new "cross-border e-commerce + live streaming" mode enables consumers to fully understand the cross-border product and purchase process in real time, intuitively and in detail, which further improves consumers' satisfaction. It is widely known that the transactions in cross-border e-commerce are more complex than domestic e-commerce. For instance, the transactional processes usually involve delivery risks and crossing language barriers, which may increase consumers' perceived risks and uncertainties and deter consumers from taking full advantage of cross-border e-commerce (Koh et al., 2012; Guo et al., 2018). Luckily, live streaming could solve the above problem, which not only provides richer information to consumers through real-time responses and interactions with consumers, but also creates a hot selling atmosphere attracting consumers purchasing cross-border goods (Sun et al., 2019). Secondly, the streamers in the cross-border e-commerce context usually use price measures such as spikes and price reductions to stimulate and attract consumers. In the cross-border context, low price and good quality are the key factors that increase sales. According to a recent PayPal survey (2018), attractive prices are the reason why 72% of Australian consumers choose cross-border online shopping. Similarly, a report of Chinese cross-border e-commerce indicates that users pay more attention to genuine goods, service quality and low prices (iiMedia Research, 2021). Given above-mentioned unique natures of live streaming in cross-border e-commerce, it is quite meaningful to investigate (1) how the new "cross-border e-commerce + live streaming" mode affect consumers' perceived uncertainty and perceived value, which further affect consumers' cross-border online purchase intention and (2) what is the role of saving money in the relationships.

To address the research questions, this study examines the impacts of cross-border e-commerce live streaming features on the consumers' purchase intention from the perspectives of consumers' overall perceived value and overall perceived uncertainty based on the SOR theory. At the same time, through investigating the moderating effects of saving money, this study reveals the impacts of amazing bargains in the live streaming. A total of 272 samples were collected by a questionnaire survey, and then statistical analysis and hypothesis testing were carried out through structural equation models. The results show that live streaming features significantly increase consumers' overall perceived value and purchase intention, and significantly reduce consumers' overall perceived uncertainty. In addition, saving money further increases the impact of live streaming features on consumers' overall perceived value. This study provides a theoretical basis and reference for cross-border e-commerce platforms and merchants to effectively leverage live streaming to influence consumer perception and purchase intention.

The findings of our study provide the following contributions to the existing literature. First, this study enriches the research by interpreting how live streaming can be used to affect consumers' cross-border purchase intention based on SOR theory. In particular, we examined the influencing mechanism of "cross-border e-commerce + live streaming" on the consumers' purchase intention from the perspectives of consumers' overall perceived value and overall perceived uncertainty. Second, our study unveils the moderating effect of saving money on cross-border live streaming features affecting consumers' overall perception. The results show that saving money can strengthen the positive impact of live streaming features on the overall perceived value while has no effect on the relationship between live streaming features and overall perceived uncertainty. Therefore, saving money is indeed a useful measure but should be used appropriately and carefully in live streaming. Our study also provides practical suggestions for cross-border e-commerce platforms and sellers to promote the continuous and healthy development of cross-border live streaming e-commerce.

THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

SOR Theory and Consumer Purchase

The SOR (Stimulus-Organism-Response) model was proposed by Mehrabian and Russell (1974) based on environmental psychology. The model believes that external factors would trigger a certain cognitive or emotional response and in turn lead to changes in consumer behavior (Jacoby, 2002). In recent years, with the vigorous development of live streaming e-commerce, scholars have explored the impact of live streaming on consumers' purchase intentions and behaviors based on the SOR model. For example, Hu and Chaudhry (2020) used the SOR model to study how relational bonds can enhance consumer engagement.

Existing research mainly focuses on domestic live streaming e-commerce, and there has been a limited understanding of the impact mechanism of live streaming in the context of cross-border e-commerce. Therefore, based on the SOR theory, our study will use live streaming feature (S) as an external stimulus, and explore the mechanism of its influence on consumers' cross-border purchase intentions from the perspectives of consumers' overall perceived value and overall perceived uncertainty. In addition, considering the widely used promotion tools of saving money in the current live streaming scenarios, this article will also

explore the moderating effect of saving money on cross-border live streaming features affecting consumers' overall perception. The research model is shown in **Figure 1**.

The Impacts of Live Streaming Features on Overall Perceived Value, Overall Perceived Uncertainty, and Purchase Intention

Live streaming features refers to the functions and features that live streaming could achieve real-time interaction through the comprehensive use of text, sound and image, and live streaming could deliver true and reliable information to consumers from multiple aspects, enabling consumers to clearly evaluate products' performance (such as price, quality, and characteristics) (Zhou et al., 2018; de Wit et al., 2020). Cross-border live streaming e-commerce combines the advantages of multiple media, which not only enables sellers to transmit detailed and rich product information in real time (for example, production or procurement process, instructions for use), but also allows the streamers to communicate with consumers the feel, appearance, or smell of the products. The authenticity, visualization, and interactive performance displayed by the live streaming make consumers feel closer to cross-border products in space and time (Hu and Chaudhry, 2020).

According to the SOR theory, the live streaming features as an external stimulus will affect the cognitive response of consumers. Previous studies have pointed out that cognition can be divided into two dimensions: positive cognition and negative cognition in nature (Dubé and Menon, 2000). Guo (2020) also believes that when customers make purchase decisions, they not only care about prices, but also comprehensively compare the benefits and costs of available products. Therefore, this article will jointly understand the impact of live streaming features on consumers' purchase intention from the two dimensions of consumers' perceived value and perceived uncertainty in cross-border live streaming e-commerce.

Existing research points out that the structure of perceived value is multifaceted (Lee et al., 2002; Turel et al., 2007). Cocosila and Igonor (2015) believed that perceived value is related to the perception of product or service utility. Kim and Niehm (2009) proposed that perceived value includes a trade-off between the "obtained" part (the benefit that the buyer obtains from the seller's product) and the "given" part (the cost paid by the buyer to purchase the offer). If people think that the gain exceeds what is given, they often feel satisfied. Chen and Lin (2018) believed that perceived value is a person's feeling that certain objects or activities can bring benefits. Based on this, this study believes that the overall perceived value is constructed by multiple value perceptions, specifically referring to consumers' overall judgment and evaluation of the transaction value and acquired value of the cross-border live streaming shopping according to their needs (Kim et al., 2012).

In addition, the perceived uncertainty in the network environment also plays an important role in the transactions between buyers and sellers (Yeh et al., 2012). Uncertainty refers to the degree to which the future environment cannot be accurately predicted due to imperfect information (Pfeffer and Salancik, 2015). As we all know, the perceived uncertainty in the e-commerce environment is high, especially in cross-border environments (Kim et al., 2017). This additional uncertainty may come from different factors, such as cross-border delivery (Guercini and Runfola, 2015), laws (Bieron and Ahmed, 2012), band (Guercini and Runfola, 2015) and online payment systems (Miao and Jayakar, 2016) and so on. In this study, the overall perceived uncertainty refers to the extent to which the buyer cannot accurately predict the outcome of the transaction due to factors related to the seller and/or cross-border products (Yeh et al., 2012).

Although research on domestic live streaming e-commerce is quite mature, the relationship between live streaming features and consumer perception in cross-border e-commerce still needs to be enriched. Cross-border live streaming e-commerce, as a main form of synchronized social media, has the advantages of high real-time, high interactivity and synchronization of communication (Wang and Wu, 2019), which not only provides useful information related to products or brands, but also delivers rich and interesting content, so the unique features of live streaming provide a more effective online shopping environment and stronger value perception than traditional media. Compared with domestic e-commerce, cross-border e-commerce platforms have higher information asymmetry and opportunism, which increase the overall perceived uncertainty of consumers (Yang and Shen, 2015). However, through live streaming, cross-border e-commerce demonstrates the use of products, displays different perspectives of products, and answers consumer questions in real time (Lu et al., 2018; Xu and Ye, 2020), having the characteristics of strong pertinence and low information loss, which can effectively reduce consumer perception of uncertainty. Based on this, this paper proposes the following research hypotheses:

H1: The live streaming features can enhance consumers' overall perceived value in cross-border e-commerce platforms.
H2: The live streaming features can reduce consumers' overall perception uncertainty in cross-border e-commerce platforms.

Purchase intention refers to the future intention and plan of customers to purchase the products or services they want (Aizen, 1991). Theory of reasoned action (TRA) believes that a person's behavioral intention is affected by a person's attitude toward the action and subjective judgments about the execution of the action (Chang, 1998). In this article, purchase intention refers to consumers' intention to purchase cross-border products or services from sellers through live streaming (Sun et al., 2019).

The direct presentation of commercial information such as brands, products, prices, and promotional methods in cross-border live streaming e-commerce helps save consumers time for searching and comparison and improve their decision-making efficiency. At the same time, streamers rely on their professional skills to present cross-border products to consumers (Hu and Chaudhry, 2020), making consumers believe that the information in live streaming is more trustworthy than it in web pages of traditional e-commerce. The differentiated, professional, and

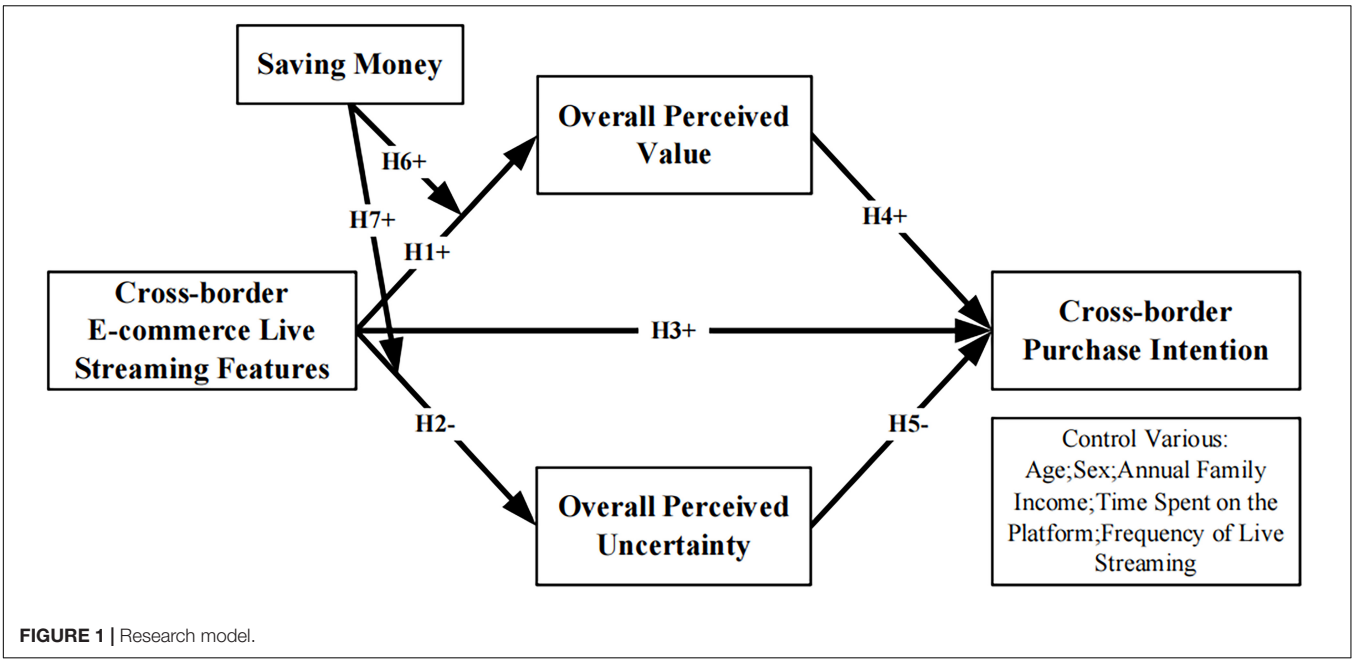


FIGURE 1 | Research model.

personalized services provided by cross-border live streaming e-commerce help consumers fully understand the use and functional information of cross-border products and facilitate their purchase decisions. Based on this, this paper proposes the following research hypotheses:

H3: The live streaming features can enhance consumers' purchasing intentions in cross-border e-commerce platforms.

The Impacts of Overall Perceived Value and Overall Perceived Uncertainty on Purchase Intention

Regarding the relationship between overall perceived value and purchase intention, scholars pointed out that value perception factors such as service, entertainment, social interaction, finance, information, and image can directly affect purchase behavior (Chen and Lin, 2018; Hu and Chaudhry, 2020). Theory of Consumption Values believes that the motivation of consumers to participate depends on the value they expect to obtain from the experience. When customers think that they can obtain greater value from a product or activity, they will integrate more into the product or activity (Vivek et al., 2012). In contrast, due to the complexity of live streaming purchase decisions in cross-border e-commerce and the limited consumer perception, cross-border online shopping platforms, merchants, delivery companies, third-party payment and other external uncertainties will increase consumers' worries, thereby reducing consumers' willingness to buy (Yang and Shen, 2015). Based on this, this paper proposes the following research hypotheses:

H4: In the context of cross-border e-commerce, consumers' overall perceived value has a positive impact on purchase intention.

H5: In the context of cross-border e-commerce, consumers' overall perceived uncertainty has a negative impact on purchase intention.

The Moderating Effects of Saving Money

Saving money refers to the extent to which consumers spend less or save money in cross-border purchases (Chiu et al., 2014). PayPal survey (2018) shows that price attraction is an important reason for consumers to choose cross-border online shopping. The cost of purchasing products or services has always been a general concern of consumers. In the traditional Chinese values and Confucian values, thrift is considered as a very important virtue (Cheung et al., 2003). However, in the context of cross-border e-commerce, whether giving consumers more concessions on prices helps to win more opportunities in the global market and how to win is worthy of further study.

Cross-border live streaming e-commerce can not only help consumers choose products more intuitively and conveniently, but also often launch various online promotion methods such as discounts, gifts and trials to increase consumers' purchase possibilities. Wolfinbarger and Gilly (2001) pointed out that the pleasure of finding bargains is one of the reasons why individuals shop online. Therefore, the use of promotional methods to save consumers money can, to a certain extent, affect the impact of live streaming features on consumer perception in cross-border e-commerce. In the process of cross-border live streaming e-commerce, live streaming features can enable consumers to understand the products more clearly and enhance their perceived value. If cross-border live streaming e-commerce can save consumers money, it will further enhance consumer satisfaction and make consumers feel that they have gained more value. In addition, saving money is likely to further help live streaming features to reduce overall perceived

uncertainty in cross-border e-commerce. In the process of cross-border live streaming, saving money can give consumers profit, and establish trust in cross-border live streaming and streamers, so that consumers can trust live streaming features and live streaming information, thereby effectively reducing their perceived uncertainty. Based on this, this paper proposes the following research hypotheses:

H6: In the context of cross-border e-commerce, saving money strengthens the positive impact of live streaming features on the overall perceived value.
H7: In the context of cross-border e-commerce, saving money strengthens the negative impact of live streaming features on the overall perceived uncertainty.

METHODOLOGY

The Samples and Data Collection

In order to test the research model and related hypotheses, this paper adopts a questionnaire survey method to collect data. It is noted that our study concentrates on consumers who have watched the live streaming of Alibaba's Taobao Global Shopping and Tmall International e-commerce platforms. The reasons are as follows. First, Taobao Global Shopping and Tmall International Live streaming platforms play important part in Alibaba Group's cross-border e-commerce platform, and their cross-border business in China and worldwide is very mature (Zhou et al., 2018). Second, Taobao Global Shopping and Tmall International e-commerce platforms are representative since they are frequently used and renowned to Chinese consumers.

Our study collects questionnaires through the Wenjuanxing app, which is the widely used data collection app in China. Since "cross-border e-commerce + live streaming" is a relatively new e-commerce field, we used a screening question to weed out respondents who have not been in contact with live streaming e-commerce or have not had any live streaming shopping experience. To guarantee the research quality, respondents who involved in the pre-survey are also excluded from the final survey. To express our gratitude, respondents who complete the survey will receive a reward of RMB 15 (equivalent to $2.14). In the end, we totally received 300 questionnaires. After removing questionnaires with too short answer time and failing the validity test, there are 272 valid questionnaires remaining.

Measurements

In this paper, in order to ensure the accuracy and practicability of the questionnaire, all measurement items are based on the previous maturity scale and modified according to our research scenario. Among them, items of live streaming features refers to Zhou et al. (2018), items of overall perceived value refers to Kim et al. (2012), overall perceived uncertainty refers to Yeh et al. (2012), and items of money saving refers to Chiu et al. (2014), items of the purchase intention refers to Mou et al. (2019) and Sun et al. (2019). Likert's seven-part scale is employed to measure each dimension, ranging from 1 (strongly disagree) to 7 (totally agree) to indicate the response to each construct related to the research questionnaire.

Since the survey was carried out for Chinese participants, this article conducts a forward-backward translation method to ensure the accuracy and consistency of the questionnaire presentation (Mullen, 1995). At the same time, in order to avoid the problem of common method bias (CMB), anonymous evaluation is used when designing the research program, and the length of the questionnaire is designed reasonably, while the order effect of the items is balanced. In addition, before the formal survey, this article conducted a preliminary survey of the questionnaire (N = 50) to explore the validity and readability of the questionnaire structure, and made appropriate revisions to the questionnaire based on the feedback to ensure the validity of the content of the scale.

DATA ANALYSIS RESULTS

Descriptive Statistics

In the 272 valid survey samples, there are a total of 192 females and 82 males. More than 90.81% of the samples have a bachelor's degree or above, 76.47% are people aged 20–29, and 77% of the samples have an annual household income of less than RMB 0.2 million. In the past 3 months, most people spent an average of less than 2 h on Tmall Global/Taobao Global e-commerce every days. The descriptive statistics of our survey samples are shown in **Table 1**.

Measurement Model Analysis

We use Cronbach's alpha (CA) and composition reliability (CR) in the SmartPLS 3.0 software to test the consistency and stability of the scale. The results of the reliability test are shown in **Table 2** (Note: Diagonal elements represent the square root of AVE). The CA values of all variables are between 0.798 and 0.931 and the CR values are between 0.882 and 0.956, all satisfying the standard of 0.7 (Fornell and Larcker, 1981), indicating that the research has good reliability.

In this paper, the rationality and validity of the questionnaire are verified by structural validity test. The convergent validity is tested by using the average extracted variance value (AVE) and factor loadings. As shown in **Table 2**, the AVE values of all constructs are in the range of 0.714 to 0.879, which exceed the acceptable level of 0.5 (Fornell and Larcker, 1981), and the factor loadings of all constructs exceed the required value of 0.7, indicating that the data also satisfy convergent validity. Two methods are used to evaluate discriminant validity. The first method is the Fornell-Larcker criterion. **Table 2** shows that the square roots of AVE exceed the correlation coefficient of each latent variable, confirming good discriminative validity (Fornell and Larcker, 1981). The second method is cross-loadings method. As shown in **Table 3** (Note: The numbers in bold indicate the factor loadings of the construct items, and the numbers not in bold indicate the cross loadings of the construct items), all factor loadings exceed the cross-loading amount, again verifying the discriminant validity (Hair et al., 2018). As a result, the data shows a satisfied discriminative validity.

TABLE 1 | Descriptive statistics of the study sample.

Variable	Category	Frequency	Percentage (%)
Gender	Male	82	30.15
	Female	192	69.85
Age (years)	Less than 20	17	6.25
	20–24	140	51.47
	25–29	68	25
	30–34	20	7.35
	35–39	5	1.84
	40–44	9	3.31
	45–49	8	2.94
	More than 50	5	1.84
Education level	Secondary school or below	9	3.31
	Junior college	16	5.88
	Bachelor	172	63.24
	Master's	71	26.10
	Ph.D.	4	1.47
Annual household income (RMB)	Less than 50,000	28	10.2
	50,000–100,000	68	25
	100,000–150,000	58	21.3
	150,000–200,000	56	20.5
	200,000–250,000	17	6.2
	250,000–300,000	18	6.6
	300,000–350,000	8	2.9
	350,000–400,000	6	2.2
	400,000–450,000	2	0.7
	450,000–500,000	3	1.1
	Above 500,000	8	2.9
Frequency of use (hours)	Less than 0.5	103	37.87
	0.5–1	96	35.29
	1–2	43	15.81
	2–3	18	6.62
	3–5	9	3.31
	Above 5	3	1.10

Common method bias refers to the spurious variance between predictor variables and benchmark variables caused by the same data source, the same measurement environment, project context, and the characteristics of the project itself. Through reasonable design of our research process, the common method bias is controlled and reduced. At the same time, we also use the Harman's single-factor method to identify common method bias. If the majority of the covariance can be explained by a single factor or a general factor, it is indicated that the common method bias is present. Principal component analysis extracted a total of 10 factors, of which the explanatory variance of the first principal component was 26.496%, which was lower than the standard of 40% (Chin et al., 2012), indicating that the data collected in this paper did not have obvious common method bias problems.

Structural Model Analysis

In order to obtain stable and reliable results, we used the bootstrapping algorithm of SmartPLS 3.0 to run 5,000 times to study the path coefficient and significance of each hypothesis. At the same time, the R^2 of the related constructs was calculated, and the results are shown in **Table 4** and **Figure 2**. The research results show that the R^2 of overall perceived value, overall perceived uncertainty, and purchase intention are 36.5, 4.8, and 40.6%, respectively. The results show that live streaming features is positively associated with overall perceived value ($\beta_1 = 0.323$, $P < 0.001$) and purchase intention ($\beta_3 = 0.324$, $P < 0.001$) while negatively associated with overall perceived uncertainty ($\beta_2 = -0.133$, $P < 0.05$) in cross-border e-commerce. That is, H1, H2, and H3 are supported. In addition, the results show that the overall perceived value ($\beta_4 = 0.410$, $P < 0.001$) positively affects purchase intention in cross-border e-commerce, that is, H4 is supported. And the overall perceived uncertainty negatively affects purchase intention ($\beta_5 = -0.137$, $P < 0.01$), that is, H5 is established.

The results of the moderating effect are shown in **Figure 2**. The model uses age, gender, and annual household income as control variables to study the relationship between live streaming features, overall perceived value and overall perceived uncertainty, and purchase intentions of cross-border e-commerce. In addition, the impact of interactions between saving money and live streaming features on consumer perception is also studied (where LSF*SMV refers to the moderating effect of saving money on the relationship between live streaming features and overall perceived value and LSF*SMU refers to the moderating effect of saving money on the relationship between live streaming features and overall perceived uncertainty).

Figure 2 shows that, as a moderating variable, saving money strengthens the positive impact of live streaming features on the overall perceived value of consumers in cross-border e-commerce ($\beta_6 = 0.157$, $P < 0.05$), that is, the H6 hypothesis is supported. However, contrary to our hypothesis, the moderating effect of saving money on the relationship between live streaming features and overall perceived uncertainty is not significant ($\beta_7 = 0.047$, $P > 0.05$), that is, the H7 hypothesis does not hold.

TABLE 2 | Cronbach's alpha (CA), composite reliability (CR), average variance extracted (AVE), and correlations.

Constructs	CA	CR	AVE	LSF	OPV	OPU	SM	PI
Live streaming features (LSF)	0.872	0.913	0.725	0.851				
Overall perceived value (OPV)	0.869	0.911	0.718	0.356	0.847			
Overall perceived uncertainty (OPU)	0.931	0.956	0.879	−0.113	−0.102	0.938		
Saving money (SM)	0.858	0.914	0.779	0.219	0.516	0.149	0.883	
Purchase intention (PI)	0.798	0.882	0.714	0.472	0.515	−0.237	0.218	0.845

TABLE 3 | Factor loadings and cross loadings.

Constructs	Items	Factor loadings and cross loadings				
		LSF	OPV	OPU	SM	PI
LSF	PLSF1	**0.788**	0.276	−0.111	0.228	0.299
	PLSF2	**0.896**	0.284	−0.074	0.153	0.447
	PLSF3	**0.920**	0.354	−0.105	0.213	0.481
	PLSF4	**0.793**	0.293	−0.101	0.157	0.351
OPV	OPV1	0.251	**0.836**	0.003	0.522	0.400
	OPV2	0.324	**0.871**	−0.064	0.447	0.427
	OPV3	0.285	**0.825**	−0.137	0.377	0.427
	OPV4	0.345	**0.857**	−0.151	0.399	0.491
OPU	OPU1	−0.097	−0.055	**0.935**	0.174	−0.226
	OPU2	−0.108	−0.147	**0.957**	0.114	−0.231
	OPU3	−0.114	−0.088	**0.921**	0.128	−0.210
SM	MS1	0.222	0.472	0.100	**0.871**	0.216
	MS2	0.241	0.445	0.114	**0.872**	0.234
	MS3	0.119	0.448	0.180	**0.905**	0.129
PI	ITP1	0.430	0.359	−0.244	0.138	**0.836**
	ITP2	0.470	0.477	−0.250	0.180	**0.907**
	ITP3	0.277	0.474	−0.091	0.244	**0.787**

Factor loadings are in bold.

TABLE 4 | Main effects results.

Path	Path coefficient	Standard deviation	*T* value	*P* value	Hypothesis
LSF→OPV	0.323	0.062	5.198	0.000	H1 was supported.
LSF→OPU	−0.133	0.066	1.988	0.047	H2 was supported.
LSF→PI	0.324	0.060	5.350	0.000	H3 was supported.
OPV→PI	0.410	0.065	6.349	0.000	H4 was supported.
OPU→PI	−0.137	0.049	2.807	0.005	H5 was supported.

CONCLUSIONS AND IMPLICATIONS

Discussions and Conclusions

Based on the SOR model, this article explores how live streaming features affect consumers' overall perceived value, overall perceived uncertainty, and purchase intention in cross-border e-commerce. We proposed 7 hypotheses, of which H7 is not supported, and the other hypotheses are consistent with the analysis results. In view of the empirical results, further discussion is as follows.

The findings that live streaming features can directly increase consumers' purchase intention in the context of cross-border e-commerce are consistent with those of prior studies in the domestic e-commerce context (e.g., Zhang, 2018; Sun et al., 2019). In addition, the present study also finds that live streaming features have a positive impact on consumers' overall perceived value while have a negative impact on consumers' overall perceived uncertainty. That is, H1, H2, and H3 are established. According to the cumulative prospect theory (Tversky and Kahneman, 1992), consumers' purchase intention is based on a full comparison of various decision-making factors. In the "cross-border e-commerce + live streaming" environment, consumers' immersive shopping experience and the rich information provided by sellers are all subtly affecting consumers' perception, which will increase the overall perceived value and reduce the overall perceived uncertainty of consumers. At the same time, the synchronization, visualization, and professional services provided by the live streaming will help consumers fully understand the use and functional information of cross-border products, and promote consumers to make purchase decisions.

Furthermore, the hypothesis test shows that the overall perceived value of consumers has a positive impact on purchase intention while the overall perceived uncertainty of consumers has a negative impact on purchase intention. That is, H4 and H5 are established. This is in line with the conclusions of Vivek et al. (2012) which pointed out that a higher level of perceived value will trigger purchase intention, and Yang and Shen (2015) which indicated that factors such as overall perceived uncertainty and purchase intention show a significant negative correlation. Whether it is a domestic e-commerce or cross-border e-commerce, the overall perception of consumers is an important indicator that affects purchase intentions. Sellers should pay more attention to consumers' perception and consumers' online shopping experience.

The research conclusion also shows that saving money can strengthen the positive impact of live streaming features on

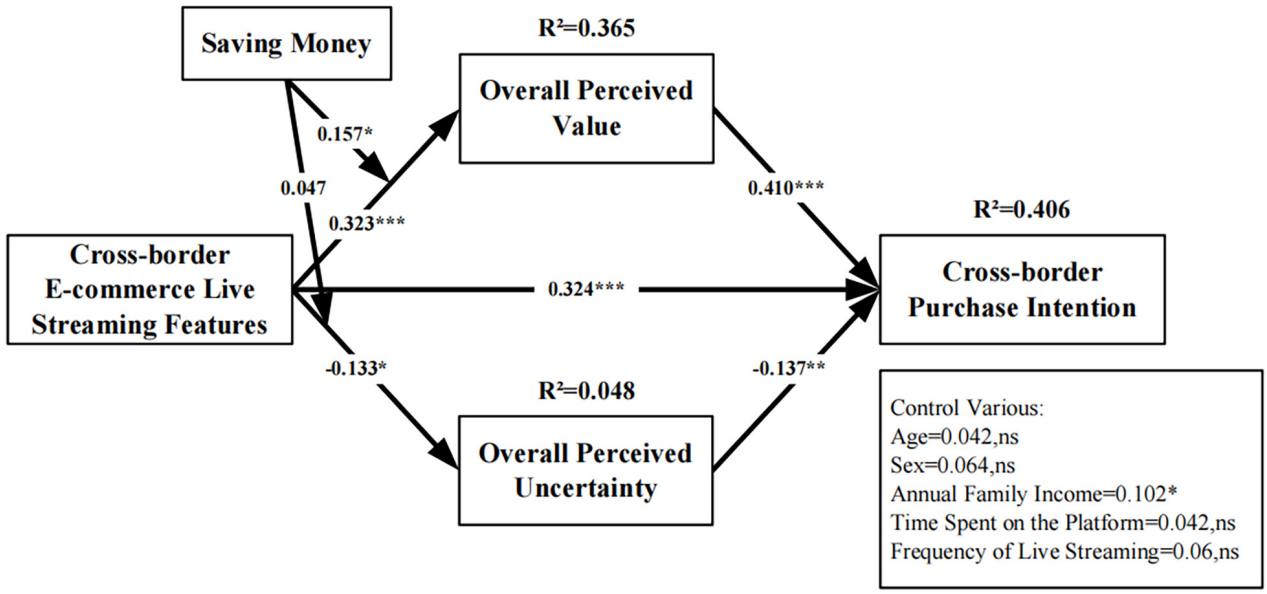


FIGURE 2 | Results of the research model. *$p < 0.05$, **$p < 0.01$, and ***$p < 0.001$. n.s., not significant.

the overall perceived value, that is, H6 is established. This is consistent with the conclusion of Soscia et al. (2010) that saving money helps consumers obtain lower-cost products, thereby enhancing their value perception. However, the moderating effect of saving money on the relationship between live streaming features and overall perceived uncertainty is not significant, that is, H7 does not hold. Due to the complexity of cross-border e-commerce live streaming shopping (such as language issues, customs clearance issues, international delivery issues, etc.), consumers may associate negative words such as "low quality" and "unmarketable" with low prices when faced with cheap products or large discounts. Although saving money can give consumers profit, it will also make consumers question the quality of live streaming products, thereby increasing consumers' perceived uncertainty. Those two effects of saving money canceled out leading to the insignificant moderating result of saving money on the relationship between live streaming features and overall perceived uncertainty. In summary, saving money is more like icing on the cake. A good cross-border e-commerce live streaming can enable consumers to understand the product more clearly and increase the perceived value of consumers. Under the circumstance, if measures of money-saving are implemented, it will further improve consumers' satisfaction, thereby promoting consumers' purchase behavior.

Research Implications

The important implications of this research is to enrich the research of live streaming in the field of cross-border e-commerce and expand the application scope of SOR theory. The empirical results show that cross-border e-commerce platforms can indeed increase the overall perceived value of consumers through live streaming and reduce overall perceived uncertainty, thereby increasing consumers' purchase intention. At the same time, the research also provides the following enlightenment for promoting the healthy development of "cross-border e-commerce + live streaming" mode.

First, this study verifies the important role of live streaming in cross-border e-commerce so that the practitioners should accelerate the construction of live streaming of cross-border e-commerce platforms, and actively explore optimization methods in live streaming to enhance consumer experience. Our study found that compared with traditional cross-border e-commerce operation models such as web pages or short videos, live streaming has features of higher authenticity and interactivity through the streamers' description of the product's feeling, appearance, or scent and other information. As a consequence, live streaming is able to increase consumers' overall perceived value and reduce consumers' overall perceived uncertainty, which in turn can increase consumers' purchasing intentions. In addition, provided that live streaming is more mature in domestic e-commerce, the cross-border e-commerce market should draw on and learn from the successful experience of domestic live streaming e-commerce, accelerate the expansion of live streaming in cross-border e-commerce, and thereby improve and enrich consumers' cross-border shopping experience. At the same time, the uniqueness of cross-border e-commerce live streaming should also be considered. Due to uncertain factors such as supply of goods, brand reputation, logistics and distribution capabilities in cross-border consumption, cross-border e-commerce platforms should strengthen the audit of cross-border products and improve the access threshold of live streaming products. Second, given that live streaming features can indeed increase consumers' purchase intention in both direct and indirect ways, practitioners should make good use of the tool of live streaming. Our results show that live streaming features can effectively enhance consumers' perceived value

while reducing consumers' perceived uncertainty. And those reminds cross-border e-commerce platforms and merchants that when embracing live streaming, they must strengthen the selection and professional training of cross-border e-commerce live streaming personnel, and pay attention to the output of live streaming content. More specifically, streamers should enrich the output content of live streaming and make high-quality content to attract consumers and eliminate consumers' worries.

Third, our study would facilitate practitioners' understanding regarding the effect of saving money in cross-border live streaming e-commerce. Our results indicate that saving money can indeed positively moderate the relationship between live streaming features and the overall perceived value of consumers in cross-border e-commerce, while the moderating effect on the relationship between live streaming features and the overall perceived uncertainty of consumers is not obvious. Therefore, saving money is more like icing on the cake and cross-border e-commerce platforms and streamers should take measures of saving money appropriately and carefully in live streaming. For example, cross-border e-commerce platforms and merchants should further strengthen their product quality control, so that consumers can trust low-priced products in cross-border live streaming e-commerce, and formulate reasonable money-saving strategies to stimulate consumers' willingness to buy cross-border products.

Limitations and Further Research

There are still some limitations in this study. First, the cross-border e-commerce platforms selected in this research are relatively mature cross-border e-commerce platforms, and future study could further expand and enrich the types of research subjects. Second, factors such as product types and streamers types can be introduced in future research to deeply explore and analyze the underlying mechanisms between live streaming and consumers' perception and behavior. Last but not least, researchers can further explore the impacts of different degrees and methods of promotion tools in cross-border live streaming e-commerce.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Secretariat of Academic Committee, Zhejiang University of Technology. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

JG, YL, YX, and KZ contributed conception and design of the study. JG and YX organized the data collection. YL performed the statistical analysis, wrote the first draft, and revised sections of the manuscript. JG, YX, and KZ polished the manuscript and contributed to the writing of manuscript revision. All authors contributed to the article and approved the submitted version.

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Empathic Psychology: A Code of Risk Prevention and Control for Behavior Guidance in the Multicultural Context

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This study aims to uncover the relationship among multicultural differences, empathy, and the behaviors of risk prevention and control in the context of crisis events by using a sample of 300 individuals in 10 different multicultural countries. A theoretical logic model was applied to empirical analysis, and the results indicated that cultural differences positively influenced the behavior of empathy communication and risk prevention and control. Further analyses revealed that real-time monitoring of changes in empathy could provide better options of measures for local risk prevention and control when the same crisis event occurred in a multicultural context. With user-generated content (UGC) emerging in the web 2.0 era, this paper proposed a more profound empathy code regarding the periodicity of risk prevention and control. This paper expects to contribute to the circumvention of cognitive errors caused by cultural differences, and to further provide effective conduction for individuals' risk prevention and control behaviors.

Keywords: crisis events, empathy communication, public empathy, risk prevention and control, multicultural context

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INTRODUCTION

As social crises occur frequently, both industry and academia have paid much attention to the social damage caused by both insufficient and excessive risk prevention and control. In industry practice, practitioners have attempted to seek ways to reduce the overall damage caused by crisis events and to coordinate losses in various aspects. Meanwhile, exploring the reasonable scope of risk prevention and control has become hot topics in academia. With the expansion of economic globalization, cultural exchanges among countries have become more frequent, while public safety emergencies are also on the rise. Advances in the Internet have accelerated the emergence of the user-generated content (UGC) model, which has led to a dramatic change in the way the public disseminates information. Public safety has a profound impact on the individuals with different concepts of risk prevention and control in the multicultural context. These impacts generally stem from the failure to overcome the negative influences of a crisis, or from the huge changes in lifestyle that cause individuals to be uncomfortable with the new social lifestyle. As far as the relevant authorities are concerned, neither of these situations are ideal, but both are often equally inevitable. Therefore, how to properly handle risk prevention and control in a normal lifestyle has become an important public management issue.

The appearance of behavior is usually driven psychologically. Nowadays, the transmission of information is more convenient and faster. Once a crisis event

occurs, it will inevitably affect the psychological attitudes of the public, which in turn affects behaviors. Public psychology is at the core of explaining the phenomenon of psychological resonance in crisis events, which has been well-studied in the medical psychology I. The most cited concept is empathy of Rogers (1958), which mainly focuses on the process of individual perception while considering the resulting emotional change. Recently, the concept of empathy has become common in the fields of management, sociology, communication, and education (Tansey and Burke, 2013).

We attempt applied the psychological concept of empathy to explore the current hot issues in public risk prevention and control from the perspective of empathy, and explores the general logic of risk prevention and control behaviors occurring in the context of UGC. Specifically, we summarized these hot issues are into four sub-questions: the first is whether different cultural differences lead to different risk prevention and control behaviors of the public; the second is whether empathy presents different characteristics in different cultural contexts; the third is whether empathy exerts a direct influence on the occurrence of risk prevention and control behaviors; and the fourth is whether the process of public risk prevention and control changes in the context of UGC and the law of occurrence. The solutions to the four research questions will systematically analyze the psychological black box of behavior guidance on risk prevention and control under the background of cultural differences and provide theoretical enlightenment for countries and regions to respond to crisis events.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Previous studies on risk prevention and control under the background of cultural differences, not only revealed the laws of multicultural differences and social conflicts, but also showed the significance and application of empathy communication in crisis prevention and control, reflecting the proactive research prospects. Our study aims to enrich the literature of active risk prevention and control behaviors in the multicultural context and further solidate the research basis.

Multicultural Differences and the Occurrence of Social Conflict

Diversity is an important trend of contemporary cultural development, and the conflicts caused by its different manifestations are the key factors in the occurrence and evolution of crisis events. The concept of cultural difference was first proposed by Hofstede (1980), who categorized culture value into four dimensions "power distance index," "uncertainty avoidance index," "individualism-collectivism," and "masculinity-femininity." The concept has been widely applied to explain the cultural heterogeneity between different cultures (Li and Katsumata, 2020; Liu et al., 2021). The view that heterogeneity of cultural value triggers secondary conflicts in public safety emergencies has been widely recognized by academics in studies related to cross-cultural conflicts (Nielsen and Lockwood, 2016).

However, with the increasing findlings of internal and external factors, scholars believe that the factors affecting culture are not limited to a single dimension, but the results of the interaction of multiple dimensions, thus giving rise to the concept of multiculturalism. From the 1970s to the present, the process of globalization has been intensifying; the differences between cultures have become more pronounced; the resulting conflicts have become more acute; and multiculturalism has become the focus of continuous research in the European and American academia. However, the concept of multiculturalism still has no clear definition. It has different uses and connotations in different fields. This concept shows its inherent educational thought through historical and literary critical theory, which is a mixture of political attitude and ideology (Maddux et al., 2021). Specifically, the conflicts caused by multicultural differences are high-dimensional manifestations of cross-cultural differences and conflicts, and multicultural differences involve more complicated influencing factors than cross-cultural differences. Therefore, the study of cultural differences and conflicts in multicultural countries should be based on the study of cross-cultural differences and conflicts, as well as the heterogeneity of cultural values, in order to deeply explore the roots of cultural differences and conflicts in these countries that are affected by multidimensional factors. Based on the cultural dimension theory of Hofstede (1980), scholars such as Kogut and Singh (1988) proposed the concept of cultural distance. They believe that relevant research should follow the conceptual framework of cultural distance index analysis and transform the conceptual understanding of national borders into cultural borders and attribute cross-cultural conflicts to the heterogeneity of cultural values at the national level (Kogut and Singh, 1988; Beugelsdijk et al., 2017). Previous studies analyze cross-cultural conflicts through the cultural value perspective (Lu, 2015).

To sum up, the main influencing factor of cultural value dimensions on cross-cultural conflicts is essentially the heterogeneous manifestation of the existence of cultural values. However, the cultural composition in a multicultural context is more complex. It is affected by factors such as the differences in region, culture, nationality, and domestic education levels, as well as external factors such as international cultural differences, world ethnic cultural differences, and international differences. Existing studies suggest that this framework can serve as a guide to the analysis of cultural differences and conflicts in multicultural countries.

Cultural distance is a widely used measurement constructed in international business, and this distance measurement is particularly important in a global multicultural context (Sekiguchi, 2006; Li and Katsumata, 2020; Li et al., 2021). How to measure the differences more accurately between cultures is the key to resolve crisis events in multiculturalism. The perceived cultural differences in multiculturalism are related to the inclusiveness of multiculturalism itself (Alexandra et al., 2020). Specifically, actual conflicts are not caused by multiculturalism, while the social crisis caused by cross-cultural differences originate from the information asymmetry in multiculturalism

(Xie, 2021). Accordingly, cultural differences have both common features and individual differences within and across countries. Previous literature has uncovered that crisis events caused by cultural differences can be resolved through predetermined solutions, and cross-cultural differences has strong impacts on individual attention, perception, and psychology (Gutchess et al., 2021) and even play a certain role in guiding individual response mechanisms in the face of crisis events. It is also worth studying which factors in unexpected crisis events affect individuals in a multicultural context and how these factors originate and arise. Exploring the interaction between individuals and multiculturalism in different cultural contexts (Knein et al., 2020) is important to study issues such as individual responses to crisis events in multicultural contexts.

Multiculturalism in all its forms has now become a major vehicle for globalization and modern values, which is an important arena for debate on the topic of national and religious identity (Hulewat, 1996). While multiculturalism tends to exist only symbolically in Europe, Japan, and other societies where modern values prevail, in developing regions, especially the Middle East, where traditional values and identities dominate the society multiculturalism is an exploration of the composition and regular expression of value systems. With the rapid development of society, the conflict of compartmentalization caused by intercultural communication is becoming more pronounced, which is ultimately not so much a clash between civilizations as a clash of cultural identity differences within civilizations (Lieber and Weisberg, 2002). Academics have generally found that, in addition to the obvious rules, specific mental and emotional empathic behaviors are altered by cultural context as well. Therefore, paying attention to individual psychological changes and coping strategies resulting from cultural differences based on different cultural environments enable us to gain a deeper understanding of why people behave accordingly in multicultural environments and how the results emerge as a function of cultural orientations and values (Main and Kho, 2020).

Based on the research focusing on the psychological and emotional characteristics of individuals in multicultural contexts, previous scholars have also conducted corresponding research on conflicts arising from the heterogeneous characteristics of cultural values (e.g., Han et al., 2021). Scholars have found that national cultural differences are potential factors stimulating the occurrence of crisis events, that cultural differences between countries are a major cause of conflict in international crisis events, and that the pattern of social crisis events caused by multicultural differences is universally applicable on a global scale (Yu et al., 2020). At the macro level, previous studies focused on cross-cultural conflict, ethnic stereotypes (Brigham, 1971), geographic distance (Li and Katsumata, 2020), and differences in cultural values (Cramton and Hinds, 2014). However, with the rapidly and dynamically changing society, the traditional conflict tracing model is hard to use to interpret the increasingly diversified cultural forms and the ever more enriched cultural dimensions. Therefore, it is necessary to further research the cultural differences and root causes of conflicts in transnational countries to explore the mechanisms by which cultural differences affect individual psychology, emotions, and behaviors in crisis events. This can explain the problems associated with social events in an era of frequent crises. However, research and references in this area still need to be enriched, and it is especially necessary to study the relationship and interaction between cultural differences and crisis event risk prevention and control in diverse countries. Therefore, we aims to explore the differences between global multicultural differences and their ways of preventing public crises and aim to improve the existing theoretical framework of cultural heterogeneity. This study aims to enrich the literature to deconstruct the connection between citizens' psychology, emotions, and active prevention mechanisms when facing social and international crises. Therefore, we propose:

H1: *Multicultural differences positively influence the occurrence of risk prevention and control behaviors.*

The Meaning and Application of Empathic Communication in Crises

The application of empathy in the field of communication is currently a hot topic. Although the concept of empathy communication has attracted more and more attention by scholars in the study of public opinion research, unified definition is not clear yet. The current research on empathy communication mostly focused on the process of evaluating the effectiveness of communication, emphasizing the perceptual connection and similarity of the audience's perspectives. Broadly speaking, the emerging communication concept of empathy communication is derived from the psychological concept of empathy. Empathy was first translated from German by the British psychologist Edward Titchener in 1909 and means "feeling into" (Chen, 2017).

Since empathy was transferred to the field of psychotherapy by design aesthetics, it has long been a key concept of clinical psychology theory and practice. Thereafter, Carl Rogers systematically explained the psychological, emotional, and behavioral characteristics of applying the concept of empathy to cognitive psychotherapy (Rogers, 1958). According to Rogers (1958), the so-called empathy is the ability of one person to understand the unique experience of another and to react to it. This concept allows one person to have a certain amount of empathy for another person and then take action (Hyland-Wood et al., 2021). The view accepted by most scholars is that empathy can distinguish emotional cognitive components. In particular, the emotional component of empathy refers to an individual's response to another person's feelings, which is expressed as the consistency of one person's feelings with another person's emotional state (Cao et al., 2021; Zhou et al., 2021).

Up to date, studies have wildly applied the emotional and cognitive manifestations of empathy to the description of the thematic characteristics of communication audiences, management objects, and landscape visitors. As in contemporary social crisis events, empathy communication has a significant impact on events and social opinions, profoundly expressing the psychological, emotional, and behavioral feedback of the communication audience under the influence of the crisis. In the case of the COVID-19 outbreak in early 2020, information

dissemination began to play an important role, as some countries recommended self-isolation to control the epidemic, while others recommended a conservative response measure to ensure normal life (Chen et al., 2020). The intervention of the media accelerated the spread of epidemic news and caused psychological fluctuations and emotional resonance effects in the information audience in the process of dissemination. Due to the spread of information about the COVID-19 epidemic, sympathy and preventive behaviors for the affected people began to spread in varying degrees over various regions. This is the product of the panic caused by the epidemic on media platforms. This panic has shaken the original normal social operating mechanism, affecting medical and health care, social security, and national stability (An et al., 2020). Thus, it is important to understand the transmitting process of empathy in a crisis, which is a key link in predicting the process of social development and an important guide for coping with group panic triggered by individual factors in crises. In the research related to the spread of empathy during the COVID-19 pandemic, some scholars correspondingly proposed the concept of a psychological typhoon eye for the description of public opinion distribution (Raza et al., 2020). This concept describes the irrational panic psychology and behavior of the public in major emergencies and provides a new idea for the study of an empathy communication mode, that is, the closer the public is to high-risk locations spatially, the calmer the public; the farther the public is from high-risk locations, the more they panic. The proposed communication mode is different from the original way of thinking about empathy communication, breaking the basic perception that the original analysts and participants of a crisis event must have a common feeling. The empathy-altruism hypothesis indicates that disasters often severely damage individuals' mental health (Cialdini et al., 1997), which is why providing positive, timely, and adequate psychological crisis intervention can help disaster victims, their families, and ordinary people overcome difficulties. Overall, the psychological impact of crisis events on people shows more negative effects at the root. How to better understand the audience's empathy caused by crisis transmission and to jointly explore ways and contradictions from time and perspective are both important. The spatial dimensions are a topic worthy of in-depth discussion. Therefore, we propose:

H2: *Multicultural differences positively influence public empathy.*

Risk Prevention and Control Within Multicultural Differences

Gallagher (1952) put forward the concept of risk management, which refers to the decision-making process of social organizations or individuals to reduce the negative results of risk. Risk management is a public organizational method that selects, optimizes, and combines various risk management techniques to effectively control risks, solve the losses caused by risks, and obtain maximum safety (Kraman and Hamm, 1999). The basic goal of risk management is to obtain maximum security at minimum cost, and risk prevention and control is an important part of risk management. At present, preventing and controlling the occurrence of crisis events is the main means to maintain social stability and social security. Due to the unpredictability of crisis events, most studies have idented that risk prevention and control of crisis events should be changed from passive to active. Specifically, active risk prevention and control exist not only at the macro level of policy governance, but also at the micro level which is equally important for individual active risk prevention and control. There is limited literature on individual active risk prevention and control. Compared with the social conflicts caused by multicultural differences, as well as the application of empathy communication in crises, it is necessary to focus on active prevention and control of individuals, and then formulate reasonable plans. In the modernization process of human society, and with the continuous development of technology and the economy, globalization and informatization have become more and more intense, and various social risks have frequently appeared, and even suddenly appeared in front of the public (Vicentini and Galanti, 2021). There is no doubt that after the outbreak of COVID-19, the world is at an important moment of public management. Governance systems have formed amid social concerns, and countries have introduced new polices one after another to actively prevent and control risks. How will governments, citizens, businesses, non-profit organizations, and the voluntary sector respond to a series of future large-scale social crisis events that will occur in the future? Can they be better prepared, react faster, coordinate better, and work more effectively, which is also the research focus of today's society (Lindquist, 2020). In the context of multinational cultures and empathy communication mechanisms, it is essential to make necessary changes and improvements to the existing macro-societal proactive prevention and control mechanisms or the ones being tested. At the micro level, a public crisis may be regarded as an individual's amorphous existence, but it can affect an almost unlimited number of individuals, groups, and organizations in the environment. Effective crisis management in a specific environment requires that individual citizens fully understand the public crisis. A large number of studies related to public crises have explored relevant laws, but there is almost no consensus on how to define the term (Borodzicz and van Haperen, 2002). The outbreak of the COVID-19 pandemic represents the obvious differentiation of individual active risk prevention and control in many public crisis events, and it is affected by various factors such as geography, culture, and thinking patterns. Therefore, to better understand the characteristics and laws of individual active risk prevention and control in public crises, it is necessary to explore both the differentiated characteristics and the common characteristics.

However, the roots of the differentiation and commonality of active risk prevention and control have not yet been revealed. In many contemporary crisis prevention and control cases, the impact of cultural differences has gradually attracted the attention of scholars, and the concept of cultural identity is considered as the cause of the characteristics of active risk prevention and control behavior. In the context of economic globalization, cultural identity has a certain impact on the

stability of international communication (Friedman, 1994). Cultural identity is the commonsense cognition belonging to a certain group, and it is an important component of one's self-concept and self-cognition (Assmann and Czaplicka, 1995). It is reflected in race, religion, social class, generation, region, and any social ownership of a group with its own unique culture. Therefore, cultural identity is a characteristic of both individuals and groups with the same cultural background. At present, the academia believes that cultural identity includes three identities: personal identity, relational identity, and public identity (Jonker et al., 2020).

Cultural identity is an affirmative cultural value judgment, which refers to the recognition of the value utility of the emerging culture within the community or the foreign cultures outside the community by the members of the cultural group. It is an attitude and recognition method that conforms to traditional cultural value standards (Jonker et al., 2020). Huntington (1996) believes that cultural identity, which is an important basis for national identity and state identity, is the most important soft power in the overall performance of national power and has gradually become an important factor in dealing with crises. Cultural exchanges among countries can strengthen cultural identity, but they can also trigger conflicts in the collision. Although scholars have researched cultural identity, the current cultural identity concept has emerged along with modernity and the public crisis caused by it, and its new era characteristics have begun to gradually manifest (Zajda and Majhanovich, 2021). In terms of behavioral characteristics, there are highly significant differences in the ways in which different countries and people respond to the manifestations of crises. In the case of COVID-19, the government and the people in the Eastern cultural system paid more attention to epidemic prevention and control. However, in the Western cultural system, the government and the people advocated for liberalism and opposed restraints on life due to prevention and control. From a cultural perspective, both approaches are deeply rooted in cultural identity, and neither approach can be judged as right or wrong (Gato et al., 2021). Therefore, it is difficult to identify cultural differences between countries related to active risk prevention and control, and how to efficiently handle crises should be adapted to local conditions and form effective prevention and control behaviors that reflect a sense of cultural identity. Analyzing the similarities and differences between the characteristics of this multicultural empathy communication and the active prevention and control mechanism and exploring the regularity of multinational cultural identity in the resolution of crisis is a valuable guide for mankind when dealing with major crises in the future.

Multicultural heterogeneity determines significant differences in the response and handling of crisis events in local society. In a specific public crisis, empathy communication affects individual psychology and active risk prevention and control behavior. Although exist obvious differences among diverse cultures, the fact is undeniable that some common patterns are real. Researching and exploring the internal relationship between the common laws of different cultures and empathy communication is of positive significance for preventing and solving social crisis events and reducing the negative social impacts brought by transference of empathy. We aim to investigate the internal influence of cultural differences on empathy communication in a multicultural context, the relationship between these influences and the psychological and emotional reactions of individuals in society under crisis events, and the connection between proactive risk prevention and control behavior. It provides a more scientific action guide and theoretical reference for addressing public crises prevention and control under the background of multiculturalism.

In summary, multicultural differences lead to frequent social conflicts, while deviations in management concepts at the national and state levels make social laws appear incongruous. Management has begun to pay attention to the changes in public psychology and on the effect of empathy communication of crisis information to control those active risk prevention and control behaviors in the multicultural context. This study can tentatively conclude that the regulation of empathic psychology may become a key element of today's crisis management. Therefore, we propose:

H3: *Empathy positively influences the occurrence of risk prevention and control behaviors.*

H4: *The interaction between empathy and multicultural differences influences risk prevention and control behaviors.*

RESEARCH DESIGN

To further integrate theory with practice, this study selects COVID-19 as the research subject. And we are motivated to clarity the inherent laws of risk prevention and control guidance under the background of cultural differences through questionnaire surveys on the respondents whose differences in culture, psychology, and behavior of each country are apparent.

Research Hypothesis and Theoretical Model

Based on the literature review and the understanding of this research question, it can be preliminarily drawn that the research on the behavioral guidance of risk prevention and control under the background of cultural differences focuses on the three levels of multicultural differences, empathy, and risk. This study should address four basics assumptions, and the theoretical framework is shown in **Figure 1**.

Factor Characteristics and Question Design

To statistically measure the three factors of multicultural differences between empathy and risk prevention and control behaviors, this study summarizes the characteristics of these factors and the established scales.

Multicultural Differences

Since each country has its unique background of geography, humanities and history, and cultural integration, there are significant differences in humanities between countries, collectively referred to as cultural differences. Specifically,

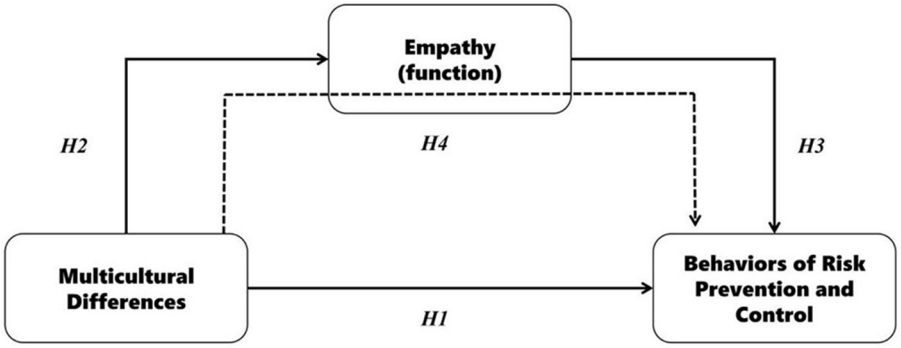


FIGURE 1 | Research hypothesis model.

cultural differences refer to cultural differences unique to people in each country/region due to regional differences (Hofstede, 1980). In today's globalization of extensive exchanges and interactions, the concept of pluralism has begun to incorporate the idea of cultural differences. The academia has reached a consensus in a handful of research and explorations. Multiculturalism refers to the co-existence of multiple interrelated cultures. In a particular region, territory, society, group, or class system, everyone has independent cultural characteristics (Giardini and Wittek, 2019; Xu et al., 2020). It is different from the previous assumptions on cultural existence because it is diverse in space and extensive in time (Parekh, 2001). Academia generally believes that understanding and application of multiculturalism involves scientifically analyzing and exploring differences in space and time.

Academic circles have explored the factors that influence the differences of multiculturalism to measure their effectiveness in human society under realistic conditions (Sekiguchi, 2006; Li and Katsumata, 2020; Li et al., 2020, 2021). This study focuses on the impact of multicultural differences on public psychology and risk prevention and control behavior. Therefore, the Normative Multicultural Scale (NMS) is selected to measure the effects of multicultural differences on individuals in terms of policies and practices (Stuart and Ward, 2018). The scale enables us to systematically analyze the direct impacts of multicultural differences on interpersonal and intergroup communications at the level of multicultural ideology and multicultural policy, which has scientific significance.

Empathy

The classic concept of empathy has been applied in several fields, such as philosophy, sociology, and psychology (Eisenberg and Strayer, 1987). Although the formulation and application of the theory may seem ancient, it is still one of the main concerns of researchers (Bovina, 2020).

For the measurement of empathy, there are six measurement scales with high reliability: Negative Emotional Nature (NE) (Watson and Clark, 1984), Empathy Quotient (EQ) (Baron-Cohen et al., 2004), Basic Empathy Scale (BES) (Jolliffe and Farrington, 2006), Questionnaire for Cognitive and Affective Empathy (QCAE) (Reniers et al., 2011), Interpersonal Reactivity Index (IRI) (Davis, 1983), and Content Area of Extended Empathy (ACME) (Vachon and Lynam, 2015). Interpersonal Reactivity Index (IRI) and the Content Area of Extended Empathy (ACME) have been most adapted in prior studies. Previous literature reported that the ACME has more measurement breadth than the IRI and more comprehensively focuses on both positive and negative cognition of the empathic phenomenon (e.g., Murphy et al., 2020). Therefore, to better understand the role of empathy in cross-cultural communication, we adapted the ACME scale in this study. We conducted a questionnaire-based public psychological survey to investigate the rules of guiding risk prevention and control behaviors in the context of multi-culture at three levels, cognitive empathy, affective resonance, and affective dissonance.

Risk Prevention and Control

Risk prevention and control were first applied to the economic field and are proactive preventive behaviors chosen by business subjects in response to changes in the market or stock market. This preventive behavior can reduce economic losses and maximize financial outcomes. Later, crisis prevention and control were applied to various fields to observe the reaction of individuals in certain events. The effects of economic crisis on employee job satisfaction, commitment, and self-regulation scale are classic scales for measuring individual behaviors of risk control during crises (Markovits et al., 2014). Risk prevention and control behaviors also refer to social support in the field of psychology (Elklit et al., 2001). Social support is a multidimensional concept that includes both intra-individual cognitive and extrinsic environmental factors. In previous studies, researchers have developed a variety of measurement instruments from different perspectives, according to their different understandings of social support. The measurement of social support can be divided into two categories based on the definition of social support. One measurement is the content characteristics of social support and the other is the structural characteristics of social support. The concept of social support and coping style has been widely adapted and extended since the 1970s. The main scales on coping styles are the Ways of Coping

Questionnaire (WCQ) scale developed by Folkman and Lazarus (1980), the COPE scale developed by Carver et al. (1989), and the Crisis Information Seeking and Sharing (CISS) scale developed by Lee and Jin (2019). Among those theories, the WCQ scale developed by Folkman and Lazarus (1980) has been widely applied in the studies of risk management (e.g., Jonker et al., 2020). In this study, individuals' behavior is mainly expressed in several dimensions of the reference scales CISS and WCQ, namely, individual autonomous behavior, socially active defense mechanism and security satisfaction, and affective commitment, therefore, the CISS and WCQ scales were adapted to this study.

Sample and Method Selection

For data collection, people from different cultures in different countries under the influence of the COVID-19 pandemic were selected for the survey. To better explore the generalization patterns, a normal distribution of the sample was required due to the different levels of economic development in the study-restricted areas. To ensure that the selected sample qualified, the basic needs of the subject study were determined through selection. After obtaining a reasonable screening sample, an undifferentiated questionnaire survey was conducted on 320 subject who were significantly culturally heterogeneous and influenced by the role of empathy in crisis. The age of respondents covered 30–60 years old, and those who have formed mature and stable values.

This study applied questionnaires design, descriptive statistical analysis, and PLS-SEM to explore the logical relationship among multicultural differences, empathy, risk prevention, and control. First, the explanatory variables were screened by using a questionnaire, exploratory factor analysis, and descriptive statistical analysis. Second, the theoretical model was analyzed by using Smart PLS 3.3.3 software for confidence and validity tests. Third, we verified the four main paths. H1–H4 of the research hypotheses were verified by the influence coefficients of each path and the risk in the context of cultural differences was interpreted from the perspective of empathy. The final explanation of the mechanism of risk prevention and control behavior guidance in the context of cultural differences from the perspective of empathy was used to answer the three research questions in this study.

EMPIRICAL ANALYSIS

Analysis of Demographic Variables

To enrich the literature of risk prevention and control behaviors in the multicultural context, the study constructed relevant questionnaires based on the existing scale index system (as shown in **Table 1**). Between May 2020 and January 2021, the team members distributed electronic questionnaires with the assistance of international cooperators. A total of 300 valid samples were obtained after screening and eliminating 20 from the 320 samples.

The samples of this study were collected by survey at a college-level cultural industry management research center group. Therefore, this study was conducted relying on the relevant partner institutions of the host schools and colleges, as well as the personal partners of the research group members. The questionnaire was distributed online. The survey of this study was conducted in 10 countries, including China, Korea, Thailand, Japan, Pakistan, Russia, USA, Canada, Cameroon, and New Zealand, and 320 questionnaires were distributed. The survey process was divided into three main phases: the first phase was from May 2020 to September 2020; the second phase was from September 2020 to November 2020; and the third phase was between December 2020 and January 2021. A total of 20 questionnaires were excluded that lacked nationality information or if respondents finished the survey in less than 15 min, and finally 300 valid questionnaires were finally obtained, which provided the data basis for the subsequent empirical study (statistical characteristics are shown in **Table 2**). The preliminary data analysis of demographic variables reveals two main points. First, the study sample was distributed across all age groups who generally had a high level of education. Second, the sample had a broad geographical distribution and most of the participants had experienced sudden social crises. Therefore, the sample recovered was valid for further exploration.

Descriptive Statistical Analysis of Variables

The mean and standard deviation analysis of valid samples is the descriptive statistical analysis of the dimensions of multicultural differences, empathy, and behaviors of risk prevention and control. As required, the valid sample data for statistical analysis obeyed normal distribution, including the cultural difference variables DW1 ($M = 4.33$; $SD = 0.801$), DW2 ($M = 4.21$; $SD = 0.762$), DW3 ($M = 4.30$; $SD = 0.819$), DW4 ($M = 4.15$; $SD = 0.834$); the empathic psychological variables GX1 ($M = 4.19$; $SD = 0.900$), GX2 ($M = 4.18$; $SD = 0.835$), GX3 ($M = 4.20$; $SD = 0.850$), GX4 ($M = 4.26$; $SD = 0.814$), and GX5 ($M = 4.34$; $SD = 0.752$), GX6 ($M = 4.26$; $SD = 0.772$); and risk prevention and control behavior variables FF1 ($M = 4.31$; $SD = 0.822$), FF2 ($M = 4.45$; $SD = 0.728$), and FF3 ($M = 4.33$; $SD = 0.785$). All measurements were within the acceptable range of the measurement criteria, and thus the data were validated for the next statistical analysis.

Reliability and Validity Analysis

For the reliability analysis, the focus was on the reliability, consistency, and stability of the measurement results, that is, whether the test results reflected the stable and consistent true characteristics of the test taker. This study then conducted an overall preliminary reliability test on the 13 valid data points recovered from the questionnaire scale: $\alpha = 0.943$, indicating a good reliability.

For validity analysis, the effect of dimensionality reduction was achieved by extracting factors with eigenvalues >1. This study used orthogonal rotation to measure the intrinsic association between variables, simplifying the statistical data structure by reducing the dimensionality of the data. Deep analysis requires the judgement of data structure validity based on test statistic (KMO), Bartlett's test, contribution rates, and factor loadings. This study tested the validity of the data structure of the three dimensions proposed by the hypotheses. The results showed that the KMO value was 0.953, which was >0.8; the

TABLE 1 | Study scale and question items.

Study scale	Items' tags	Measurement question items
Multicultural differences (DW)	DW1	Your consciousness and values are different compared to people in other regions (value differences)
	DW2	Your information is delivered differently compared to people in other regions (habit differences)
	DW3	Your risk prevention and control measures are different compared to people in other regions (difference in needs)
	DW4	You understand things in a different direction compared to people in other regions (cognitive differences)
Empathic communication (GC)	GC1	You can distinguish the reasons why people act differently (discriminate)
	GC2	You can understand why people think this way (understanding)
	GC3	You can predict the actions of others (prediction)
	GC4	Helping people in need makes you feel good (feel)
	GC5	You don't care if people are happy or depressed (affective)
	GC6	When people are upset, you try to help them (subconsciously)
Risk prevention and control (FF)	FF1	You will change your habits when a crisis event occurs (change)
	FF2	You will promote your claims when a crisis event occurs (advocacy)
	FF3	You will tense yourself up when a crisis event occurs (heightened awareness)

TABLE 2 | Statistical of demographic variables.

Category	Demographic features	Quantity	Percentage	Category	Country name	Quantity	Percentage
Gender	Male	152	50.67%	Region distribution	China	73	24.33%
	Female	148	49.33%		Korea	32	10.67%
Whether they suffered a sudden crisis	Yes	234	78.00%		Thailand	22	7.33%
	No	66	22.00%		Japan	42	14.00%
Age	Under 40	112	37.33%		Pakistan	23	7.67%
	40–59	134	44.67%		Russia	23	7.67%
	60 and over	54	18.00%		USA	19	6.33%
Education	Non-bachelor	50	16.66%		Canada	23	7.67%
	Bachelor	167	55.67%		New Zealand	28	9.33%
	Post-graduate or above	83	27.67%		Cameroon	15	5.00%

significance was 0.00, which was <0.05, indicating that the validity was good enough and the data qualified the need of structural equation model analysis.

On the other hand, to further verify the validity of the test sample under multicultural differences, the study measured the validity and reliability of the country-specific samples (as shown in **Table 3**). The Cronbach's alpha coefficient was greater than 0.9 in all countries, the KMO value was 0.948, and the Bartlett's test of sphericity approximation chi-square was 3297.955, indicating that the validity was good enough and the data qualified the need of structural equation model analysis (Bland and Altman, 1997).

Structural Equation Modeling Based on Smart-PLS

This study applied the partial least squares method, which is suitable for small sample analysis and can handle non-normally distributed data. Since the PLS method can overcome the problem of covariance among observed variables and remove the effect of unhelpful noise on the regression, it can endow the PLS model with better robustness (Sarstedt et al., 2019). Therefore, PLS-SEM was selected as an effective tool for exploration in this study.

Specifically, a single dimensional test was conducted on the secondary indicators corresponding to the three primary indicators. The results showed that the eigenvalues of the first principal component of each dimension were >1, and the eigenvalues of the remaining principal components were <1. All dimensions passed this test. Then, using Smart PLS 3.3.3 software and the PLS algorithm, the intrinsic mechanism model of multiculturalism and empathy in crisis was established by the reflective measurement model (**Figure 2**), and the normative fit index (NFI) was 0.868 (>0.8), which reached the model fit requirements well.

The results of the model show that, except for the evaluation item of risk prevention and control, the other two latent variables represented two primary indicators, and the 13 secondary indicators were composed of dimensional item codes and serial numbers. The PLS algorithm is used for analysis, the software is standardized and used for the following analysis. The results show that the model fit well; and had significant explanatory utility for the internal potential relationships; the estimation effects were all acceptable; and the reliability indicators fit the structural validity, with the specific parameters shown in **Table 4**.

The R^2 value of risk prevention and control in **Table 4** is 0.709, which indicates that each latent variable had strong explanatory power for risk prevention and control.

TABLE 3 | Validity and reliability tests of countries.

Country name	Sample size	Cronbach's alpha	KMO and Bartlett's test
China	73		KMO = 0.948, and the Bartlett's test of sphericity approximation chi-square was 3297.955
Korea	32	0.973	
Thailand	22	0.964	
Japan	42	0.957	
Pakistan	23	0.904	
Russia	23	0.965	
USA	19	0.977	
Canada	23	0.973	
Cameroon	15	0.909	
New Zealand	28	0.965	

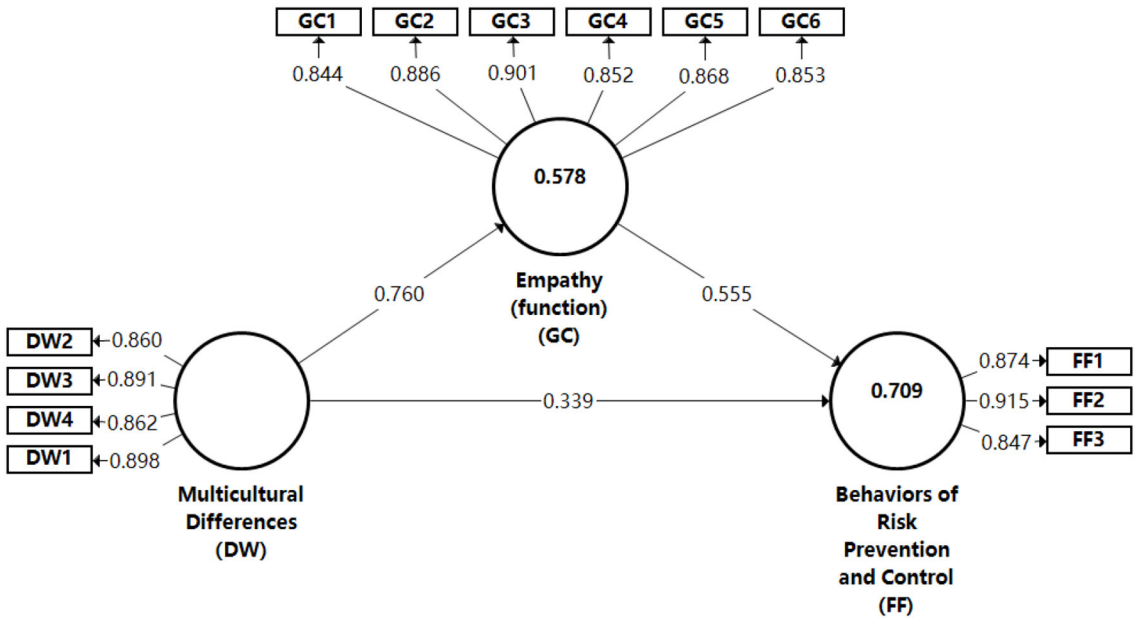


FIGURE 2 | Reflective measurement model.

The Cronbach's alpha coefficients of each latent variable were all >0.7, indicating that each latent variable has good reliability. The combined reliability CR of each latent variable satisfies the requirement of >0.7, which proves the high reliability of the model. The average extracted variance AVE and rho_A of each latent variable were >0.5, and thus reached the relevant statistical criteria (Fornell and Larcker, 1981).

Further, we assessed the influences of Q^2 exogenous variables on endogenous variables, and acquired a Q^2 >0.35, which indicates a higher influence of the exogenous variables on the endogenous variables and indicates that the predictive relevance of the model is stronger. The value of Q^2 in **Table 2** is 0.567, indicating that the exogenous variables of this model have strong predictive relevance to the endogenous variable of the level of comprehensive development, indicating that the predictive power of the PLS model is stronger (Hai et al., 2019).

To test the correlation coefficients, a matrix of correlation coefficients among the latent variables was constructed, as shown in **Table 5**. The diagonal line is the open root sign value of the average extracted variance (AVE) of each latent variable. The values below the diagonal value are the correlation coefficients among the latent variables, respectively. Comparing these two sets of correlation coefficients indicates that the latent variables have different theoretical connotations and have good differential validity.

The t-statistic of each path coefficient was calculated using Bootstrapping; the significance level of the path coefficient estimates was tested (two-tailed test) as shown in **Table 6**. If 2.58 > T > 1.96 then the path coefficient estimates were significant

TABLE 4 | Model reliability test results and fit indices.

Indicators	Cronbach's alpha	rho_A	CR	AVE	R^2	Q^2
Empathy (GX)	0.934	0.935	0.948	0.753	0.709	0.567
Multicultural differences (DW)	0.901	0.907	0.931	0.771		
Behaviors of risk prevention and control (FF)	0.852	0.856	0.911	0.773		

TABLE 5 | Correlation coefficient matrix between latent variables.

	Empathy (GX)	Multicultural differences (DW)	Behaviors of risk prevention and control (FF)
Empathy (GX)	0.868		
Multicultural differences (DW)	0.760	0.878	
Behaviors of risk prevention and control (FF)	0.813	0.761	0.879

at the 0.05 level. If $3.29 > T > 2.58$ then the path coefficient estimates were significant at the 0.01 level. In the Bootstrapping test, all path coefficients had high t-statistics of the structural equation model. All path coefficient passed the test at the corresponding significance level and the stability of the model structure was good (Streukens and Leroi-Werelds, 2016).

To verify whether multicultural differences would impact individual risk prevention and control through empathy, the study used the Bootstrapping method to calculate the coefficient of the specific mediated path. The results showed that the mediated path had a reliable mediated performance, with the specific parameters shown in **Table 7**. The study finally obtained the PLS-SEM. The following interpretations were made based on the path coefficients of the structural equation model and the previous theoretical derivations. The model fitting test available to estimate whether multicultural differences positively influenced the occurrence of risk prevention and control behaviors (H1). When social crisis events occur, different cultural groups take different measures of prevention and control behavior in the process of coping, which generally stems from the direct influence of values. In the process of risk prevention and control, the influence of diverse cultural differences on the individual behavior of risk prevention and control is not significant. Because the cultural identity carried by individuals in the macro environment of multicultural society cannot directly influence the decision making of the society, and the cultural identity of individuals may even be weakened by other factors.

Heterogeneous manifestations of multiculturalism drive different changes in empathic psychology, thus positively influencing the changes in public empathy, proposed in H2. In a multicultural context, empathy is often influenced by the efficiency and content of cultural communication, thus it varies with the way different cultures receive and process information. In short, the cognitive level and reception patterns of social individuals in different cultural systems are influenced by their native environment and have certain limitations. The real social environment indirectly leads to differential understanding and omission of information transmission between the two cultural groups in the process of emotional transmission, and the differences will be reflected in the fluctuation of emotions of different cultural groups in response to social crises.

The impact of empathy on risk prevention and control behavior is intuitively visible, and H3 is both a test of previous perceptions and a secondary validation based on the data. The emergence of new media has accelerated the dissemination of crisis information. The emotional activity of individuals influenced by media information is the ideological basis of practical behavior thus the emotional impact of crisis information largely determines the strength of their risk prevention and control. For example, the mass panic effect of the COVID-19 pandemic does not essentially come from the crisis itself, but rather from the direct impact of the spread of empathy, and the spread of panic causing the emergence of overreaction as a reflection of this principle.

Combined with the above model, we conclude that multicultural differences are an important consequence for the differentiation of individual behaviors of risk prevention and control in crisis events. The strength of risk prevention and control behaviors is influenced by the combination of information accuracy and completeness in the process of empathy generation. Differences in culture and cognitive structure are important consequences for the lack of information accuracy and completeness, which can verify the value of the psychological mediating utility of empathy in H4. It demonstrated that empathic psychology as a mediating variable in the context of multicultural differences can interact together with empathy, which can impact public risk prevention and control behaviors and their differential performance in crisis events.

Furthermore, this study verifies the mediating role of empathy in risk prevention and control in a multicultural context, and further concentrate the research on how culture drives behavior. Verifying the cognitive and emotional empathy characteristics can be interpreted through the correlation coefficients of specific question items, which both modulate risk prevention and control behaviors. Therefore, the public behaves differently when faced with COVID-19 in each country. Based on those points, the study also highlights that indirectly regulating the public's perceptions

TABLE 6 | Significance test results of path coefficients.

	O	M	STDEV	T	*P*
Empathy (GX) → Behaviors of risk prevention and control (FF)	0.555	0.550	0.070	7.976	0.000
Multicultural differences (DW) → Empathy (GX)	0.760	0.764	0.049	15.419	0.000
Multicultural differences (DW) → Behaviors of risk prevention and control (FF)	0.339	0.346	0.066	5.106	0.000

TABLE 7 | Results of the specific mediated path test.

Specific mediated path	O	M	STDEV	T	*P*
DW → GX → FF	0.422	0.419	0.050	8.427	0.000

and emotions is a better option than directly issuing policies against crises.

FURTHER EXPLORATION OF THE LOGIC OF RISK PREVENTION AND CONTROL BEHAVIORS IN THE UGC ERA

Background of the UGC Era and the Actor of Risk Prevention and Control

User-generated content (UGC), and its core embodiment, means that each individual can be both a communicator and an audience. Since social networks have become a key source of information acquirement, cognition, emotion, and behavior have changed to accommodate a new mode of expression.

Based on the previous research, there is a typical cause and effect logic in information dissemination, and the actors of risk prevention and control are the disseminators and audiences of information. Information is disseminated in very diverse channels in the UGC era, the disseminators and audiences blur the distinction and show cyclical turnover.

Occurrence of Risk Prevention and Control Behavior in the Context of UGC

Periodicity is the internal logic of the identity of actors changing risk prevention and control in the UGC era and is more detailed under the mechanism of culture, empathy, and risk prevention and control. Specifically, the first disseminator of crisis information can be either the official media or the public, and the former has a certain authority, while the latter highlights the universal characteristics of content dissemination. In this era, communicators tend to be more subjective and more inclined to share their own feelings and potential perceptions, and thus the background of the UGC strengthens the motivation of communicators in the early stage of information dissemination. Therefore, communicators begin to enter the culture, empathy, and risk prevention and control mechanism, meanwhile multicultural differences strongly influence the risk prevention and control behavior, highlighting the mediating role of empathy psychology, which in turn shows that risk prevention and control behavior is dominated by emotion. Behavior originates from the audience and then influences others, the group effect is the significant factor currently. The background of the UGC era again presents its promotional effect, the influenced audiences are transformed into the information disseminators.

Circular Mechanism of Risk Prevention and Control in the Context of UGC

The first occurrence of risk prevention and control behavior brings about the first shift in audiences' identity. Existing perceptions, emotions, and behaviors are the basis for the new communicators to process information (Luqman et al., 2021; Sun, 2021; Sun et al., 2021). The information at the beginning of the communication has its original character and would be accompanied by the rational analysis of the actors in the second round of communication, and the social imprint of multiculturalism has been burdened from then on. The background of UGC again stimulates communicators to initiate secondary information dissemination. Compared with the official media, the secondary communication has become more prominent. Information transmission is more clear and rapid under the influence of the culture, empathy, and risk prevention and control mechanism. The risk prevention and control behavior of the new audience again generates a group effect. With the promotion of the UGC, the audience has a certain chance to become new communicators, so the third round of crisis information dissemination begins.

Communicators and audiences gradually stabilize after rounds of risk prevention and control behaviors together with the mechanism of culture, empathy, and risk prevention and control. Due to the decoding consciousness of each actor of risk prevention and control behavior, the irrational component of information has been reduced in the information flow, as well as the continuous influence of multicultural differences, which further demonstrates the centrality of empathy in the process of risk prevention and control behavior. The audience in each round of information dissemination expresses their demand for information feedback, which gives rise to the anti-driving mechanism for information disseminators. The logic of risk prevention and control behavior in the UGC era is becoming clearer.

CONCLUSION AND RECOMMENDATION

Due to the frequent occurrence of social crises, how to properly deal with social crises and minimize the losses caused has become a hot topic. In the experience of fighting COVID-19, excessively positive or negative risk prevention and control measures have negative impacts on the healthy development of society and the economy. Exploring the relationship of culture and empathy prevention and control is useful for handling the social crisis in the long run. This study explores the internal influence mechanism among multicultural differences, empathy communication performance, and individual risk prevention and control behaviors in crisis events from the theoretical evolution level. This study reveals the internal laws of multicultural differences through the intermediary variables of empathy communication and empathy. They have jointly regulated the differentiated performance and intensity of public crisis risk prevention and control behavior. This study further discusses the occurrence logic of risk prevention and control behaviors in the context of the UGC era. It also sorts out the actors, the first occurrence characteristics, and the cyclical mechanism of occurred behaviors. This study clarifies the value of empathic psychology as a code in the present time and reacts to its cyclic characteristics.

This study can answer the three initial questions raised by the survey results. First, as shown by empirical analysis, the coefficient of multicultural differences behaviors of risk prevention and control shows that multicultural differences positively impact risk prevention and control behaviors, verifying that cultural differences are one of the influencing factors of risk prevention and control behaviors. Reasons for different risk prevention and control behaviors explain, in the current COVID-19 epidemic, why different countries have different risk prevention and control behaviors. Second, the empirical analysis uncovered the coefficient of empathy behaviors of risk prevention and control, which indicates that empathy has a greater impact on individual behavior. Third, the coefficient of multicultural differences, empathy, and the correlation prove that empathy is a direct factor influencing the occurrence of risk prevention and control behavior.

Based on these findings, this study puts forward the following three suggestions for the guidance of social crisis risk prevention and control behavior. First, from the perspective of the public, information audiences should analyze multicultural characteristics of the society they live in, select information sources, objectively analyze the severity of the crisis events in the multicultural context, and apply the basic logic of cultural heterogeneity and empathy in their life practices. Internet information often affects the emotions and behavioral logic of individuals in society, resulting in many excessive prevention and control practices in social crises. Individuals should carry out reasonable crisis prevention and control practices according to their own needs. Second, the perspective of social public media and personal self-media should pay attention to the accuracy and objectivity of information dissemination, tolerate5 misunderstanding of multiculturalism, give due explanations to differences in understanding, and avoid culture as much as possible. The integration of cultural differences and emotional factors indicate that the news media that reduces negative social impact becomes the fuse that ignites social crisis. Social media is one of the social responsibility bearers and should not pursue economic benefits to the neglect of social public interests. Third, from the perspective of the government, government power should function appropriately in social crises. The government is a servant of the public, not a creator of cultural conflicts. Considering the multicultural differences in the management field, regulating the negative spread of excessive emotions in crisis events, reducing the cultural and emotional conflicts triggered by crises, and using the internal operation of culture and empathy to regulate social influence should be the focus of local governments.

Our study effectively explored the behavior-oriented risk prevention and control mechanism in a multicultural context, but there are still some aspects to be improved. First, the main source in this paper are the data of first-hand interviews, which are subject to geographic restrictions. Although the research team has collected data from 10 different countries, the accuracy of the data still needs to be improved, and we will continue the research in the future to analyze the behavioral patterns hidden under cultural differences by obtaining data covering more countries. Second, this study explains the psychological mechanism of behavior from the perspective of empathy, however, the emergence of behavior is not only limited by people's mental activities, other influencing factors such as social environment, group interaction, and economic context also deserve further study. Third, we conducted empirical analysis to verify the logic of risk prevention and control in the contemporary multicultural context. As time passes and the world environment changes, the pattern is bound to change, and comparative analysis will be conducted for multiple time dimensions in the future to enhance the research value of the findings.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by East China Jiaotong University. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

KY contributed to the empirical work, to the analysis of the results, and to the writing of the first draft. YL and XW supported the total work of the first author. HP contributed to overall quality, and supervision the literature organization. RT contributed to developing research hypotheses and revised

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How Does the Interactivity of Social Media Affect the Adoption of New Green Products?

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In the era of mobile internet, newsfeed advertising, which is most applicable to consumption scenarios that involve mobile devices, has become a core driving force in advertising. The rapid advancement of technology with respect to newsfeed advertising has not only reshaped the green consumption sector but has also had significant impacts on consumer psychology and behavior. When faced with highly social green newsfeed advertising, consumers are receptive to different degrees, which ultimately affects their receptivity to new green products. Through an experiment and a questionnaire, we find the following: (1) Consumers prefer new green products advertised through high-sociality green newsfeed advertisements more than those advertised with low-sociality ads. (2) Receptivity to green advertising can mediate the impact of the sociality of newsfeed advertising on consumer adoption of new green products. (3) The aforementioned direct effect and mediating effect are also affected by consumers' green involvement. Our paper has both theoretical and practical significance; that is, we contribute to the research on the impacts of the sociality of green advertising on the psychological mechanisms underlying consumer adoption of new green products. Additionally, we provide managerial recommendations for the future development of green newsfeed advertising and for improvements in consumer impressions of green consumption.

Keywords: green newsfeed advertising, sociality, receptivity to green advertising, green involvement, adoption of new green products

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INTRODUCTION

In the era of mobile internet, the traditional vertical communication paradigm, which is dominated by enterprises, is fading. More enterprises have begun to adopt a horizontal communication paradigm, which is customer-centric and more applicable to consumption scenarios that involve mobile devices (Wollschlaeger et al., 2017). Newsfeed advertising has emerged during this historic moment, developed rapidly, and become the new driving force behind product promotion for many enterprises (Grewal et al., 2016). Newsfeed advertising is advertising embedded within the information that streams over media platforms. Moreover, newsfeed advertising can be mutually integrated into the platforms (nativity), be presented line by line according to the presentation mode of the platform (dynamism), and support consumer participation (sociality; Huang Minxue, 2019). With the development of Web 2.0,

the interactions between users have become the center of attention; the social relationships among consumers have a more significant impact on those consumers' psychology and behavior than does direct advertising (Lambrecht et al., 2018).

To promote environmentally friendly consumption, many enterprises engage in newsfeed advertising on social media platforms, such as social communication platforms (e.g., WeChat Moments, Weibo), news streaming platforms (e.g., Jinri Toutiao) and short video streaming platforms (e.g., TikTok). The rapid increase in newsfeed advertising on these platforms has been particularly prominent. In addition, newsfeed advertising on the aforementioned platforms conforms to consumer preferences for advertisements given the trend toward more community access, more decision scenarios, and increased behavior fragmentation in the mobile internet era (Martins et al., 2018). The interactive and sharing features of social media platforms increase the willingness of intuitive consumers to build emotional links with others. Furthermore, the sociality of newsfeed advertising on social media platforms can encourage consumers to interact with and propagate information. Proposed by social presence theory, social presence refers to one's awareness of the existence of the peer and "real ego" when sharing information through social media (Slater and Wilbur, 1997). Social presence can generate a surrounding with warmth and ample interpersonal relationships. The sense of warmth can be perceived by perception of sociality. The sociality of newsfeed advertising facilitates human-computer interaction; meanwhile, users can feel a sense of co-existence when involving in interaction, and generate a sense of warmth (Short et al., 1976; Hassanein et al., 2007). Different from traditional advertising, green advertising can often generate a warm atmosphere. Therefore, compared with traditional newsfeed advertising, green advertising is more able to exhibit the sociality of newsfeed advertising (Luo et al., 2020). At the same time, consumers' behaviors, such as "like," "comment" and "forward," can enhance the sociality of the contents while obscuring transaction attributes, assisting consumers with social relationship construction (He et al., 2018). Compared with traditional advertising, green advertising is more able to fade transaction attributes while presenting the sociality of newsfeed advertising. Previous studies on online green advertising have mainly focused on several-on-one interactions between users and the green advertising, not on online interactions among users who have all viewed the same green advertisement (Liu, 2014; Todri-Adamopoulos and Ghose, 2016). Previous literature on green advertising has investigated the determinants of consumer reactions to green advertisements, such as advertising appeal (Chang et al., 2015; Yang et al., 2015) and target Audience (Leonidou and Hultman, 2011), or has pointed out that the views or expectations expressed by others can affect user reactions to green advertising. However, all these papers simply regard users as the objects of social behaviors; they do not regard users as the initiators of social interactions. Current information streaming media platforms and newsfeed advertisements can be further shared by making it possible for consumers to interact with others (Li and Wang, 2014; Lambrecht et al., 2018). To date, previous research on sociality has focused on information systems (Karel Kreijns, 2007), online communities (Preece, 2001) and virtual worlds (Animesh et al., 2011; Junglas et al., 2013). However, researchers have largely ignored the problems related to the sociality of advertisements, the impacts of green newsfeed advertising on consumers' green consumption behavior should be examined by scholars. Petty et al. (1983) put forward two routes for changing attitudes, which is referred to as elaboration likelihood model. The two routes can explain the difference of consumers' decision making by identifying consumers' involvement. Specifically, compared with consumers with peripheral routes, consumers with central routes pay more attention to information, and conduct comprehensive analysis, consideration, evaluation and induction, which further alters their decision-making behaviors. Thus, consumers with different involvement have different evaluations of green advertising; this is why consumers with different involvement have different reactions and have diverse purchase decision making. Consumers with high involvement have higher degrees of cognition to green information or green products, and thus they identify and appreciate them. On the contrary, since consumers with low involvement have lower degrees of cognition to green information or green products, they often hold dismissive attitudes (Rahman, 2017).

Based on the literature above, we intend to explore the sociality aspect of green newsfeed advertising and its effects on consumers. More specifically, this study aims to answer the research questions as follows: (1) Does the sociality of green newsfeed ads influence consumers' adoption of new green products? (2) What is the influence mechanism of sociality of green newsfeed ads on consumers' adoption of new green products? (3) What are the boundary conditions of the above influence mechanism? The goal of this study is to examine the relationships among sociality, receptivity to green advertising, and adoption of green products, based on the Theory of social presence (Short et al., 1976) and elaboration likelihood model (Petty et al., 1983).

In our paper, we propose the sociality of green newsfeed advertising as a mechanism that influences consumer adoption of new green products, and green involvement as a factor that mediates it. Specifically, consumers extensively adopt green products when confronting green newsfeed advertisements with a high degree of sociality; receptivity to green advertising drives the psychological adoption of new green products. In addition, consumer satisfaction with social impulses on social media platforms makes them more accepting of green advertising. When facing green newsfeed advertising with a high degree of sociality, consumers are more receptive to green advertising, which further positively affects their adoption of new green products. However, individuals with different levels of green involvement have different levels of knowledge related to greenness. Thus, consumers participate to different degrees in terms of the sociality of green newsfeed advertising, which impacts their receptivity to green advertising and their real green consumption behavior. We conducted a survey and a quasi-experiment to verify our theory and hypothesis.

The contributions of this paper are threefold. First, the different characteristics of newsfeed advertising have significant impacts on advertisement sharing and willingness to purchase (Lee and Labroo, 2004; Polatidis and Georgiadis, 2015). Based on the theory of social presence, the warmth created by social presence is reflected as one of the characteristics of newsfeed ads: sociality. We extend the related literature to green newsfeed advertising and explore the influence mechanism of sociality of green newsfeed advertising on consumer adoption of new green products. Second, receptivity to green advertising is a precondition for green advertising to impact consumer attitudes and willingness to purchase. We investigate the factors that predispose consumers to be receptive to green advertising in terms of sociality. Third, based on Elm theory, green advertising involvement is proposed in the context of green consumption, we verify the mediating effect of green involvement and untangle the boundary conditions for the adoption of new green products. Advertisers and social media platforms can provide technical support to target users and promote interactions among users. Our paper also helps managers gain insights regarding how to realize the value of new green products by promoting the propagation and popularization of green consumption behaviors.

LITERATURE REVIEW

Green Newsfeed Advertising

Green advertising refers to advertisements that typically emphasize the overall environmental benefits associated with the purchase of a specific product, such as reducing greenhouse gas emissions, reducing water pollution, and promoting biological integration (Nyilasy et al., 2014). The theme of green newsfeed advertising is a focus on environmental protection and human health, delivering environmentally friendly messages to and instilling green values in consumers. As the internet has rapidly advanced, many enterprises have chosen to place green advertisements on social media websites, including Facebook, Weibo, WeChat, Wiki, and multimedia sharing websites (e.g., YouTube, TikTok, and Kuaishou). Newsfeed advertising is one of the most effective forms of advertising in the social media environment. Compared with other forms of advertising, newsfeed advertising is considered to be highly effective with a low level of invasiveness (Fulgoni and Lipsman, 2014). An important promotional activity for enterprises is to advertise green consumption behaviors through newsfeed advertising on social media platforms. Well-designed newsfeed advertisements can boost the reliability of green products, promote those green products, extend the market for them and improve brand image.

Iyer and Banerjee (1993) is the earliest work that analyzes green printing advertising. In this study, they first introduce a framework to analyze green advertising, and then analyze samples of green advertising based on this framework. Zinkhan and Carlson (1995) discuss green consumers hold negative attitudes to business, and they are highly likely to possess a negative impression to advertising industry. Some researchers point out that the claims in advertising can affect its credibility. Compared with abstract claims in advertising, specific claims can improve the credibility and memory of information into a higher level (Alniacik and Yilmaz, 2012). This is mainly because consumers do not doubt advertising claims in most cases, and they can easily verify objective and specific information rather than abstract claims. Davis (1993) study the contents of a claim based on an abstract advertising of a shampoo. This study shows that compared with non-specific advertising claims, the specific advertising claims that state environmental benefits can generate significant favorable attitudes and higher willingness to purchase. Yang et al. (2015) find that, when green advertising emphasizes more on altruism, compared with specific advertising claims, abstract advertising claims can intensively improve green consumers' willingness to purchase. Kim et al. (2021) explore optimized social advertising strategies that can generate consumer engagement with green messages on social media. They investigate the effect of claims' specification and interest appeal on consumers' degree of involvement on social platforms and show that consumers' degree of self-structural moderates the interaction effect of claim specificity and benefit appeals type on consumers' degree of involvement.

Existing research on green advertising has mainly focused on the effect of environmental involvement, self-construction and directional control on green newsfeed advertising, respectively (Chang et al., 2015; Yang et al., 2015; Kim et al., 2021). However, it is still necessary to investigate the effect of green newsfeed advertising on consumers' psychology and behavior through empirical methods. Research has proven that, the major characteristics of newsfeed advertising, such as original nature, sociability and dynamics, are significant influencing factors of advertising results. Thus, we will further investigate the boundary conditions and internal mechanisms of how green newsfeed advertising influences consumers' willingness to purchase green products from the perspective of the characteristics of green advertising.

Social Presence Theory and Perceived Sociality of Advertising

Social presence, according to Short et al. (1976), refers to the prominence of the opposite when contacting and the prominence of interpersonal relationships brought by the former. This concept is mainly about the relationships between partners and mutual perception when communicating through computers (Gunawardena and Zittle, 1997; Tu and Mcisaac, 2002). Based on Biocca et al. (2003), Shen and Khalifa (2008) define social presence as the awareness of other living people, accompanying the participation of emotion and perception in the social space mediated by computers. According to social presence theory, social presence is the constant awareness of the coexistence of others and the perception of participating in their interactions (Junglas et al., 2013). Traditional advertising, such as banner advertising, does not allow receivers to engage in verbal or nonverbal communication with each other, and thus individuals cannot generate a sense of coexistence. Social presence theory has shown that the interactions between users and information systems can generate a sense of warmth, which is closely correlated with the sense of coexistence, and social perceptions

can reflect this feeling. Social presence theory has shown that a sense of warmness can be generated during the interaction between users and information systems. Sociality refers to the degree of generation of social spaces promoted by computer-mediated communication environment though the allowance of social support (Junglas et al., 2013). Traditional online display advertising can be frequently seen on information portals which issue different information, conducting transmission in one-way and one-to-many methods. The designers of traditional online display advertising consider that the audiences are relatively independent, and mainly take the direct effect of audiences' awareness and memory into consideration (Goldfarb and Tucker, 2011). However, consumers no longer receive messages passively in the social media era; instead, they voluntarily participate in the interaction and transmission of messages (Akpinar and Berger, 2016). Many research has shown that the effect of consumers' social relationships on consumers' psychology and behavior is more significant than the direct persuasion of advertising. The more frequently consumers interact with others with regard to advertising, the more easily they generate self-identity and resonance to the brand promoted by the advertising. This facilitates brand image building and brand value transmission. Compared with clicks on advertising, consumers' social behaviors such as like, comment and forward have more long-term significance (Ljungberg et al., 2017). Socialized transmission can enhance the social characteristic of the contents while obscuring the transaction characteristic, helping the social-relationship construction of consumers. This benefits the brand value construction and brand reputation transmission (He et al., 2018). Embedded in social communication media platforms, newsfeed advertising is endowed with sociality features. Through like, comment and forward, more consumers participate in the transmission of advertising (Lambrecht et al., 2018). For instance, on social communication media platforms such as Facebook, Weibo, and WeChat, the involvement of newsfeed advertising can be improved by intuitive and humor advertising.

Based on previous studies and motivated by the application of the interaction features of newsfeed advertising in reality, we define the sociality of newsfeed advertising as the interaction with other users through newsfeed advertising, thereby satisfying users' social motivations.

At present, many researchers are still exploring the effect of the sociality of green newsfeed advertising on consumers' green purchase behaviors. According to the extant research, the sociality of green newsfeed advertising can influence consumers' sharing behavior, attitudes and comments as well as willingness to purchase. Thus, this study will investigate the effect of the sociality of green newsfeed advertising on consumers' attitude and willingness to purchase.

Receptivity of Green Advertising

Green advertising receptivity refers to the degree to which green newsfeed advertising is received on social media platforms (Bailey et al., 2016). The receptivity of advertising measures the effectiveness of the advertisement, including the exposure rate and content design. Previous research has revealed that green advertising affects consumer consumption tendencies, generating willingness to purchase among consumers. Green advertising promotes information about green energy-saving products to consumers through television channels, Weibo and Tik Tok (Zhang et al., 2019). When exposed to green advertising on social media platforms, consumers' perceptions of and judgments about green advertising affect their attitudes toward green advertising and their beliefs about green brands or green products (Bailey et al., 2016). Existing studies have shown that receptivity to green advertising is a precondition for environmentally friendly advertising, information or sales promotion activities to influence consumer attitudes and willingness to pay. Sun et al. (2020) integrate models of the impacts of receptivity to green newsfeed advertisements on consumer willingness to purchase. They also examine the moderating effect of regulatory focus.

Although green advertising on social media platforms promotes environmental purchases, consumers do not make such purchases immediately after viewing green advertisements. Moreover, receptivity to green advertising varies from person to person. Previous literature has shown that there are individual differences in the effect of advertising appeals across consumers (Schuhwerk and Hagius, 2013). Tucker et al. (2012) illustrate how individual characteristics possibly affect consumers' receptivity to the claims promoted by environment-themed advertising. The experiment compares the promotion strategy between strong green product claims and weak green product claims. The results show that consumers who have a positive attitude to environmental protection can also accept all conditions.

According to existing research, consumers' receptivity of green advertising can essentially affect their psychological activities and decision-making behaviors. Thus, this paper will investigate the effects of the sociality of green advertising on consumers' willingness to pay in the social-media background; meanwhile, we conduct the analysis by regarding the receptivity of green advertising as a mediating mechanism.

Adoption of New Green Products

The adoption of new green products refers to consumers' willingness and decision to purchase environmentally friendly products. Previous literature has studied how promotion activities on social media platforms influence consumers' green purchase behaviors. Some researchers point out that social media marketing has a significant positive impact on consumers' willingness to purchase (Froehlich, 2009; Hynes et al., 2016). However, few researchers show that social media marketing influences consumers' willingness to purchase green products only by some mediating factors (Dopaço et al., 2018).

Social media allows users to communicate with people who possess similar interests. Social media marketing benefits advertisers since consumers choose to communicate with people who have similar lifestyles on social media platforms (Lee et al. 2018). Marketing personnel can search for sustainable consumer groups through social media platforms and recommend green products to them. Furthermore, social media facilitates the generation and transmission of information (Lee et al. 2018). Users can release and share their original contents and viewpoints on social media platforms. Thus, it can be an

opportunity for enterprises to generate online marketing strategies through social media marketing. This is because consumers acquire information through social media platforms, and make purchase decisions based on the acquired information. Moreover, because of users' personal characteristics (e.g., interaction, social networks, and personal relationships), social media marketing is a reliable advertising tool. Researchers have shown that social media marketing has a great impact on consumers' willingness to purchase (Froehlich, 2009; Hynes et al., 2016).

Existing studies have emphasized the importance of social media platforms to consumers' adoption of green products. Our paper contributes to literature by analyzing how green newsfeed advertising improves consumers' receptivity of green advertising and further influences their adoption of green products.

Elaboration Likelihood Model and Green Involvement

In elaboration likelihood model, Petty et al. (1983) consider the difference between the degree of individual's information refinement and cognitive input; moreover, there are two routes of information processing, that are, central route and peripheral route. ELM theory points out that the change of individual information processing way or attitude can be divided into central route and peripheral route for explaining consumers' information processing behavior. Based on information receivers' input degree is different: the central route has a more intensive control desire of information, and often spends more energy and time deeply analyzing and comprehending information; peripheral route does not focus much on information, and only needs to spend less energy and time understanding peripheral hints. Rokon U Zzaman et al. (2020) find that consumers will be affected by involvement when searching for shopping information and judging and analyzing relevant information. Based on ELM theory, under green consumption scenarios, green involvement reflects consumers' concerns about the input of green advertising or green products as well as concerns about information on environmental protection. Obviously, consumers with high green involvement are driven by central routes, while consumers with low green involvement are powered by peripheral routes.

Different individuals have different concerns about specific green advertisements or green products; i.e., consumers participate in specific activities to different degrees. These differences affect the psychological status and behaviors of an individual. Sheng et al. (2020) study the effects of genres of green products, appeals of green advertising and impression management incentives on intention to purchase green products based on ELM theory. Souza and Taghian (2005) show that consumers who have high levels of green involvement are willing to believe information about green products, which can further generate positive attitudes toward green products. Some studies have shown that information about environmental protection has a more positive impact on consumers who have high levels of green involvement, while consumers who have low levels of green involvement do not pay much attention to such information (Martin and Timothy., 2013). However, some research has drawn inconsistent conclusions. Schuhwerk and Hagius (2013) find that there are no differences in the purchase decisions of consumers with high levels of green involvement. However, for consumers with low levels of green involvement, there are significant differences. Compared with information about nongreen products, information about green products has a more positive impact on consumers' purchase decisions. Vlieger et al. (2013) find that consumer beliefs about the credibility of information on green products has a negative impact on their green involvement; i.e., higher levels of green involvement lead to lower perceptions of credibility.

Batra and Ray (1986) show that when faced with green advertising, consumers' green involvement affects the effectiveness of green appeals. Compared with consumers with low levels of green involvement, consumers with high levels of green involvement have more positive attitudes toward green advertisements. Matthes et al. (2014) find that green involvement impacts the publicity of green advertising and that green involvement has a significant impact on consumer attitudes toward brands and on their purchase decisions. Xu et al. (2015) find that the decision-making process for consumers with high levels of green involvement is much more complicated than that for consumers with low levels of green involvement. These two segments have different reactions to information and have different levels of receptivity. Souza and Taghian (2005) find that green involvement can affect the impact of advertising appeals on attitudes toward advertisements and perceived value. Consumers with low levels of green involvement are more inclined to ignore green appeals.

This study investigates whether individuals' different green involvement has different impacts on the relationship between the sociality of green newsfeed advertising, receptivity of green advertising, and adoption of green new product based on ELM theory. Therefore, we mainly focus on discussing how green newsfeed advertising influences consumers' receptivity of green advertising and willingness to purchase given different green involvement.

Summary

First, the existing literature on newsfeed advertising has mainly focused on the effects of characteristics (Fan et al., 2018), mechanisms (Wojdynski and Evans, 2016), and outcomes (Harms et al., 2017). However, very few researchers have focused on the psychological and behavioral mechanisms underlying newsfeed advertising. Our paper focuses on newsfeed advertising and investigates the mechanisms by which it affects consumer behavior based on the theory of social presence.

Second, regarding the characteristics of newsfeed advertising on social media platforms, the sociality of newsfeed advertising can decrease the negative perceptions of receivers to some extent and can affect consumer avoidance of advertising (Fan et al., 2018). Our paper further examines the effects of the sociality of newsfeed advertising on consumers.

Third, existing research has investigated the mechanisms by which green newsfeed advertising influences consumers' environmental purchase behaviors (Batra and Ray, 1986; Sun

et al., 2020). However, few researchers have regarded sales promotion activities on social media platforms as signals and stimuli that affect consumer cognition or investigated the mechanisms influencing environmental purchase behaviors. Based on this, our paper investigates the impact of green newsfeed advertising on consumer adoption of new green products in terms of the social media context. We adopt the concept of receptivity to green advertising and study the impacts of receptivity to green advertising on the adoption of new green products. Additionally, we consider the negative interaction effects of green involvement as well as receptivity to green advertising on the adoption of new products and investigate the psychological mechanisms underlying and boundaries on the adoption of new green products. This is a strong contribution to the existing literature.

CONCEPTUAL FRAMEWORK AND RESEARCH HYPOTHESIS

The Sociality of Green Newsfeed Advertising and the Adoption of New Green Products

According to social presence theory, social presence refers to the extent to which an entity is perceived as a "real person" and the perceived level of connection with others during the process of using media to communicate (Hassanein et al., 2007). An environment with high social presence makes people more inclined to connect with others rather than ignore them. Hassanein and Head (2004) showed that the inclusion of elements required for customer social interactions in a website can enhance customers' sense of social presence, thus improving perceived usefulness, trust and pleasure, and thus consumers' desire to buy. The perceived sociality of infomercial green ads can reflect this sense of social presence.

In the context of social network, the sociality of green newsfeed advertising is mainly reflected in that users themselves are not only the receiver of green advertising, but also the disseminator of green advertising. Through this communication process, they form social contacts with other users, enhance social communication and enhance consumers' green products adoption. Buttons such as "like," "comment" and "forward" are displayed below the green newsfeed advertising. Thus, users can publish and share their original content and views on social media, or infer the views of other audiences on the green ads through these indicators, so as to improve users' perception of the sociality of such ads, so as to enhance consumers' purchase desire.

Social media marketing is an opportunity for enterprises to formulate online marketing strategies, because consumers can obtain information through social media and then make purchase decisions based on the information. Therefore, in the face of the sociality of green newsfeed ads, the individual's cognition of green products or green behavior may be clearer in the social situation, and produce a sense of belonging in the process of communicating with other users, which will induce the diffusion behavior and green purchase behavior of green advertising.

Combining the above analysis, we propose the following hypothesis:

> *H1*: The sociality of green newsfeed advertising has a positive impact on the adoption of new green products.

The Mediating Effect of Receptivity to Green Advertising

Green newsfeed ads contain not only information related to green products or brands but also messages left by the green ad audience, such as user comments. The number of likes, shares and audience responses can be used as indicators to evaluate the perceived value of the green ads to others and their influence over other audience members' perceptions of these green ads. Sociality allows for direct verbal and nonverbal communication between audiences. According to social presence theory, sociality can create a sense of warmth among users (Cheikhammar and Barki, 2014) while also enhancing their perceived pleasure and creating a sense of close belonging among individuals (Karel Kreijns, 2007). Green newsfeed ads support social interactions among users through functions such as liking, sharing and replying, thus satisfying users' social impulses to a certain extent and improving their experience; therefore, the sociality of green social media newsfeed ads can reduce the audience's negative perceptions of green ads and improve their green ad receptivity to a certain extent.

When consumers are exposed to green ads on social media, they experience certain feelings and form certain judgments, which influence their attitudes toward the green ads themselves and their beliefs about green brands or green products (Bailey et al., 2016). Green advertising can enhance consumers' understanding of green products, promote green products, and increase their willingness to purchase green products. When consumers choose a product by excluding alternatives, they place more emphasis on green attributes (Irwin and Naylor, 2009). When consumers are aware of the green attributes of products due to green advertisements, they are more likely to purchase those products (Hartmann and Apaolaza-Ibanez, 2013). Previous studies have shown that green advertising aims to influence consumers' purchasing behavior by encouraging them to purchase products with green labels and making them aware of the positive effects of their purchases on themselves and the environment (Rahbar and Wahid, 2011). Therefore, the higher the consumer's receptivity to green advertising, the higher their understanding of green products may be and the higher their willingness to purchase green products (Chang et al., 2015).

From the above analysis, we propose the following hypothesis:

> *H2*: Green advertising receptivity mediates the relationship between the sociality of green newsfeed ads and the adoption of new green products.

Green Involvement as a Moderator

The elaboration likelihood model proposed by Petty et al. (1983) pointed out that when target users process the information content of advertisements, their investment level will affect their attitudes towards advertisements and brands. Using ELM model to process information is related to the time and experience invested. When there is time and energy to process information finely, consumers will process information through the central route; Individuals who lack time or energy tend to process information through peripheral route. The level of involvement reflects the degree of individual participation in processing information. The higher the level of involvement, the higher the degree of participation in processing information, and will tend to process information more elaborate.

Green involvement can influence the attention consumers give to green products, and it is an important factor to consider when studying the intention to purchase green products. Consumers with high levels of green involvement are willing to collect more descriptive information on product characteristics and conduct detailed and specific analyses. The communication among users in green newsfeed advertising can help consumers understand the information related to green characteristics and make more comprehensive judgments. Therefore, green involvement can improve consumer receptivity to green advertising and promote consumers' intentions to make green purchases. In contrast, for consumers who do not know much about green products, the interactions among users of green advertising are not attractive and may even cause consumers to perceive target obstacles and advertising clustering, resulting in advertisement avoidance. Therefore, due to the different levels of green involvement among consumers, this interaction can have an impact on consumers' receptivity to green advertising and their green purchase intentions (Chebat and Picard, 1985). Therefore, for consumers with a high level of green involvement, the positive effect of the sociality of green newsfeed advertising on receptivity to green advertising is enhanced; for consumers with a low level of green involvement, the positive effect of the sociality of green newsfeed advertising is weakened.

Existing research has shown that green information has a more positive impact on consumers with high levels of green involvement, while consumers with low levels of green involvement pay less attention to green product information (Chebat and Picard, 1985). Consumers with high levels of involvement are more willing to actively participate in green newsfeed ad interactions to evaluate the product and thus make decisions. Consumers' own understanding of products affects their decision-making, and consumers who are more informed about green products are less likely to believe a firm's one-sided green advertising. Low-involvement consumers invest less attention to the information related to green advertising and know less about green products. Consumer evaluations of green advertising and the receipt of more product information through green newsfeed advertising hinder the fluency of information processing (Lee and Labroo, 2004) and affect users' green purchase intentions. Therefore, the sociality of green newsfeed ads is more effective among consumers with high levels of green involvement, while the positive effect of the sociality of green newsfeed ads is diminished at low levels of green involvement.

Combining the above analysis, we propose the following hypotheses:

H3: The degree of a consumer's green involvement moderates the relationship between the sociability of green newsfeed advertising and the adoption of new green products.
H3a: The positive impact of the sociability of green newsfeed advertising on the adoption of new green products is stronger among consumers with high levels of green involvement.
H3b: The positive impact of the sociability of green newsfeed advertising on the adoption of new green products is weaker among consumers with low levels of green involvement.
H4: The degree of a consumer's green involvement moderates the relationship between the sociability of green newsfeed advertising and consumer receptivity to green advertising.
H4a: The positive impact of the sociability of green newsfeed advertising on consumer receptivity to green advertising is stronger among consumers with high levels of green involvement.
H4b: The positive impact of the sociability of green newsfeed advertising on consumer receptivity to green advertising is weaker among consumers with low levels of green involvement.

Conceptual Model

A majority of information streaming media platforms such as WeChat, Tik Tok stimulate consumers to actively participate in advertising interaction and actively carry out the secondary dissemination of advertising through the sociality of newsfeed advertising. Our study explores factors that influence Adoption of New Green Products. The research model proposed in this study is shown in **Figure 1**. Based on the theory of social presence and the related research of green advertising, social presence is defined by social psychology. Social presence pays attention to the social attributes such as interaction or communication, and regards them as a sense of warmth. The sociality of newsfeed advertising can reflect the aforementioned sense of warmth, satisfy consumers' needs for communication by interactive features of newsfeed advertising, and improve consumers' willingness to use green products by perfecting their advertising experience. Sociality will positively affect the receptivity of green newsfeed ads, and then affect the adoption of new green products by consumers. In the ELM theory, motivation and ability are the key factors that influence the elaboration likelihood by information receivers, with the central route usually being used when motivation is stronger and the peripheral route conversely. Motivation consists of three factors: involvement, variety of arguments, and individual cognitive needs. Studies have shown that the higher the level of involvement, the stronger the motivation to process the information (Krugman, 1965), consumers are more willing to

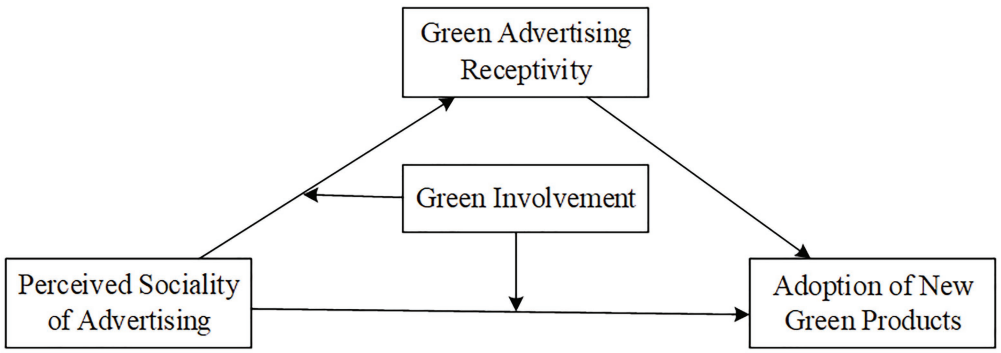


FIGURE 1 | Conceptual model.

engage with the social features of green newsfeed ads, which in turn influences their attitudes and behaviors toward green ads and green products. Therefore, in the case of high involvement, the interaction of involvement and sociality will have an impact on green product adoption and green ad receptivity. So green advertising involvement will play a moderate role.

Based on the discussion above, the conceptual model of this study can be built as shown in **Figure 1**.

STUDY 1

Participants, Procedure and Measures

One hundred forty students from a school in Guangxi were invited to participate in this study. Of those students, 68 were male, and 72 were female ($M_{age} = 25.53$, $SD = 5.139$).

Study 1 had a one-way (sociality of green newsfeed advertising: high vs. low) between-subject design. The participants were randomly divided into two groups (high vs. low). There were 70 participants in each of the two groups. To better motivate the participants to complete the experiment, the participants who participated seriously in the experiment received a reward of 3 RMB each.

China has the most social media users in the world. In China, social media are classified into microblogging sites (e.g., microblogs and blogs), social networking sites (e.g., QQ and WeChat), video and photo sharing sites (e.g., TikTok and Kwai), and community exchange sites (e.g., Post Bar and Zhihu). Since the experimental participants are school students who are familiar with microblogs, which support interactions among users and their nonsocial media friends, Sina Weibo was chosen as the social platform on which the infomercial was distributed in this experiment.

Participants in the highly social green newsfeed ad group read a green ad on Weibo with the ability to like, retweet and comment. The green newsfeed ad was in the same format as the native Weibo content, with only the word "ad" in the upper right corner, and advertised a product made from recycled materials. The number of likes, retweets, and consumer comments on the green ad, as well as the interactions among consumers, were displayed below the ad. Participants in the nonsocial green newsfeed ad group read a green ad without the ability to like, retweet, or comment; in all other ways, the form and content of the green ad were the same as those of the highly social green newsfeed ad. Participants in both groups were presented with textual materials explaining the concepts of green infomercial advertising and green advertising.

After reading the materials, the participants completed a questionnaire on the sociality of green newsfeed ads, receptivity to green ad and the adoption of new green products. Finally, participants were asked to fill in their demographic information such as gender and age. All items were assessed using a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). We used SPSS 26.0 to conduct exploratory factor analysis on the data of each variable. The results showed that the factor load of all variable measurement indicators was greater than 0.700, the eigenvalue was greater than 1, the Cronbach's α value for the green newsfeed ad sociality scale (Han and Drumwright, 2017) was 0.867, the Cronbach's α value for the new green product adoption scale (Sun et al., 2018) was 0.931, and the Cronbach's α for the green ad receptivity scale (Paço and Reis, 2012) was 0.878. the Cronbach's a value of each variable was more than 0.867, and the KMO coefficient was more than 0.775, indicating that the measured variables had high reliability and validity and were suitable for formal experiments.

Analysis and Results

Manipulation Test

To test the success of the manipulation of the sociality of the green newsfeed ads, we conducted an independent sample t-test on the perceived sociality scores of the participants in the presence of social and nonsocial green newsfeed ad group. The results show that there was a significant difference in the level of perceived sociality scores between the low-sociality ad ($M_{low\text{-}sociality} = 4.42$, $SD = 0.93$) and the high-sociality ad ($M_{high\text{-}sociality} = 5.28$, $SD = 0.89$), $t(60) = -5.58$, $p < 0.001$. These results were consistent with expectations, suggesting that the manipulation of the advertising claims was successful.

Hypothesis Testing

The results of the one-way ANOVA indicated that the high-sociality group was significantly more receptive to the green

ad than the low-sociality group [$M_{high\text{-}sociality} = 5.62$, $M_{low\text{-}sociality} = 4.72$, $F(1, 138) = 30.38$, $p < 0.001$]. In addition, the high-sociality group participants had significantly lower scores on the adoption of new green products scale than the low-sociality group [$M_{high\text{-}sociality} = 5.74$, $M_{low\text{-}sociality} = 4.86$, $F(1, 138) = 34.66$, $p < 0.001$].

Next, referring to mediation analysis model (Model 4), using the bootstrapping method to test the mediation model (Preacher et al., 2007; Hayes, 2013). As shown in **Table 1**, the total effect of the sociality of green newsfeed ads on consumer adoption of new green products was significant (0.58, 1.16), and the effect size was 0.87. The mediating effect of receptivity to green ads was significant (LLCI = 0.40, ULCI = 0.89, excluding 0), and the mediating effect was 0.63. In addition, the sociality of the green newsfeed ads (high vs. low) had a significant effect on the adoption of new green products after controlling for receptivity to green ads (LLCI = 0.02, ULCI = 0.03, excluding 0), and the effect size was 0.24. The direct effect (0.24) and mediating effect (0.63) accounted for 27.61 and 72.39% of the total effect (0.87), respectively. Green ad receptivity partially mediated the relationship between the sociality of green newsfeed ads and the adoption of new green products.

Discussion

In Study 1, two green newsfeed ads with different levels of sociality promoting recycled items were presented to the participants, preliminarily demonstrating that the effects on consumer adoption of new green products varied with the sociality of the green newsfeed ads. The results show that the two groups had significantly different intentions to adopt new green products and that consumers had a higher willingness to adopt new green products when facing green newsfeed advertisements with high levels of sociality. The direct effect of the sociality of the green newsfeed ads on consumer adoption of new green products was significant, consistent with H1. In addition, we explored the mechanism by which the sociality of green newsfeed ads influenced the adoption of new green products. The differences in perceived sociality (high vs. low) affected the participants' receptivity to the green ad, which affected their adoption of the new green product. The results showed that, compared with ads with low levels of sociality, highly social green newsfeed ads lead consumers to become more receptive to green ads and thus result in increased consumer intentions to adopt green products, which confirmed that green ad receptivity plays a partially mediating role in the relationship between the sociality of green newsfeed ads and consumer adoption of new green products. Hypothesis H2 is verified. Next, using a questionnaire, Study 2 used a phosphate-free detergent as the subject of green advertising to verify the direct and partial mediating effects and to further verify whether the above influencing mechanism is moderated by green involvement.

TABLE 1 | Total effects, direct effects and mediating effects.

	Effect	Boot SE	Boot LLCI	Boot ULCI	Relative effect
Total effect	0.87	0.15	0.58	1.16	
Direct effect	0.24	0.10	0.02	0.03	27.61%
Mediating effect	0.63	0.13	0.40	0.89	72.39%

STUDY 2

Sample and Data Collection

This study used a questionnaire to collect data from Chinese consumers to test the research hypotheses. The online questionnaire was posted on Wenjuanxin,[1] a platform that provides functions equivalent to Amazon Mechanical Turk, from July 15 to August 15, 2021 and was forwarded inside social media platforms such as Weibo, WeChat and QQ. The questionnaire shows a green advertisement based on the newsfeed ads on Sina Weibo; the ad focused on a phosphate-free detergent. The newsfeed ad included the functions of liking, retweeting and commenting to facilitate consumer interactions, with the number of likes, retweets and consumer reviews of the green ad and product, as well as the interactive content between consumers, on display below the advertisement. This study also contained the same explanatory text about green newsfeed advertising and green advertising as in Study 1. The green involvement scale used was Zaichkowsky (1985) scale, and the other variable scales were the same as in Study 1, with a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree) for all question items. The Cronbach's α value for green involvement was 0.852.

One hundred adult social media users volunteered to participate in the online study in exchange for 3 RMB. A total of 100 questionnaires were received from 55 males and 45 females ($M_{age} = 24.98$, $SD = 5.28$).

Measurement Model and Analysis

This study used R 4.0 and SPSS 26.0 to analyze the data. The results of the confirmatory factor analysis (CFA) for the overall fit indices for the measurement model were as follows: $\chi^2/df = 1.69$, $p < 0.001$, CFI = 0.94, TLI = 0.92, IFI = 0.94, PNFI = 0.71, and RMSEA = 0.08. These results indicate that the fit of the measurement model met the threshold values. The reliability and validity statistics are shown in **Tables 2** and **3**.

In addition, all of the constructs in this study had good discriminant validity, as the correlation coefficient between each pair of constructs was smaller than the square root of the AVE values of the two constructs (Fornell and Larcker, 1981). These results provide strong support for the adequacy of the reliability, convergent validity, and discriminant validity of the constructs.

Since this study used single-source data, it was necessary to check for common method bias (CMB). We used the method proposed by (Harman, 1976), and the results showed that the variance explained by the first principal component was 32% of the total cumulative variance, which is less than 50%, basically indicating that there is no serious common method bias. Additionally, the variance inflation factors of all predictor

[1]https://www.sojump.com/

variables were tested and found to be no higher than 1.446, so there is no serious problem with multicollinearity.

Moderating Effect Test

An ANOVA was conducted with the adoption of new green products as the dependent variable. The results showed that the sociality of the green newsfeed ad [$F(1, 96) = 18.40$, $p < 0.001$, $\eta^2 = 0.16$] and its interaction with green involvement [$F(1, 96) = 6.94$, $p = 0.01$, $\eta^2 = 0.07$] were significant, as was the main effect of green involvement [$F(1, 96) = 5.20$, $p = 0.025 < 0.05$, $\eta^2 = 0.05$]. An ANOVA with receptivity to green ads as the dependent variable showed that the main effect of the sociality of green newsfeed ads [$F(1, 96) = 34.51$, $p < 0.001$, $\eta^2 = 0.26$] and its interaction with green involvement [$F(1, 96) = 8.81$, $p = 0.04$, $\eta^2 = 0.08$] were also significant and that the main effect of green involvement was not significant [$F(1, 96) = 3.05$, $p = 0.08 > 0.05$, $\eta^2 = 0.03$]. The mean values of the variables at different levels of green involvement are shown in **Figure 2**. **Figure 2** shows that the variation in both the mean values of receptivity to green advertising and the adoption of new green products are similar for different levels of green involvement.

Moderated Mediating Effect

There were no significant effects of gender, age, household income or education on the adoption of new green products. A moderated mediating model was established to test whether the direct and mediating effects of the sociality of green newsfeed ads on consumer adoption of new green products was moderated by the consumer's level of green involvement. As shown in **Table 4**, the sociality of green newsfeed ads had a significant effect on receptivity to the green ad ($\beta = 0.46$, $t = 6.61$, $p < 0.001$), which had a significant effect on new product adoption ($\beta = 0.33$, $t = 2.75$, $p < 0.01$). The interaction between green involvement and the sociality of green newsfeed ads had a significant effect on new product adoption ($\beta = 0.23$, $t = 2.68$, $p < 0.01$), and the interaction between green involvement and the sociality of news feed ads had a significant effect on receptivity to the green ad ($\beta = 0.26$, $t = 3.67$, $p < 0.001$).

Then, the mediation model (Model 8) was verified by using the same method used in Study 1(Hayes, 2013). As shown in **Table 5**, for high levels of green involvement, the direct effect of the sociality of green newsfeed ads on the adoption of new green products was significant (LLCI = 0.31, ULCI = 0.78, excluding 0) with an effect size of 0.54; the mediating effect of receptivity to the green ad on the relationship between the sociality of green newsfeed ads and the adoption of new green products was also significant (LLCI = 0.45, ULCI = 0.77, excluding 0), and its effect size was 0.61. For the low-sociality advertisement, the direct effect of the sociality of the green newsfeed ad on the adoption of new green products was not significant (LLCI = −0.02, ULCI = 0.41, including 0); the mediating effect of receptivity to the green ad was significant (LLCI = 0.06, ULCI = 0.41, excluding 0), and its effect size was 0.23. The results of the moderated mediation model verify H3 and H4.

TABLE 2 | Confirmatory factor analysis (CFA) results for the measurement model.

Construct	Item	Loading	Cronbach's α	Composite reliability	AVE
Sociality of Green Newsfeed Advertising	SGNA1	0.818	0.899	0.901	0.647
	SGNA2	0.821			
	SGNA3	0.759			
	SGNA4	0.840			
	SGNA5	0.767			
Receptivity to Green Advertising	GAR1	0.728	0.821	0.822	0.536
	GAR2	0.723			
	GAR3	0.732			
	GAR4	0.747			
Green Involvement	GI1	0.784	0.852	0.855	0.596
	GI2	0.770			
	GI3	0.739			
	GI4	0.802			
Adoption of New Green Products	GPA1	0.803	0.843	0.842	0.573
	GPA2	0.774			
	GPA3	0.745			
	GPA4	0.719			

Discussion

Study 2 verified the boundary conditions for the main effect of the sociality of green newsfeed ads on the adoption of new green products and the mediating effect of receptivity to green ads. The results reconfirmed that the sociality of green newsfeed ads significantly affect consumer adoption of new green products. Moreover, the sociality of green newsfeed ads affected consumer receptivity to those green ads, and receptivity to the green ads had a significantly positive effect on consumer adoption of the new green product (Li and Wang, 2014). Study 2 used a questionnaire to investigate how the positive effects of the sociality of newsfeed ads on receptivity to green ads and the adoption of new green products varied under different levels of green involvement. The results of the study show that when consumers report high levels of green involvement, the positive effect of green ad sociality on receptivity to green

TABLE 3 | Means, standard deviations (SDs), and correlations.

	Mean	SD	SGNA	GAR	GI	GPA
SGNA	5.475	0.892	0.804			
GAR	4.528	0.745	0.643**	0.732		
GI	2.694	0.736	−0.138	−0.174	0.772	
GPA	5.590	0.954	0.488**	−0.533**	−0.240*	0.757

*$p < 0.05$; **$p < 0.01$.

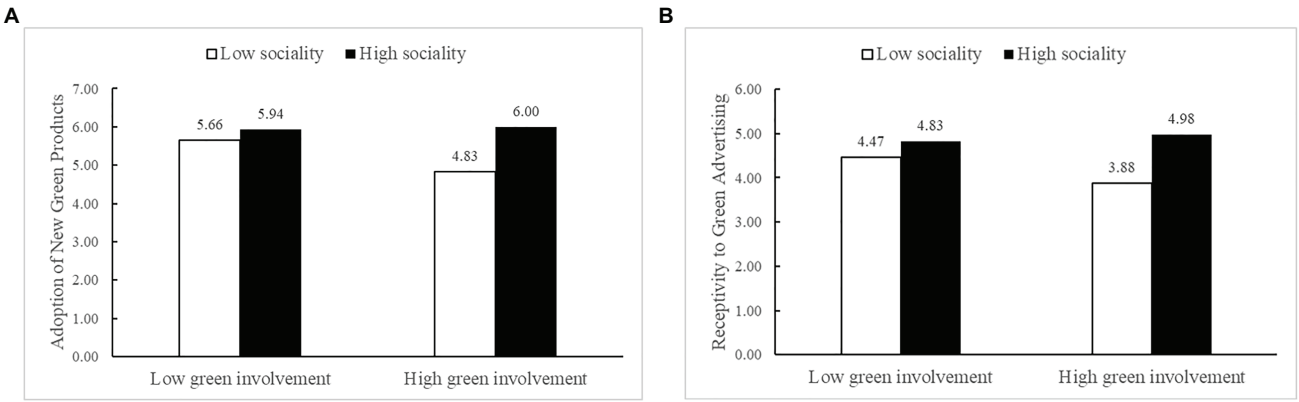


FIGURE 2 | Means of the variables at different levels of green involvement. **(A)** Means of the adoption of new green products at different levels of green involvement. **(B)** Means of the receptivity to green advertising at different levels of green involvement.

ads and on the adoption of new green products increased, while for consumers who reported low levels of green involvement, the positive effect of green ad sociality on receptivity to green ads and the adoption of new green products was alleviated. The level of green involvement moderates both the direct effect of green ad sociality on green product adoption and the mediating effect on receptivity to green ads, verifying H3 and H4.

GENERAL DISCUSSION

Research Conclusion

We investigated how the use of newsfeed technology in green advertising affects consumer adoption of new green products. Based on advertisements for two green products, a product made from recycled materials and a phosphate-free laundry detergent, we used a combination of experimental and survey methods to explore the mechanisms underlying and boundary conditions for the effect of the social attributes of green infomercial advertising on consumer adoption of new green products.

We captured user perceptions of the social attributes of newsfeed ads based on one of the technical characteristics of newsfeed ads: sociality (Lambrecht et al., 2018). The sociality of green newsfeed ads affects consumer adoption of new green products, and receptivity to green ads partially mediates this effect. Study 1 confirmed this direct effect and the partial mediation of receptivity to green ads. Through a questionnaire-based survey, Study 2 confirmed that the direct and mediating effects of receptivity to green ads on the sociality of green newsfeed ads and on the adoption of new green products are moderated by consumers' green involvement. High levels of green involvement enhance the positive effects of the sociality of the infomercial on receptivity to green ads and new green product adoption, while low levels of green involvement alleviate the positive effects of the sociality of newsfeed ads on receptivity to green ads and new green product adoption.

Theoretical Contributions

First, this study advances the empirical research on green newsfeed advertising and expands the scope of research on consumer adoption of new green products. Newsfeed ads on social media have their own unique characteristics: they are consistent with the native content in terms of form and function while meeting the need for interaction among users (Lee and Labroo, 2004; Polatidis and Georgiadis, 2015). In social presence theory, consumers obtain a sense of social presence through interactive functions when using social media, and this sense of social presence gives consumers a sense of warmth, which in this study is reflected in sociality. In this paper, the direct effect of the sociality of green newsfeed ads on the adoption of new green products is verified through experimental and survey methods.

Second, existing research has established different models for the mechanism by which receptivity to green ads influences the intention to purchase green products (Li and Wang, 2014; Sun et al., 2020), neglecting the study of the antecedent influences on receptivity to green ads in the context of social media. Therefore, this study extends the study of the influence of green ads on consumer adoption of new green products to newsfeed ads on social media, focusing on the social attributes of newsfeed ads and exploring the influence of the sociality of newsfeed ads on the adoption of new green products, thus theoretically and empirically exploring how the sociality of newsfeed ads affects consumers' green consumption behavior and verifying the effect of the sociality of newsfeed ads on the adoption of new green products. We also verify the mechanism underlying the effect of sociality on green product adoption.

Third, in the green marketing context, the ELM theory suggests that there are differences in the processing of green advertising messages and the formation of consumer attitudes, the different levels of attention given to green ads by consumers affect their psychology and their green consumption behaviors (Wang et al., 2018). In this study, levels of green involvement were introduced into the research framework to determine the boundary conditions for the effectiveness of the sociality of green newsfeed ads. The study found that green involvement among consumers moderates the effect of the sociality of

TABLE 4 | Moderated mediation model test.

	Receptivity to green advertising			Adoption of new green products		
	β	*se*	*t*	*β*	*se*	*t*
Sociability of Green Newsfeed Advertising	0.46	0.07	6.61***	0.37	0.09	3.94***
Green Involvement	−0.12	0.08	−1.44	−0.30	0.10	−3.13**
Receptivity to Green Advertising				0.33	0.12	2.75**
Sociability×Green Involvement	0.26	0.07	3.67***	0.23	0.09	2.68**
R-sq	0.41			0.50		
F	22.36			24.15		

$^{**}p<0.01$; $^{***}p<0.001$.

TABLE 5 | Mediating effect in different green involvement levels.

	Green involvement	Effect size	Boot SE	Boot LLCI	Boot ULCI
Direct effect	Low	0.20	0.11	−0.02	0.41
	High	0.54	0.12	0.31	0.78
Moderated mediating effect	Low	0.23	0.09	0.06	0.41
	High	0.61	0.08	0.45	0.77

newsfeed ads on receptivity to green ads and on new green product adoption, and the boundary conditions for the main effect and mediating mechanism were determined in order to build a more in-depth and clearer framework in the theoretical and applied fields.

Managerial Implications

Social advertising is a very effective form of advertising in which advertisers can provide social functions within their ads and benefit from spontaneous interactions among consumers. When launching newsfeed ads on social media, advertisers can choose social media platforms with full user-interaction features as their advertising platform to avoid the negative impacts of low sociality. Advertisers and social media providers should deepen their understanding of the traditional mechanisms underlying internet advertising and, on this basis, make better use of sociality in their green newsfeed ads to improve the user experience and enhance their competitiveness.

Enterprises should pay attention to the publicity of their green advertising. Publicity should be based on the consistency of the relationships among the attributes, values and characteristics of their green product, which will help to shape and strengthen consumers' feelings or ideas about that green product. In green advertisements, specific information should be transmitted instead of general information, such as information about the specific environmental benefits produced by the green products being advertised, as this is conducive to improving consumer receptivity to the green advertisements and enhancing consumer understanding of the green products.

Enterprises should also focus on targeting their marketing on social media to different consumer groups. On social media, more green product advertisements should be recommended to consumers with high levels of green involvement to stimulate their intention to make green purchases. For consumers with low levels of green involvement, enterprises should recommend green advertisements to specific consumers on social media in order to develop and educate consumers about green labels and green products so that consumers can clearly see the unique advantages of green products, develop the knowledge and skill to purchase green products, and increase their green involvement.

Limitations, and Future Research

The limitations of our study include the following four issues. (1) The theoretical model does not account for the characteristics of the social media. Consumer behavior on social media is closely related to the consumers' motivations, and future research can combine social media features with user models to examine audience perceptions of green newsfeed ads in different media environments and deepen the understanding of green infomercial applications. (2) To increase the practicality of this study's managerial insights, future research can add other characteristics of green newsfeed ads to the research model, such as the relative positions of the green ads. The location of embedded ads affects the attention users give to the ads (Liao et al., 2017), so future research can control for the relative position of green ads in the newsfeed, such as the front or middle part of the news feed, as a way to derive more specific guidance on green newsfeed advertising practices. (3) This study did not examine the strength of the relationships among users when examining the sociality effect, and future research could further examine the effect of the strength of user

relationships on the relationship between sociality and audience perceptions of green advertising. (4) This study lacks a specific limitation for green products. Future research may investigate specific green products and compare consumer purchase intentions across different green products.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

XC, XW, and XH contributed to conception and design of the study and wrote sections of the manuscript. XC organized the database and wrote the first draft of the manuscript. XW performed the statistical analysis. All authors contributed to the article and approved the submitted version.

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Three-Way Interaction Effect Model: Moderating Effect of Resource Between Business Age and Host Performance

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In the field of accommodation sharing, little attention has been paid to micro-entrepreneurship of hosts. Based on the signaling theory and the resource-based theory, we proposed a three-way interaction effect model to investigate the moderating effect of resource configuration (business size and host reputation) on the relationship between business age and host performance. A statistical analysis of the secondary panel data crawled from Airbnb.com was tested through the negative binomial model. The results shown that: (1) Business age is positively related to host performance; (2) the positive impact of business age on host performance is stronger for smaller size; host reputation has no significant moderating effect on the relationship between business age and host performance; (3) the joint consideration of business age, size, and host reputation has a three-way interaction effect on host performance. The positive impact of business age on host performance is strongest for hosts with smaller size and higher host reputation. These results are helpful to understand the micro-entrepreneurship performance of hosts in the field of accommodation sharing.

Keywords: micro-entrepreneurship, accommodation sharing, resource-based theory, host performance, business age

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INTRODUCTION

In recent years, the sharing economy has witnessed a spurt of development on a global scale. It has significantly changed the tourism and hospitality industries (Priporas et al., 2017; Akbar and Tracogna, 2018). Since tourism and hospitality industries are labor-intensive requiring less expert knowledge (Phizacklea and Ram, 1995), they have become one of the main areas of individual entrepreneurship (Hollick and Braun, 2005; Nikraftar and Hosseini, 2016; Li et al., 2020). The emergence of P2P accommodation platforms provides individuals with "franchising" micro-entrepreneurship opportunities (Cohen and Sundararajan, 2015). Individuals are able to generate income by renting out vacant houses through P2P accommodation platforms (Martin, 2016; Teubner et al., 2017). Airbnb, the premier platform for shared accommodation (Oskam and Boswijk, 2016), has attracted 4 million people in 100,000 cities worldwide to rent out their vacant houses for micro-entrepreneurship (Airbnb, 2021).

Previous studies have focused on the economic and social impact (Oskam and Boswijk, 2016; Koh and King, 2017), marketing and consumer behavior (Lutz and Newlands, 2018; Casais et al., 2020), and pricing issues (Gibbs et al., 2018; Magno et al., 2018) on accommodation sharing. However, to the best of our knowledge, fewer studies have regarded Airbnb hosts as the micro-entrepreneurs, and thus, the research on accommodation sharing entrepreneurship has been largely neglected (Sigala, 2016). Against the backdrop, this study explored the accommodation sharing from the perspective of micro-entrepreneurship. Tourism micro-entrepreneurship is small-scale, informal tourism businesses with fewer owners/managers/worker (Ferreira et al., 2015; Ditta-Apichai et al., 2020). In this perspective, each host is all operating a micro-enterprise. As the competitive pressure is increasing with the number of hosts on the platform increases, it has become an important issue to explore the impact mechanism of the host's performance.

Existing studies have identified the significant impact of firm age on firm strategy and performance (e.g., Steffens et al., 2009; Ismail and Jenatabadi, 2014). Nevertheless, consensus on how firm age affects firm performance has not yet reached and two major views are found in literature. The first propose is that younger firms are more risk aware (Shane and Venkataraman, 2000), flexible (Resnick et al., 2006), and innovatively and thus could effectively utilize their own resources to achieve better performance (Withers et al., 2011; Kilenthong et al., 2016). On the other hand, the second view holds that the managers of young firms are lack of experience and knowledge (Slevin and Covin, 1997; Thornhill and Amit, 2003), which then leads to misuse and waste of resources. As a firm grows maturer, its experience and knowledge become progressively abundant, and thus, its performance improved (Harvie et al., 2010). There are two main reasons for this controversy: First, the discussion of the relationship between firm age and performance lacks a specific industry analysis; second, the impact of resources on this relationship is not clearly resolved. Therefore, this study attempts to answer the following two questions:

On the sharing accommodation platform, how does business age affect host performance?

How does the host's resource configuration (business size and host reputation) affect the relationship between business age and performance?

To answer the aforementioned question, a three-way interaction model was proposed based on the resource-based theory. Specifically, this study investigated the moderating influence of host's business size and reputation on the relationship between business age and host performance by using Airbnb's secondary panel data. Random effect negative binomial models were adopted to test hypotheses. This paper examined the following issues: (1) the direct effect of business age on host performance; (2) the moderating effect of size and host reputation on the above direct effect; and (3) the three-way interaction effect of business age, size, and host reputation on host performance. The findings not only enrich the resource-based theory and provide implications for future study on hosts' entrepreneurial behavior, but also help hosts to optimize performance or make business expansion decisions.

THEORY AND MODEL

Signaling Theory

The signaling theory proposed by Spence (1978) provides a basic framework to account for how buyers and sellers try to solve the problem of information asymmetry in the online shopping context. Sellers have an incentive to signal the quality of their goods and services to customers. When customers are unfamiliar with service providers, they can use information clues, such as the service provider's past experience as the reflection of service quality (Wells et al., 2011). External signals (Richardson et al., 1994) are usually not evaluated as the inherent clues of the product, such as sellers' reputation (Chu and Chu, 1994) and commitment (Boulding and Kirmani, 1993), and are generally considered to be better received than internal signals (i.e., product clues), especially when external signals are more accessible or easier to understand (Parasuraman et al., 1988). In general, signal sources with high reliability are more effective in changing users' attitudes or behaviors than that with low reliability. When users believe that signal providers have rich relevant knowledge, experience, or resources, users are more likely to adopt their signal for decision-making (Wu and Wang, 2011). Similarly in the field of sharing accommodation, if the hosts show more resources and professionalism, it will usually be easier for consumers to make decisions (Xie et al., 2021).

Resource-Based Theory

The resource-based theory stresses that internal resources of a firm are the primary determinants of a firm's superior competitive advantage (Wernerfelt, 1984; Barney, 1991). Resources refer to the tangible and intangible resources used by the firm to conceive and implement its strategy (Barney, 2001; Wiklund et al., 2010). The former include financial or physical value (Grant, 1991), while the latter refers to non-physical resources, such as skills, reputation that brings firms sustainable competitive advantages (Hall, 1992; Amit and Schoemaker, 1993). Firm resources are essential for the creating, implementing, and obtaining entrepreneurial behavior rewards (Covin and Slevin, 1991). Small- and medium-sized enterprises (SMEs) may be particularly restricted in terms of tangible and intangible resources (Thornhill and Amit, 2003; Anderson and Eshima, 2013).

Both tangible and intangible resources are crucial for a company to gain a competitive advantage (Williamson, 1975; Barney, 1991; Tayles et al., 2007)). Previous studies revealed that tangible resources (e.g., financial and fixed asset) are significantly positively related to entrepreneurial orientation or firm growth. For instance, firm size, as an indicator of the stock of tangible resources (Wiklund and Shepherd, 2003; Audia and Greve, 2006), has been proved to be significantly related to firm performance, particularly entrepreneurial performance

(Rajan and Zingales, 1995; Serrasqueiro and Nunes, 2008). However, Kamasak (2017) found that intangible resources make a larger contribution to firm performance than tangible resources. This is especially true for SMEs, that is, SMEs with higher levels of intangible resources have greater flexibility, which may promote firm growth (Rogers, 2004). Firm reputation, for example, is considered as a critical intangible resources in a firm's strategic arsenal (Barney, 1991) and has been proved to be positively correlated to firm performance (Greenwood et al., 2005; Hall and Lee, 2014).

Business Age and Host Performance

Though firm age, as mentioned above, can significantly impact the firm's strategy and performance (Stinchcombe, 1965; Kristiansen et al., 2003), the empirical conclusions are controversial on the relationship between firm age and performance. Following Birch's (1979) pioneering research, the mainstream view is that younger firms grow faster than older ones (Geroski and Gugler, 2004; Davidson, 2010). For instance, the study by Coad and Rao's (2010) study found that the expected growth rate of sales, profits, and productivity of older firms was low, and they have not converted employment growth into sales, profits, and productivity growth. However, research by Coad and Rao (2010) and Capasso et al. (2015) also found evidence that firm performance increases with age. This result is grounded on the consensus that older firms have more specific resources than younger firms (Hannan and Freeman, 1984; Ranger-Moore, 1997). Specifically, in the start-up stage, human capital like the knowledge and operating ability of the manager or founder is critical for the survival of the business (Van Praag, 2003). In the following stages, manager's capacity in older firms can be increased through previous start-up or management experiences. In this sense, compared with the younger firms which lack knowledge or resources to execute their strategy (Venkataraman et al., 1990; Lussier, 1995), older firms are likely to perform better with the growth in manager's experience and knowledge (Harvie et al., 2010).

Knowledge and intelligence accumulated through interaction with consumers is one of the critical factors for firms to succeed in the competition within tourism and hospitality industries (Stamboulis and Skayannis, 2003). For hosts under analysis in this study, most of them are non-accommodation professionals who seek for extra income by utilizing idle resource (Lee, 2016; Li et al., 2019). That is, they have not received professional training and lack experience and knowledge in customer management, cost control, platform recommendation algorithms, and taxation (Dillahunt and Malone, 2015; Cetin and Bilgihan, 2016; Hamari et al., 2016; Jhaver et al., 2018; Liang et al., 2020). However, through learning by doing, they can continuously improve their skills in terms of using facilities, tools and technology, cost reduction, pricing, and interaction with guests (Wang and Nicolau, 2017; Benítez-Aurioles, 2018). This also enables the host to replicate its service operations more effectively, further improving service profitability. That is, with the host's business age increasing, the profitability of host is more likely to increase (Agiomirgianakis et al., 2012; Aissa and Goaied, 2016). In addition, time is one of the key contributors to the development of social capital (Nahapiet and Ghoshal, 1998). For the sharing economy, the social capital that hosts build over time may positively affect consumer satisfaction and trust (Huang et al., 2017; Teubner et al., 2017), so the host performance therefore will accordingly getting better and better. Based on above, we propose the following hypothesis:

> *Hypothesis 1:* The host's business age is positively associated with host performance.

The Moderating Role of Size

Previous research believes that the influence of firm age on firm performance is different according to resources obtained (Steffens et al., 2009). Most of those studies explored the boundary conditions. For example, many scholars discuss the interactive impact of firm size and firm age on firm growth or performance (Steffens et al., 2009; Nunes et al., 2013). Specifically, larger enterprises generally have scale-based cost advantages, while SMEs with less assets show better flexibility, enabling them quickly to respond to market changes (Lam et al., 2019; Choi et al., 2021). In the early stage of entrepreneurship, insufficient funds or managers' capabilities are some of the main reasons for the SMEs's death (Wiklund et al., 2010). In this sense, for SMEs, larger size may increase their fund pressure and management costs, and as the firm age grows, it may hinder the improvement of managers' experience and ability, which then affect the growth in performance.

As an emerging industry, sharing accommodation provides more opportunities for early hosts to build first-mover advantages. In the stage of initial entry, hosts entering the sharing economy platform may carry out particular renovations before renting, such as decorating and adding new facilities, which may increase funds burden. In addition, as hosts are mostly self-employed, large size means that they are required to manage the multiple accommodations at the same time, which can not only increase the management and service costs, but also affect consumers' perception of service quality. As a result, consumer satisfaction and trust may decline, which can weaken the effect of age on performance. Thus, for small size businesses, hosts are more flexible in responding to the market and can pay more attention to service quality. With the increase of business age, hosts' management and service capabilities grow faster, which then is more likely to promote performance growth. On the country, for large size businesses, management and service costs are higher. The management capabilities accumulated over time may not be enough to respond to market changes and satisfy consumers, which may weaken the positive impact of age on performance. Based on above, we propose the following hypothesis:

> *Hypothesis 2:* The relationship between business age and host performance is moderated by size, such that the relationship is stronger for lower size.

The Moderating Role of Host Reputation

Under resource-based theory, intangible resources are not easy to obtain and replicate in the factor market, which is the most potential source of business success (Kor and Mesko, 2013; Molloy and Barney, 2015). As one of the typical intangible resources, firm reputation involves a comprehensive external evaluation of the firm's past performance (Dowling, 2016). Moreover, due to the inherent uncertainty associated with Internet transactions, firm reputation is considered a key asset for online sales (Bensebaa, 2004), which can inform consumers of the credibility and quality of the company, thereby simplifying the consumer's decision-making process (Drover et al., 2018). Therefore, reputation is considered as the key driving force for consumers to respond positively to the firm and has positive effects on firm performance (Srivastava et al., 2001; Wei et al., 2017).

According to the signaling theory, the comprehensive evaluation of hosts' reputation, such as "superhost" in the Airbnb platform, indicates that the host's comprehensive service quality is relatively high. Previous studies have shown that online users are more willing to use and pay higher fees to service providers with high reputation scores (Yacouel and Fleischer, 2012; Ert et al., 2016). "Superhost" is considered more trustworthy and high-quality which can attract more consumers and orders (Kim et al., 2016; Viglia et al., 2016). That is, if the host's reputation is high, as business age grows, the accumulation of word-of-mouth may make it easier for businesses to gain performance growth. Therefore, we propose the following hypothesis:

> *Hypothesis 3:* The relationship between business age and host performance is moderated by host reputation, such that the relationship is stronger for higher host reputation.

Business Age, Size, Host Reputation, and Host Performance

Grant (2002) stated that selecting strategically relevant tangible and intangible resources to generate more value is the best way to attain superior sustainable performance. This study proposes that tangible resources and intangible resources may synergize in the host entrepreneurship process, which brings performance growth. In light of the relationship between business age and host performance, business age is more suitable for hosts with a smaller size and a higher level of host's reputation. This is because that smaller business size and higher host reputation would create synergy in business age implementation as internal resources from highly consumer identification of host's reputation can enhance the complementarity in the influence of business age on host's performance, thereby further enhancing the fit between smaller business size and business age.

The resource-based theory indicates that valuable, rare, and unique resources promote favorable performance results outcomes (Wernerfelt, 1984; Barney, 1991). Newbert (2007) observed that intangible resources are the critical source of competitive advantage due to their inherent inimitable nature. Combined with Hypotheses 2 and 3, this shows that the relationship between business age and performance would be the strongest among smaller size of hosts that also possess a host reputation advantage compared with industry peers. That is, hosts with smaller-sized business are likely to respond to market changes faster and pay more attention to single consumers with higher service quality than their bigger-sized peers. Meanwhile, compared with hosts of larger-sized business, hosts with smaller-sized ones may make better use of their host reputation with strategic value to form competitive advantages. Therefore, they show the strongest performance growth.

In a netshell, as business size decreases, the fit between business age and host performance increases, which can be further improved by high host reputation. Accordingly, the positive impact of business age on host performance will enhance for smaller size as host reputation increases. Therefore, we propose the following hypothesis:

> *Hypothesis 4:* Business age, size, and host reputation have a three-way interaction effect on host performance, such that the association between business age and host performance will be strongest when size is smaller and host reputation is higher.

MATERIALS AND METHODS

Data and Measures

Airbnb was selected as the data set, which is the world's largest peer-to-peer (P2P) accommodation sharing platform (Nieto García et al., 2020). Airbnb is growing rapidly, with over 5.6 million worldwide listings in nearly 220 countries and roughly 900 million arrived guests (Airbnb, 2021). There are almost 4 million hosts on Airbnb with $9,600 average annual earnings per host (Airbnb, 2021). We extracted all Airbnb listings information in Beijing, a representative Chinese city with a long history of accommodation sharing. Every host of Airbnb has a unique profile page that contains the release date, all guests' reviews, and their attributes. By sorting these time clues, we track the host's start-up and growth behavior over time. Since this study focused on the influence of business age on hosts' total booking behavior, we studied hosts in the platform during the period 2013–2018 to ensure the robustness of the results. After eliminating hosts that do not exist for the entire 5 years, the final panel data including 348 hosts from May 2013 to May 2018 were identified.

Table 1 shows the definition of variables and summary statistics. The dependent variable is the total number of reviews for all properties (*Host_Num*) operated by a host. This variable indicate the popularity of the host and represent the booking behavior of the host (Liang et al., 2020). There are several reasons for choosing this to represent the host performance. First, the total number of reviews reflects the lowest booking threshold. This is because that the guests are able to post reviews on Airbnb only after completing the booking. Second, as Liang et al. (2017) states, the unique design of the

TABLE 1 | Descriptive statistics.

Variable	Definition	Mean	SD	Min	Max
Host_Num	Number of reviews a host has received	6.92	16.65	0.00	209.00
Business_age	Number of years since a host registered with Airbnb	2.46	1.63	0.00	8.00
Size	Number of properties operated by a host	0.68	1.18	0.00	10.00
SuperHost	Dummy variable indicating whether the host is recognized by Airbnb as a superhost, with values of 1 = Super Host, 0 = Regular Host	0.31	0.46	0.00	1.00
ResponseTime	The average time a host takes to confirm to customer reservations, with values 1 = More than a day, 2 = One day, 3 = Few hours, 4 = Less than an hour	3.49	0.85	1.00	4.00
HostDescribe	Dummy variable indicating whether the host has a detailed self-description, with values of 1 = Described, 0 = Not Described	0.78	0.41	0.00	1.00
IdentityVerified	Dummy variable indicating whether the host has identity verifications on the Airbnb, with values of 1 = Verified, 0 = Not Verified	0.75	0.43	0.00	1.00

accommodation sharing platform makes the review volume a crucial predictor of total bookings. Third, previous researches show that most of the reviews on Airbnb are positive with ratings higher than 4.5 (the full scale is 5), so review valence is not a necessary consideration (Fradkin et al., 2015). The three-way interaction variables are the years since a host joined the platform (*Business_age*); the number of properties (*Size*) operated by a host; and superhost status (*SuperHost*) represents the reputation of the host. We also have control variables of host characteristics that may affect the host performance, including the average time a host takes to confirm to customer reservations (*ConfirmTime*); whether the host has identity verifications on the platform (*IdentityVerified*); and whether the host has a detailed self-introduction (*HostDescribe*).

Model Specification

The dependent variable is count data with non-negative integers (number of reviews a host has received); thus, this study takes into consideration Poisson regression and negative binomial regression. However, as the conditional variance is much larger than the conditional expectation and data presented are overdispersed, Poisson regression is rejected. After Hausman tests, random effect negative binomial models with year are established to examine the significant role of unobserved host characteristics (Yao et al., 2020). In order to test the three-way interaction effect of *Business_age*, *Size*, and *SuperHost* on *Host_Num*, this study analyzed three βmain equations as below:

$$\begin{aligned} Host_Num_{it} = {} & \alpha_0 + \beta_1 Business_age_{it} + \beta_2 ResponseTime_{it} \\ & + \beta_3 IdentityVerified_{it} + \beta_4 HostDescribe_{it} \\ & + \mu_i + \lambda_t + E_{it} \end{aligned} \quad (1)$$

$$\begin{aligned} Host_Num_{it} = {} & \alpha_0 + \beta_1 Business_age_{it} + \beta_2 log\left(Size\right)_{it} \\ & + \beta_3 SuperHost_{it} + \beta_4 Business_age_{it} \\ & * log\left(Size\right)_{it} + \beta_5 Business_age_{it} \\ & * SuperHost_{it} + \beta_6 log\left(Size\right)_{it} \\ & * SuperHost_{it} + \beta_7 ResponseTime_{it} \\ & + \beta_8 IdentityVerified_{it} \\ & + \beta_9 HostDescribe_{it} + \mu_i + \lambda_t + E_{it} \end{aligned} \quad (2)$$

$$\begin{aligned} Host_Num_{it} = {} & \alpha_0 + \beta_1 Business_age_{it} + \beta_2 log\left(Size\right)_{it} \\ & + \beta_3 SuperHost_{it} + \beta_4 Business_age_{it} \\ & * log\left(Size\right)_{it} + \beta_5 Business_age_{it} \\ & * SuperHost_{it} + \beta_6 log\left(Size\right)_{it} \\ & * SuperHost_{it} + \beta_7 Business_age_{it} \\ & * log\left(Size\right)_{it} * SuperHost_{it} \\ & + \beta_8 ResponseTime_{it} + \beta_9 IdentityVerified_{it} \\ & + \beta_{10} HostDescribe_{it} + \mu_i + \lambda_t + E_{it} \end{aligned} \quad (3)$$

where μ_i and λ_t denote the individual effects and time effects, α_0 is the constant term, and $\mathcal{E}_{it}$ represents the residual error term. We take a log transformation on the *Size* with skewed distribution (skewness = 3.267). In equation (1), we estimate whether *Business_age* has a positive impact on *Host_Num*. In equation (2), we estimate whether *Size* and *SuperHost* have the moderating influence on the relationship between *Business_age* and *Host_Num*. In equation (3), we estimate under what level of *Size* and *SuperHost*, the relationship between *Business_age* and *Host_Num* is the strongest. Since there may be multicollinearity between the interaction terms, variables in the interaction terms have been mean-centered, and models have been calculated the variance inflation factor (Day and Wensley, 1988).

RESULTS

Table 2 shows the correlation coefficients among all variables. The results show that *Business_age* ($r = 0.240$, $p < 0.01$), *Size* ($r = 0.553$, $p < 0.01$), and *SuperHost* ($r = 0.181$, $p < 0.01$) are significantly positively correlated with the dependent variable *Host_Num*. Also, the variance inflation factor (VIF) of all models are tested to estimate the multicollinearity. The results show that the average VIF value is 1.45, which is lower than 10, indicating that multicollinearity is not a serious problem in the study (Mason and Perreault Jr., 1991).

In **Table 3**, main models 1 to 3 show the coefficients of the random effects negative binomial estimations. In model

TABLE 2 | Correlation coefficient matrix.

	1	2	3	4	5	6	7
Host_Num	1.000						
Business_age	0.240*** (0.000)	1.000					
log(Size)	0.553*** (0.000)	0.590*** (0.000)	1.000				
SuperHost	0.181*** (0.000)	0.028 (0.242)	0.015 (0.537)	1.000			
ResponseTime	0.122*** (0.000)	−0.065*** (0.007)	−0.022 (0.362)	0.239*** (0.000)	1.000		
HostDescribe	0.098*** (0.000)	0.088*** (0.000)	0.093*** (0.000)	0.155*** (0.000)	0.001 (0.981)	1.000	
IdentityVerified	0.042* (0.079)	0.026 (0.273)	0.004 (0.878)	0.133*** (0.000)	0.019 (0.418)	0.129*** (0.000)	1.000

*Values of pin parentheses. *p<0.1; ***p<0.01.*

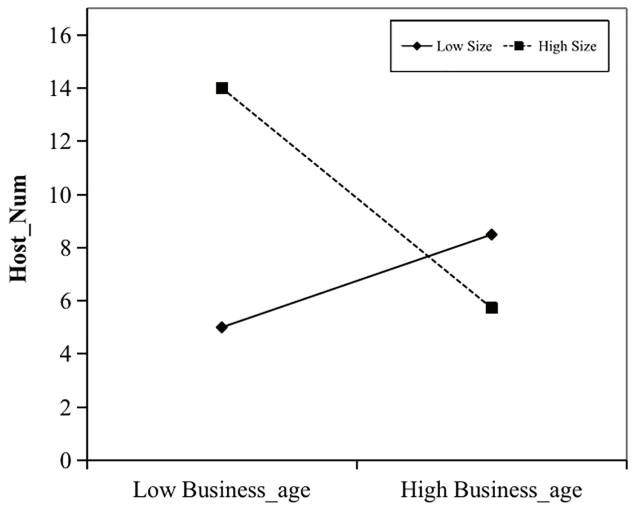


FIGURE 1 | Interaction of business age and size on host performance.

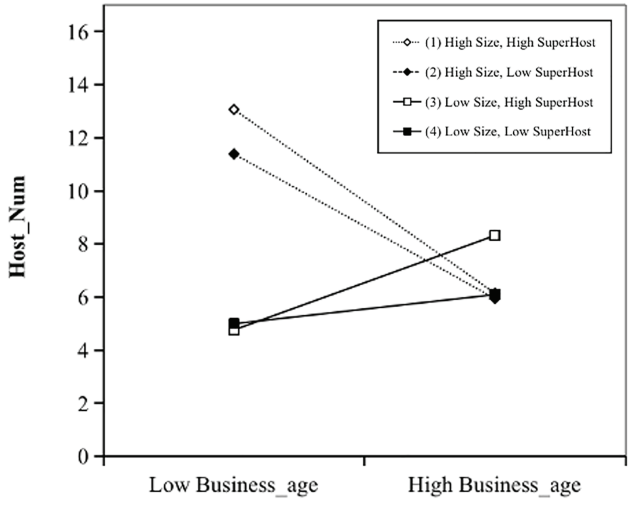


FIGURE 2 | Three-way interaction of business age, size, and host reputation on host performance.

1, *Business_age* and control variables were introduced. The results suggest that *Business_age* has a significantly positive effect on *Host_Num* (β = 0.147, p <0.01). Hypothesis 1 was supported. It indicates a general understanding that with the accumulation of experience, the host has enhanced business capacities, entrepreneurial experience, and social capital, which are all conducive to improving their business performance.

Hypothesis 2 indicates that business age has a greater influence on performance in smaller-sized hosts than larger-size ones. In model 2, the interaction of *Business_age* and *Size* has a significantly negative effects on *Host_Num* ($\beta = -0.614$, $p < 0.01$). **Figure 1** shows that the impact of *Business_age* on *Host_Num* increases when *Size* is low, but decreases when *Size* is high. Hypothesis 2 was supported. This result shows that for an inexperienced host, it is beneficial to operate fewer rooms within his/her capacity. As the business age increases, the host has more expertise to improve his/her performance. However, it is more likely to be retrieved by consumers when a host rents out multiple rooms. Thus, junior hosts with several rooms could have better performance. As the business age increases, renting several rooms would make it easier for hosts to attend to one thing and lose sight of another, which is detrimental to their business performance in the long run.

Hypothesis 3 indicates that host reputation can strengthen the influence of business age on host performance. In model 2, the interaction of *Business_age* and *SuperHost* does not has a significant effect on *Host_Num*. Hypothesis 3 was rejected. Therefore, contrary to Hypothesis 3, host reputation does not significantly affect the relationship between business age and host performance.

Hypothesis 4 illustrates the three-way interaction effect of business age, size, and host reputation on host performance. Model 3 shows that the three-way interaction in term of *Business_age*, *Size,* and *SuperHost* has a significantly negative coefficient on *Host_Num* ($\beta = -0.295$, $p < 0.05$. The model also suggests that the interaction between *Business_age* and *Size* has a significantly negative coefficient on *Host_Num* ($\beta = -0.514$, $p < 0.01$); the interaction of *Business_age* and *SuperHost* has a significantly positive coefficient on *Host_Num* ($\beta = 0.264$, $p < 0.01$); and the interaction of *Size* and *SuperHost* has a significantly positive coefficient on *Host_Num* ($\beta = 0.775$, $p < 0.1$). **Figure 2** indicates that an increase in *Business_age* on *Host_Num* is significantly enhanced when *Size* is low and *SuperHost* is high, but is significantly decreased when both *Size* and *SuperHost* are high. Hypothesis 4 has been supported. Results toward hypothesis 4 show that the relationship between business age and host performance is strongest among younger hosts possessing higher levels of size and reputation. In addition, the results also show that when size is involved, host reputation plays a positive moderating role in the relationship between

TABLE 3 | Regression result.

	Negative binomial regression (Main Models)			OLS regression (Robustness Models)		
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Constant	−4.591*** (0.34)	−4.848*** (0.27)	−4.596*** (0.28)	−1.086*** (0.17)	−0.649*** (0.11)	−0.619*** (0.11)
ResponseTime	0.283*** (0.07)	0.243*** (0.05)	0.239*** (0.05)	0.248*** (0.04)	0.165*** (0.03)	0.163*** (0.03)
HostDescribe	0.373** (0.15)	0.157 (0.1)	0.161 (0.1)	0.190** (0.09)	0.061 (0.05)	0.061 (0.05)
IdentityVerified	0.13 (0.12)	−0.057 (0.1)	−0.048 (0.10)	0.085 (0.09)	0.017 (0.05)	0.019 (0.05)
Business_age	0.147*** (0.06)	0.437*** (0.07)	0.346*** (0.07)	0.429*** (0.02)	0.152*** (0.02)	0.137*** (0.02)
log(Size)		3.759*** (0.2)	3.473*** (0.26)		2.836*** (0.15)	2.666*** (0.17)
SuperHost		0.648*** (0.18)	0.048 (0.27)		−0.127** (0.06)	−0.236*** (0.06)
Business_ age*log(Size)		−0.614*** (0.06)	−0.514*** (0.08)		−0.393*** (0.04)	−0.341*** (0.05)
Business_ age*SuperHost		0.059 (0.06)	0.264*** (0.1)		0.246*** (0.04)	0.307*** (0.05)
log(Size) *SuperHost		−0.156 (0.19)	0.775* (0.44)		0.149 (0.17)	0.797*** (0.28)
Business_ age*log(Size) *SuperHost			−0.295** (0.13)			−0.205** (0.08)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Wald chi-square (p)	0	0	0			
N	1740	1740	1740	1740	1740	1740

*Standard errors in parentheses. *p < 0.10; **p < 0.05; ***p < 0.01.*

TABLE 4 | Test of hypotheses.

	Hypotheses	**Results**
H1	The host's business age is positively associated with host performance.	Supported
H2	The relationship between business age and host performance is moderated by size, such that the relationship is stronger for lower size.	Supported
H3	The relationship between business age and host performance is moderated by host reputation, such that the relationship is stronger for higher host reputation.	Not Supported
H4	Business age, size, and host reputation have a three-way interaction effect on host performance, such that the association between business age and host performance will be strongest when size is smaller and host reputation is higher.	Supported

business age and host performance. All the empirical results can be seen in **Table 3**.

Then, we use an alternative estimation method as the robustness check. As shown in **Table 3**, models 1 to 3 map the main models of negative binomial regressions, while models 4 to 6 show the robustness checks of OLS regressions. In OLS regression models, we take a log transformation on the dependent variable *Host_Num* with skewed distribution (skewness = 5.886). As a result, the robustness check models have consistent coefficients with main models.

DISCUSSION

The tourism and accommodation industries have long been a fertile field for entrepreneurial activities due to their low barriers to entry (Nikraftar and Hosseini, 2016; Li et al., 2020). However, in the field of accommodation sharing, little attention has been paid to entrepreneurial research. Previous studies have shown that shared platforms provide a suitable platform for entrepreneurship (Cohen and Sundararajan, 2015), especially in the field of accommodation. Based on the signaling theory and the resource-based theory, this study investigated the influence of the business age on host performance in the area of accommodation sharing and the three-way interaction effect of business age, size, and host reputation. As shown in **Table 4**, except for hypothesis 3, our hypotheses 1, 2, and 4 are all supported.

First, in terms of direct effect of business age on host performance, our findings are consistent with Anderson and Eshima (2013) and Karadag (2017). Moreover, it is also cemented by studies from traditional firms (Sørensen and Stuart, 2000; Chang et al., 2002). In the context of accommodation sharing, accumulated knowledge and experiences of the host are vital for hotel operating that can influence host performance. Specifically, the positive impact of business age on host performance suggests that observation, imitation, and learning are crucial for the continuous operation of the host. Accumulated experience and knowledge in customer management, cost control, platform recommendation algorithms, advertising, and taxation can promote host performance. This view is from a learning perspective and has been recognized by Harvie et al. (2010) and Othman and Rosli (2011).

In addition to explaining the direct effects of business age, it has also identified the moderating impact of the resource configuration (business size and host reputation) on host performance from the perspective of resource-based theory. Specifically, business age significantly influences performance of hosts with smaller-sized business than that with larger-sized ones. The results suggest that size smallness is not always a liability for performance, but also an asset for business age.

In addition, the impact of business age on host performance increases when size is low, but decreases when size is high, potentially because that the host performance in sharing accommodation depends heavily on human capital. That is, hosts with smaller-sized business are required of lower management and serviceability, making it easier to satisfy consumers, operate business successfully, and enhance performance growth. However, hosts with larger-sized business always manage multiple rooms alone, which can easily increase management difficulties and weaken the service level for every single room, gradually leading to negative influences on performance. It may also be that hosts with larger-sized business have less flexible ability to cope with market changes, and some lists fail to operate, resulting in declining performance. Firm age is closely related to firm size (Coad et al., 2013). Among the extant literature, Kilenthong et al. (2016) pointed out that when taking firm age into consideration, firm size would obviously influence market behavior, that is, firm size can moderate firm age and firm performance. Meanwhile, our research results are also consistent with Bates (2005).

Unexpectedly, it is also discovered that host reputation does not significantly influence the relationship between business age and host performance. According to a study on firm reputation, young firms' reputation is found to be unstable (Flanagan and O'Shaughnessy, 2005). So, in the early stage of a host's start-up, high reputation can be easily destroyed by other factors. However, in the later stage of a host's entrepreneurship, business age and the "superhost" which convey quality signals, could be mutually confirmed, so the individual influence of the host's reputation may be lower. In addition, the negative moderating effect of size may limit the positive moderating effect of reputation, and reputation effect thereby is not significant.

Finally, the result of the three-way interaction estimates is of vale to gain a deeper understanding on the joint effect of business age, size, and host reputation on customer perception. The joint effect suggests that hosts with smaller-size business have a flexible advantage, giving rise to the performance growth if they pursue business age with a high level of host reputation.

Theoretical Implications

This study has the following theoretical contributions. First, the business age and performance of companies have long been discussed over the past 50 years, yet no consensus has been reached. This study, focusing on accommodation sharing industry, concluded that the business age positively affects host performance in the accommodation sharing. The results show that the accumulation of experience and knowledge is vital for the labor-intensive industry like shared accommodation, which is different from the previous view that young firms are more risk aware, innovative, and flexible, and thus have higher performance (Shane and Venkataraman, 2000; Zahra et al., 2006; Withers et al., 2011). This study therefore can supplement the existing research on firm age and performance.

Second, this study agrees with the view that SMEs are restricted in both tangible and intangible resources (Thornhill and Amit, 2003). However, unlike Newbert's (2007) statement that intangible resources have greater strategic significance for SMEs, the present study suggests that for small firms in shared accommodation industry, the relationship between business age and host performance is more affected by individual moderating effect of tangible resources or joint moderating of tangible and intangible resources. Notably, tangible resources are a necessary condition. In contrast, the boundary effect of intangible resources is weaker than that of tangible resources. This new finding enriches the research on tangible and intangible resources in digital economy. This study thus clarifies the moderation mechanism of the host's tangible and intangible resources on the relationship between business age and performance.

Third, most of the micro-research on Airbnb focuses on consumer behavior, and relatively less attention has been drawn to hosts (Sigala, 2016). This study re-explains the business behavior of hosts from the perspective of entrepreneurship. This enriches the research on the objects of accommodation sharing and helps to understand entrepreneurship in the informal economy and sharing economy in a narrow sense.

Practical Implications

This study has some implications for practical guidelines for accommodation sharing entrepreneurs and platform developers. First, it can help hosts to make correct adjustments to achieve optimal performance growth based on their business age, previous size, and reputation when improving performance or making expansion decisions. Moreover, tangible resources (such as size) are essential than intangible resources (such as reputation) for hosts. The hosts could reduce or expand their room numbers to achieve performance optimization. On this basis, hosts can improve the allocation of intangible resources. Second, this study may also help platform managers better understand hosts' behaviors and solve hosts' dilemmas. The accumulation of experience and knowledge in related industries and entrepreneurship help hosts to continue their business. In order to help the junior host to become a mature host faster, platform developers could provide some suggestions based on the comprehensive results of the current business age, size, and reputation. Moreover, platform developers may help the hosts renovate their houses and formulate and provide more appropriate courses and promotional products to help the hosts, thereby promoting the platform's development. In addition, the platform can provide more free or low-cost search engine optimization services for hosts who rent fewer rooms in the early stages of their start-up.

Limitations and Future Research

This study also has several limitations which is to be solved in future research. First, the sample used in this study is limited to China. If the model is retested in different environments or cultures, the results may be different. In the future, scholars should further test and verify the findings in different contexts and cultural backgrounds. Second, the data used in this study are mainly based on the Airbnb sharing platform, while a variety of accommodation sharing software have emerged in

recent years, such as Golightly, Koala, Meituan, Tujia, and Xiaozhu, which deserve further exploration. That is, as these platforms serve different types of individuals in different countries, future research could focus on participants with diverse backgrounds and further refine the business behaviors of different hosts. Third, traditional hotels have gradually begun to operate on third-party digital platforms, which is bound to have a certain impact on accommodation sharing entrepreneurship (Dogru et al., 2020). Thus, whether the conclusions of this study are also applicable to traditional hotels operated by third-party digital platforms remains to be verified. In addition, our study only uses the resource configurations of size and reputation, while many other resources could be considered as boundary condition. Finally, this study mainly focuses on accommodation sharing, but the sharing economy has spawned micro-entrepreneurs in different fields. Further study on the applicability of the findings in other fields can be conducted. Meanwhile, shared accommodation entrepreneurs can be divided into part-time entrepreneurship and full-time entrepreneurship. These two different types of entrepreneurs have different attitudes toward performance, resulting in different business strategies. Therefore, future research should further discuss this issue.

CONCLUSION

Hosts on sharing accommodation platforms are generally non-professionals, meaning that the professionalism and reliability of the services provided can be easily questioned by consumers. Therefore, how platform hosts release signals to show more reliability, attract more consumers, and improve performance are of paramount significance for their business success. However, most of the existing studies focus on the psychological and behavioral aspects of consumers participating in sharing accommodation from the perspective of consumers. There is a huge gap in terms of the relationship between hosts' resources and entrepreneurial performance from the perspective of hosts' micro-entrepreneurship. Based on the web data crawled from the Airbnb platform, this study firstly explored how the business age of a host affects his or her performance. Secondly, it explores the moderating role of the tangible resources and intangible resources owned by the hosts in this direct effect. Finally, the impact of the three-way interaction on host performance has also been discussed. In particular, this empirical research found that business size and host reputation do have a significant joint moderating effect on the relationship between business age and host performance. This study not only enriches the empirical research on the micro-entrepreneurship of hots in the sharing accommodation field, but also provides practical implications for platform hosts on how to deploy their own resources to achieve performance optimization.

DATA AVAILABILITY STATEMENT

Publicly available datasets were analyzed in this study. This data can be found at: http://insideairbnb.com/get-the-data.html.

AUTHOR CONTRIBUTIONS

XL and ZX contributed to the current research ideas and design of this study. LT wrote the first draft of the manuscript. ZX performed the statistical analysis and contributed to improve the manuscript. XLy edited the revised manuscript and contributed to avoid language errors. All the authors contributed to the article and approved the submitted version.

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The Impact of Calling on Employee Creativity: Evidence From Internet Companies

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With the rapid development of technology and increasingly fierce competition in the global market, innovation has become the most important competitive advantage for enterprises. Employee creativity is widely considered the source of organizational innovation. This study explores the antecedents of employee creativity from the perspective of career development in the context of high-technology industry. Specifically, we examine the effects of calling on employee creativity through the mediation of career commitment and the moderation of responsible leadership. With data collected from a sample of 218 respondents from internet companies, a series of regression analyses was conducted to test the proposed hypotheses. In addition, a moderated mediation model was further examined. Discussion, implications, and limitations are presented.

Keywords: calling, career commitment, responsible leadership, creativity, internet companies

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INTRODUCTION

Economic globalization and technological innovation are the themes of today's world. In particular, information technology enables people to share and spread resources conveniently and rapidly, making competition among organizations increasingly fierce. Almost all enterprises, particularly high-technology companies, emphasize the importance of human capital. Faced with a complex and changing external environment, employee creativity has become the driving force and core competitive capability of organizations.

Under these circumstances, the question of how to help high-technology enterprises improve their innovativeness to gain competitive advantages attracts both business scholars and practitioners. Organizational innovativeness depends on employees' creativity. Therefore, this research hopes to identify the factors enhancing employee creativity in the high-technology industry and to explore its mechanism.

In the domain of vocational research, an important concept is calling, which refers to the deep meaning people feel toward their work (Wrzesniewski, 2003). It relates to self-fulfillment, meaningfulness, and happiness in one's career choice and development. According to Duffy and Dik (2013); calling is salient in both university student and adult populations, and it can enhance career, commitment, career maturity, work meaning, job satisfaction, life meaning, and satisfaction levels. Dobrow and Tosti-Kharas (2011) identify the positive effects of calling on career-related efficacy, the professional pursuit of the calling domain, and the satisfaction with the calling domain. These studies show that employees who have a strong sense of calling are likely to pursue superiority in their work. These employees realize the meaningfulness of their work and tend to voluntarily

invest more time and energy in it, demonstrating a high degree of career commitment. They will gain higher career achievements and job satisfaction from work and create greater value for their employers. Therefore, we postulate that in the high-technology industry, calling may inspire employees' innovativeness and creativity through the mediation of career commitment.

Previous studies have indicated that leadership style may affect various organizational behaviors (e.g., Cable and Judge, 2003; Benjamin and Flynn, 2006; Graham et al., 2015). Some studies have focused on employee innovative behavior. For example, Lei et al. (2011) discover that transactional and transformational leadership exert negative and positive influences on employee innovative behavior, respectively. Fang et al. (2019) find that inclusive leadership, which emphasizes people-oriented justice, and fairness, may stimulate the new generation of employees' innovative behavior through the mediation of social capital. However, no study has been conducted on the effects of responsible leadership on innovative behavior.

This study introduces responsible leadership as an adjustment variable, aiming to explore the effect of responsible leadership on employee creativity and its mechanism, as well as the moderating role of responsible leadership in the relationship between professional commitment and employee creativity. As a novel leadership style, responsible leadership is identified as a social–relational and ethical phenomenon. Different from the prevailing leadership style theory, which emphasizes the relationship between leaders and followers in an organization, responsible leadership exists in the interaction with various followers as stakeholders inside and outside a corporation (Maak and Pless, 2006). It focuses on value creation and social change, and it tends to satisfy the needs of various stakeholders while pursuing organizational goals. It advocates communication with stakeholders through open discussions and considers the feelings and values of others to obtain common interests. Responsible leadership provides an atmosphere that encourages employees with a high sense of calling to work creatively. Therefore, we postulate that responsible leadership may play a moderating role in the relationship between calling and employee creativity.

CALLING AND EMPLOYEE CREATIVITY

Work as a calling was originally a religious concept, but it has become a popular concept across psychological disciplines in recent years. Calling refers to a psychological state that reflects individuals' passion for a job that is considered the meaning of their life (Duffy and Dik, 2013). It reflects individuals' attitudes and perceptions toward their current work (Dobrow and Tosti-Kharas, 2011). Many empirical studies have examined the consequences of calling in work performance and quality of life. For example, Duffy and Sedlacek (2007) examine the effect of calling on the career development of American college students. They find that students' sense of calling is positively correlated with decidedness, comfort, self-clarity, and choice–work salience and negatively correlated with indecisiveness and lack of educational information. Hirschi and Herrmann (2012) find that calling is positively correlated with college students' decidedness and self-efficacy. Dobrow and Tosti-Kharas (2011) find that calling promotes individuals' work engagement and satisfaction, career-related self-efficacy, and clarity of professional identity. Hirschi and Herrmann (2013) report that the presence of a calling can affect life satisfaction through the mediation of vocational identity achievement among German university students. Duffy et al. (2012) discover that university students' sense of calling affects life satisfaction with the moderation of core self-evaluation and the mediation of personal meaning in life and academic satisfaction.

Calling has also been examined in Eastern societies. Based on a qualitative study among Chinese college students, Zhang et al. (2015) derive a multi-dimensional construct of calling. This construct has four dimensions— career-related calling, guiding force, meaning and purpose, altruism, and active tendency— which are considered to greatly converge with those found in Western cultures. Using a sample of Korean salespersons, Park et al. (2015) find that the sense of calling affects organizational citizenship behavior through the mediation of occupational self-efficacy in Korea.

Employee creativity refers to the ability to generate novel things or ideas that can lead to new products, services, production methods, or work processes (Amabile and Gryskiewicz, 1989). Both personality traits and organizational context can stimulate an individual's creativity. McCrae and Costa (1997) maintain that individuals with high openness to experience are more likely to absorb and integrate new information and seek novel environments and experiences. Amabile and Gryskiewicz (1989) identify several environmental stimulants to creativity, including freedom, challenge, resources, and supervisor, and some obstacles to employment creativity, such as time pressure, politics, status quo, and evaluation. Amabile et al. (1996) find that the perceived work environments of group supports, challenging work, and organizational and supervisory encouragement can enhance employee creativity. Through multi-level studies, Liu et al. (2011) discover that employees can translate organizational autonomy support and individual autonomy orientation to individual job creativity through harmonious passion.

Calling can improve work performance. For high-technology companies, innovativeness and creativity are the most important occupational characteristics. From the perspective of social information processing, employees with a high sense of calling often perceive the significance of their work for the organization, enhancing intrinsic motivation toward individual creativity (Amabile, 1994). Moreover, calling helps motivate employees to make great efforts to absorb new knowledge and master advanced skills, enabling them to better deal with challenges and enhance their creativity. Therefore, we propose a positive relationship between calling and employee creativity.

H1: Calling is positively related to employee creativity.

Career Commitment as a Mediator

Career commitment reflects individuals' attitudes toward their career and profession (Blau, 1985). It shows a certain expectation that employees have about their jobs. It is related to other work attitudes, such as work ethic endorsement, job involvement, and

organizational commitment (Blau, 1988; Irving et al., 1997). This shows that individuals with a high career commitment tend to center their lives around work and vacation. They are likely to spend more time and energy to succeed in their careers (Meyer et al., 1993). The antecedents of career commitment are work–role salience, career satisfaction, and organizational opportunity for development (Aryee and Tan, 1992). Career commitment also affects work outcomes, such as job satisfaction, turnover intention, and career success (Irving et al., 1997; Goulet and Singh, 2002; Poon, 2004). Employees with a high career commitment recognize the value of their jobs, and they tend to make more efforts to improve their knowledge, skills, and performance. They more easily acquire positive emotions from their profession, are more likely to proactively pursue career success, and have lower turnover intentions.

In organizations, employees with high career commitment usually pay more attention to career development, set higher career goals, and make greater efforts to proactively develop and cultivate relevant career skills. Ellemers et al. (1998) suggest that career commitment indicates an individual's motivation to pursue career development and advancement. According to self-determination theory, career commitment acts as an intrinsic driving force to urge individuals to manage their careers (Savickas and Porfeli, 2012). When employees have a strong career commitment, they are always willing to make efforts to proactively create novel products, processes, and systems, especially in high-technology enterprises. Conversely, low career commitment usually indicates dissatisfaction with career and profession. These employees lack the motivation to seek further development in their careers and companies.

Based on the previous analysis, we can conceptually derive a close relationship between calling and career commitment. Specifically, individuals with a strong sense of calling can effectively improve their career self-efficacy and career planning, leading to stronger career commitment and work outputs. In an empirical study, Duffy et al. (2011) find the positive effects of the sense of calling on various work-related outcomes, including career commitment, organizational commitment, and job satisfaction. Among these variables, career commitment is identified as a mediator that links the calling–organizational commitment relationship to the calling–job satisfaction relationship. The authors note that career commitment may play a significant role in linking calling to work-related outcomes.

Moreover, employees with a high sense of calling can stimulate career commitment in their work and contribute to the development of an organization. On the contrary, employees who are weak in calling are often short of career commitment and unwilling to stimulate creativity.

H2: Career commitment mediates the relationship between calling and employee creativity.

Responsible Leadership as a Moderator

Responsible leadership is defined as the ability to build, cultivate, and maintain mutual relationships with stakeholders inside and outside the organization, which emphasizes responsible behavior in cooperation. Responsible leadership aims to realize the business vision through sharing meaning (Maak and Pless, 2006; Maak, 2007). It integrates the theories of social responsibility and leadership.

Compared with other leadership styles, such as responsible leadership, transformational leadership, ethical leadership, and servant leadership, responsible leadership stresses value creation and social transformation. With the pursuit of organizational goals, it focuses on the demands of various stakeholders and seeks to engage in democratic communication with them. It requires leaders to take others' emotions and values into consideration to form common interests. Voegtlin (2011) finds that responsible leadership positively affects employees' job satisfaction. According to Voegtlin et al. (2012); a good relationship between responsible leaders and stakeholders may motivate them to share knowledge, information, and experiences, which can promote enterprises' innovative culture. In summary, responsible leadership has a positive effect on balancing and coordinating the internal and external relationships in an organization, creating an open and innovative environment and enhancing employee creativity.

Creativity is the source of innovation. All the innovative processes and products in an organization come from the deep and multi-dimensional development of creativity. If employees in the organization can continuously maintain creativity, they will be able to obtain quality resources and innovative opportunities in the market, develop more excellent products and service processes over competitors, and effectively improve organizations' advantageous position in the fierce competition. In the process of organizational innovation, leadership style is a significant factor: how leaders in the organization build relationships not only with subordinates but also with other stakeholders. Previous studies find transformational leadership (Shin and Jing, 2003; Gong et al., 2009), empowering leadership (Zhang and Kathryn, 2010), and ethical leadership (Feng et al., 2018; Javed et al., 2018; Mo et al., 2019) may exert influences on employee or team creativity.

This study focuses on responsible leadership and examines it under the framework of the leader–stakeholder interaction model. We believe that responsible leaders can motivate employees' inner work enthusiasm through self-consciousness and high ethical standards to make them work proactively. They listen to employees' opinions and give them transparent support. In addition, responsible leaders have rich social relations that enable them to demonstrate a high level of openness and trust toward subordinates. According to social exchange theory, transparent leadership behaviors contribute to high-quality leader–member exchange (LMX) relationships. In a longitudinal study, Volmer et al. (2012) find that a high-quality LMX, which is characterized by a great degree of freedom in work and decision making, facilitates innovative behaviors. Therefore, a perceived responsible leadership style can stimulate the relationship between career commitment and employee creativity.

H3: Responsible leadership moderates the relationship between career commitment and employee creativity such

that the relationship is stronger for those with higher rather than lower perceived responsible leadership.

Based on H1–H3, we further propose a moderated mediation model— that is, responsible leadership plays a moderating role in the indirect influence of calling on employee creativity via career commitment.

H4: Responsible leadership moderates the indirect influence of calling on employee creativity via career commitment. Specifically, the indirect effect is stronger when responsible leadership is high rather than low.

METHODS

This study collected data through a survey of executives and staff in internet companies. A total of 230 respondents participated in the survey. With invalid questionnaires excluded, a total of 218 valid samples were obtained.

As shown in **Table 1**, among the valid sample, 142 were males (65.1%), 143 were under 35 years old (65.6%), most of the respondents had more than 10 years of working years (44%), and the majority had a bachelor's degree or above. The questionnaire survey was distributed in several major Chinese cities, including Shanghai, Beijing, and Xi'an.

Measurement

This study used established scales to measure calling, career commitment, responsible leadership, and employee creativity. Calling and career commitment were measured using twelve items adapted from Dobrow and Tosti-Kharas (2011) and seven items adapted from Suddaby et al. (2009). The reliability coefficients for the two scales were 0.958 and 0.922, respectively. Five items from Voegtlin (2011) were adopted to measure responsible leadership, with a Cronbach's α of 0.947. Three items from Baer (2012) were used to measure employee creativity, with a Cronbach's α of 0.818.

In addition, this study also considered some important demographic variables as control variables, including gender, age, working years, and education level.

TABLE 1 | Demographic variables.

Demographic variables		Percentage (%)
Gender	Male	65.14
	Female	34.86
Age	Under 35	65.60
	Over 35 years old	34.40
Working years	1–3 years	19.70
	4–6 years	17.90
	7–9 years	18.30
	More than 10 years	44.00
Education level	PhD	6.90
	Master	40.80
	Undergraduate	35.80
	College	16.70

Data Analysis

R software was used to test the construct validity of the scales through confirmatory factor analysis. As shown in **Table 2**, compared with the three-factor, two-factor, and single-factor models, the four-factor model has the best model fit of $\chi^2 = 550.693$, df = 183, CFI = 0.916, IFI = 0.916, SRMR = 0.046. This shows that the four variables have good discriminant validity.

Table 3 presents the mean and standard deviation of each variable and the correlation coefficients between them. Calling and career commitment are found to be strongly correlated (r = 0.738, $p < 0.01$), calling and employee creativity are moderately correlated (r = 0.382, $p < 0.01$), and career commitment (r = 0.380, $p < 0.01$) and responsible leadership (R = 0.378, $p < 0.01$) are significantly positively correlated with employee creativity, respectively. This shows preliminary support for the proposed hypothesis.

Hypothesis Testing

This study adopted a multi-step regression method through SPSS 22.0 to examine the hypotheses. The regression results are shown in **Table 4**. In Model 4, after controlling for the demographic variables, calling has a significantly positive effect on employee creativity (β = 0.346, $p < 0.001$). Therefore, hypothesis 1 is supported.

This study followed the steps proposed by Baron and Kenny (1986) to test the mediating effect of career commitment between calling and employee creativity. Model 2 shows that calling has a significantly positive effect on career commitment (β = 0.74, $p < 0.001$). In Model 5, when the independent variable (calling) and the mediating variable (career commitment) are put into the regression model, career commitment is positively correlated with employee creativity (β = 0.216, $p < 0.05$), and the relationship between calling and employee creativity is significant (β = 0.186, $p < 0.05$). However, the regression coefficient decreases from 0.346 in Model 4 to 0.186 in Model 5, indicating that career commitment is a partial mediator in the relationship between calling and employee creativity. Therefore, hypothesis 2 is supported.

In order to further validate the mediating role of career commitment between calling and employee creativity, we used the SPSS Process macro to conduct the bootstrap test. The results show that the indirect effect value of career commitment is 0.167, and the 95% confidence interval is [0.016, 0.317], not including 0. It shows that career commitment has a significant mediating effect between calling and employee creativity.

The regression results of the moderating effect are shown in **Table 5**. In Model 8, the interaction term of career commitment and responsible leadership has a significantly positive effect on employee creativity (β = 0.167, $p < 0.01$), indicating that responsible leadership strengthens the relationship between career commitment and employee creativity. **Figure 1** illustrates that, unlike when responsible leadership is low, the effect of career commitment on career creativity is stronger when responsible leadership is high. Further simple slope analysis shows that when the level of responsible leadership is low, the regression slope of career commitment on creativity is 0.127, $p < 0.05$.When the level of responsible leadership is high, the

TABLE 2 | Confirmatory factor analysis results.

Model	χ^2	*df*	χ^2 /df	SRMR	CFI	NNFI	IFI
Four factors: C, CC, RL, ER	550.693	183	3.01	0.046	0.916	0.903	0.916
Three factors: C+RL, CC, ER	1196.555	186	6.43	0.091	0.769	0.739	0.770
Two factors: C+RL, CC+ER	1396.114	188	7.43	0.107	0.724	0.691	0.725
Single factor: C+RL+CC+ER	1687.224	189	8.93	0.112	0.657	0.619	0.659

C, Calling; CC, Career Commitment; RL, Responsible Leadership; ER, Employee Creativity.

TABLE 3 | Variable mean, standard deviation and correlation coefficient table.

Items	M	SD	1	2	3	4	5	6	7
1. Age	3.270	0.758	–						
2. Gender	0.349	0.478	−0.143*	–					
3. Education level	3.350	0.910	0.019	−0.239**	–				
4. Working years	2.870	1.182	0.662**	0.025	−0.154*	–			
5.Calling	5.110	1.284	0.134*	−0.088	−0.061	0.080	–		
6. Career Commitment	5.524	1.158	0.058	−0.153*	0.022	0.004	0.738**	–	
7. Responsible leadership	5.296	1.304	0.008	−0.028	0.011	−0.010	0.621**	0.585**	–
8. Employee creativity	4.936	1.337	0.202**	−0.196**	−0.064	0.197**	0.382**	0.380**	0.378**

*$p < 0.05$, **$p < 0.01$.

TABLE 4 | Main effects and mediation effects.

Items	Career commitment model 1	Model 2	Creativity model 3	Model 4	Model 5
Age	0.061	−0.041	0.089	0.041	0.050
Gender	−0.149*	−0.083	−0.209**	−0.178**	−0.160*
Education level	−0.020	0.045	−0.095	−0.065	−0.075
Working years	−0.036	−0.019	0.129	0.137	0.141
Calling		0.740***		0.346***	0.186*
Career commitment					0.216*
R2 value change	0.026	0.531	0.090	0.116	0.021
F value change	1.408	53.342***	5.281***	31.090***	5.642*

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

TABLE 5 | Moderation effect.

Items	Employee creativity model 6	Model 7	Model 8
Age	0.089	0.072	0.049
Gender	−0.209**	−0.173	−0.187
Education level	−0.095	−0.092	−0.087
Working years	0.129	0.141	0.144
Career commitment		0.200**	0.250**
Responsible leadership		0.258**	0.256**
Career commitment ×Responsible leadership			0.167**
R^2 change	0.090	0.165	0.025
F value change	5.281***	23.379***	7.248**

**$p < 0.01$, ***$p < 0.001$.

regression slope of career commitment on creativity is 0.451, $p < 0.001$. Therefore, hypothesis 3 is supported.

In addition, the SPSS PROCESS macro was used to further examine the moderated mediation effect. As shown in **Table 6**, in the context of low responsible leadership, the indirect effect of career commitment through the relationship between calling and creativity is non-significant, with a 95% confidence interval (CI) of [−0.167, 0.221]. In the context of high responsible leadership, career commitment has a significant mediating effect on the relationship between calling and employee creativity, with a 95% CI of [0.094, 0.449]. This suggests that the mediating effect of career commitment is affected by different levels of responsible leadership. That is, the higher the responsible leadership, the stronger the mediating effect of career commitment. Moreover, the index of moderated mediation shows that the indirect effect of career commitment on the relationship between calling and

employee creativity is significant (95% CI: [0.012, 0.152]). The moderated mediation effect is further validated.

Implications

This study has some theoretical contributions. First, previous studies have explored the positive relationship between calling and work outcomes (e.g., Hirschi and Herrmann, 2012; Duffy and Dik, 2013), but only a few have linked calling to employee creativity. In today's business world, the internal and external environments of organizations are undergoing unprecedented changes. Employee creativity is the foundation of enterprise innovativeness, which is considered the most significant competitive advantage. Therefore, this study shows that calling plays an important role in stimulating employee creativity. Second, this study introduces career commitment as a mediator in the model. Although previous literature has identified a positive relationship between calling and career commitment (e.g., Duffy et al., 2011), we explore their effects on employee creativity, which can extend the domain of relevant theories. Third, this study examines the moderating effect of responsible leadership on the model. Previous studies on responsible leadership have mostly focused on its effect on work outcomes, such as job performance and organizational citizenship behavior, and have ignored the role of responsible leadership on employees' creative behavior. This study tests the role of responsible leadership in promoting employee creativity, which enriches the relevant theory and provides a new research direction for the future. In addition, this study finds that an individual's personal character and leadership style can interact to influence employee creativity. This provides a multi-angle and multi-level thread for future research in this area.

In terms of practical implications, this study shows that calling enhances career commitment and stimulates creative behavior. Therefore, to promote employees' innovativeness, employers should make efforts to improve employees' calling and career commitment. Specifically, managers should optimize the design of work tasks. Specific strategies include delegating authority to enhance employees' sense of calling. The sense of calling experienced by employees from these tasks can help them invest more time and energy in creating. Reasonable standards should be set around work objectives to meet employees' subjective value perception. Managers should also enrich the work content, expand work responsibilities, establish reasonable promotion channels, and strengthen work communication and contact with staff. These methods can make employees feel important in a team or organization, enhancing their self-efficacy. Moreover, in the process of building organizational culture, employers should emphasize organizational mission and vision and strive to seek the fit between organizational mission and employees' sense of calling. Lastly, the results show that responsible leadership can encourage employees to transfer calling and career commitment to substantive creative behavior, which provides a basis for leaders to stimulate employee creativity. Leaders should try to play the role of "responsible leadership" to give employees more autonomy and freedom and to actively convey trust to employees. This will give employees space for self-development and enable them to work in a more proactive manner to stimulate creativity in the organization. For employees, they should actively cultivate their sense of calling by identifying the meaning and value in their work. They should make efforts to improve work efficiency and enrich work content to make them feel a "sense of participation," thereby enhancing their sense of calling.

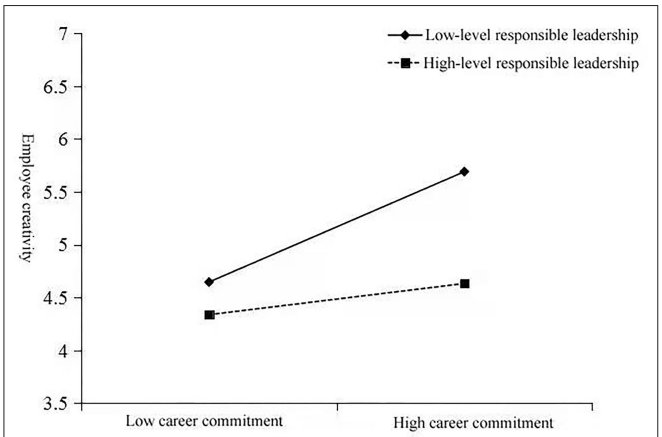


FIGURE 1 | Interaction of career commitment and responsible leadership on employee creativity.

LIMITATION

This work has some limitations. First, this study used cross-sectional data; thus, dynamic changes in the focal variables were not observed. Therefore, we suggest that scholars conduct longitudinal research in the future to further verify the dynamic correlations between the variables to acquire more rigorous and robust conclusions. Second, the current study collected data through a questionnaire survey, which was not able to examine causal relationships. Future research should adopt an experimental method to verify the causal relationship between the variables. Third, we adopted self-report data in this

TABLE 6 | Results of the moderated mediation effect.

Mediator	Level of moderator	Indirect effect	SE	95% CI	Index	SE	95% CI
Career commitment	Mean-SD	0.043	0.099	[−0.167, 0.221]	0.084	0.036	[0.012, 0.152]
	Mean	0.152	0.083	[−0.013, 0.315]			
	Mean+SD	0.261	0.092	[0.094, 0.449]			

study, which could have caused common method bias. Future studies should collect multi-source and even multi-level data to strengthen the validity of the conclusion. Lastly, only 218 valid samples were included in this study. Future research should replicate the study with a larger sample. In addition, based on the scope of this research, we focused on employees from Internet companies. In the future, researchers can collect data from other industries and make cross-industry comparisons to generate a more universal theory.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

JL designed the study, completed literature search, and paper writing. WC contributed to hypothesis development and the parts of Implications and Limitation. YR was in charge of data collection and analysis. All authors contributed to the article and approved the submitted version.

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National Culture and Culinary Exploration: Japan Evidence of Heterogenous Moderating Roles of Social Facilitation

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This article explores the role of national culture in the culinary consumption behavior of international tourists and the moderating influence of different types of travel companions. Study 1 adopted a text-mining, topical modeling approach to process useful reviews (n = 7,803) posted at TripAdvisor by users from 86 countries. Study 2 develops and tests a conceptual model of the relationships between national culture and culinary choices including culinary types and range of culinary choices, based on a secondary dataset of large-scale surveys from the tourism authority of the destination containing 9,141 responses by tourists from over 60 countries or regions. The results reveal that both Uncertainty Avoidance and Individualism-Collectivism have significant effects on tourist food consumption categories and the range of culinary choices. The study also evaluated the role of the moderating effect of travel companions, and results supported the significant relationship on the range of culinary choices when the tourists were accompanied by different types of travel companions.

Keywords: travel companions, user-generated content, culinary consumption, uncertainty avoidance, individualism-collectivism

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INTRODUCTION

Food is considered an essential part of a culture and the food preferences of tourists are shaped by their cultural background (Jia, 2020; Kim and Huang, 2021). Tourism scholars have generated valuable insights into national culture and tourist experiences (Seo et al., 2012; Li and Katsumata, 2020), by drawing on the framework of cultural dimensions by Hofstede (1980). However, most studies are limited to comparing tourists from two or three cultures based on relatively small samples and those based on the framework of Hofstede often focus on a single dimension of the framework (Jia, 2020). Moreover, despite the interesting findings reported in the extant literature, little is known about how the variations along the cultural dimensions influence tourist exploration of local food at a foreign destination.

The Japanese culture emphasizes experiencing a variety of authentic cuisines closely related to a destination, thus, Japan promotes its tourism industry by marketing specialty seasonal food products known as Meibutsu. Regarding Japanese cuisines, according to Japanese tourism authorities and previous studies (Kim, 2015; Kim and Ellis, 2015; Japan National Tourism Organization, 2020; Osaka Convention and Tourism Bureau, 2020), Japanese daily cuisines including Japanese noodle, Takoyaki, Okonomiyaki, Kushikatsu, Yakitori, Izakaya food, and Bento

as Japanese casual daily cuisines, while Sukiyaki, Teppanyaki, Kaiseki, and Kappo are segmented into traditional Japanese luxury cuisines. According to statistics from Osaka Convention and Tourism Bureau, the consumption rates of Japanese casual cuisines by tourists were Ramen (67%), Takoyaki (51%); while Japanese luxury cuisines were less popular, including Sukiyaki (9%), Shabushabu (8%), Kaiseki (7%), and Kappo (3%) (see **Table 1**).

The cultural framework created by Hofstede has been widely applied in various studies of international business and management to explain a range of phenomena, including the difference between countries/regions at the national, organizational, and individual levels. From the micro perspective, most studies focused exclusively on Uncertainty Avoidance (UAI) and Individualism-Collectivism (IDV), two dimensions that have become widely accepted in different fields of studies and have generated stable and reliable results at individual outcomes (Shavitt and Barnes, 2020; Watts et al., 2020). In food tourism literature, Jia (2020) found a link between individualism/collectivism and restaurant evaluation as U.S. tourists (individualism) tend to focus on occasion-related topics, while Chinese tourists (collectivism) tend to discuss more food-related topics. From the macro perspective, a series of reviews of the literature suggests that "Power Distance," and "Masculinity-Femininity" have theoretical relevance for the empirical research at the organization or/and country levels (Kirkman et al., 2006, p. 310, 2017), and as this study focuses on the individual level, these two dimensions are not examined in this study. Additionally, "Indulgence versus Restraint" is theoretically relevant at the organization level as well and relatively less applied to empirical studies, and "Long-term versus Short-term Orientation" is most relevant to Asian cultures (Dimitratos et al., 2011), not suited for studies focusing on multinational tourists. Therefore, these two dimensions are not examined in this study, either.

Unlike many cultures and tourist behavior studies that examine only a single culture dimension and rely on rather small samples of tourists from two or three cultures, we simultaneously examine two dimensions (UAI and IDV). In Study 2, the research context of this study is Osaka (Japan), we employ a large sample ($n = 9{,}141$) of data collected over 2 years by the Osaka Convention and Tourism Bureau (OCTB), and the results can closely reflect the diversity of international tourist. The findings of this study have practical implications for destination marketing organizations to promote local food (Rousta and Jamshidi, 2020), and in turn, food image provides tourists with extradentary and memorable local culinary experience (Kim and Huang, 2021). Osaka is situated near the sea and has been a commercial center since the Edo period, together with fish and seashells are abundantly available, and cuisines are easily transportable from other areas, Osaka has been named the "Kitchen of the Nation" in Japan. More recently, Osaka city as the capital of Osaka Prefecture ranked as the third and fourth most livable of the 140 cities surveyed by The Economist Intelligence Unit in 2018 and 2019, respectively (The Global Liveability Index, 2019). It is the host city for the 2025 World Expo. Osaka is a critical transportation hub linking Kyoto and Nara, the cultural capital of Japan, and attracts tourists from over the world. The number of international tourists traveling through the Kansai International Airport in Osaka is roughly half of all international tourists to Japan in the past two decades (see **Figure 1**).

The cultural framework created by Hofstede is considered the classic theory for analyzing cultural differences and tourist behaviors (Li and Katsumata, 2020; Li J. et al., 2021). The cultural dimensions have been applied for developing insights into the relationships between culture and tourist experiences and satisfaction. Jia (2020) who find a link between individualism/collectivism and restaurant evaluation, i.e., U.S. tourists (individualism) tend to focus on occasion-related topics, while Chinese tourists (collectivism) tend to discuss more food-related topics. However, little is known about the impact of cultural dimensions on the culinary consumption of international tourists, such as the differences in food-related topics in social media, consumption of category-specific cuisines (e.g., luxury versus daily), and the range of culinary choices. Moreover, the role of activity companions has been well studied in retailing, including enhancing the perceived hedonic value and relieving the anxiety of consumers (Li X. et al., 2021) and stimulating consumption (Clauzel et al., 2019); and influencing the emotional arousal of tourists (Su et al., 2020). However, the role of different types of travel companions in tourism literature is limited, while such knowledge is important not only for tourism organizations but also the core element of considering re-design of service in hospitality.

The main objective of this study was to bridge the aforementioned gap in tourism literature by empirically examining the impacts of national culture on culinary experiences. Specifically, we examined the following. Firstly, we examined whether national culture impacts tourist category-specific culinary consumption (luxury vs. daily) and the range of food choices. Secondly, if so, we investigated how these effects are moderated by the different types of travel companions. Two empirical studies were designed. Study 1 aimed to explore the similarities and differences of culinary experiences by the two cultural dimensions of UAI and IDV. In Study 2, we proposed several hypotheses related to the relationships among national culture, culinary consumption, and travel companions.

This research contributed to the tourism literature in several ways. First, we provided new evidence of cross-cultural differences and the consumption experiences of tourists of local food at the destination, as well as revealed the effect of travel companions on the relationship between cross-cultural differences and the consumption experiences of tourists of local food at the destination. Even tourists from high-UAI cultures, under the context of being companied by friends, are apt to consume a greater range of food and daily cuisines. Moreover, this research extended the literature by showing tourists from collectivistic cultures traveling with family members, friends, and colleagues showed a greater range of food choices than those traveling alone, and which further leads to enhance satisfaction and revisit attention. Second, we developed a conceptual framework between national/regional culture and tourist consumption of local cuisines in the specific aspects of choice of luxury cuisines versus daily cuisines and the range

TABLE 1 | Cuisines and consumption rates in Osaka, Japan.

Categories	Description	*n*	%	Japanese luxury cuisine	Japanese daily cuisine	Total cuisines
Ramen	Japanese noodle	3062	67		✓	✓
Sushi	It is made of raw fish, shrimp, shell, etc., combined with rice, and pressed by hand	2462	54	✓		✓
Takoyaki	Osaka fast food and sold at roadside stalls	2329	51		✓	✓
Udon, Soba	Japanese noodle. Udon is made of thick wheat flour; Soba is made of buckwheat	1830	40		✓	✓
Tempura	Battered and deep-fried vegetables and seafood	1476	33		✓	✓
Okonomiyaki	Japanese savory pancake or Japanese pizza	1298	29		✓	✓
Yakiniku	Luxury beef, including Kobe beef and Matsuzaka beef	1278	28	✓		✓
Seafood	Japanese style seafood including Fugu (blowfish), crab, sashimi	1084	24	✓		✓
Bento	It is a common ingle-portion take-out meal	1004	22		✓	✓
Yakitori	Skewered chicken, sometimes offering chicken sashimi	810	18		✓	✓
Izakaya food	Informal Japanese bar that serves simple food and alcoholic drinks	601	14		✓	✓
Kushikatsu	Deep-fried panko crusted meat and vegetable	577	13		✓	✓
Sukiyaki	Luxury Japanese hotpot, usually served with rare egg and sweet sauce	431	9	✓		✓
Shabushabu	Japanese hotpot served with dipping sauces, which is more savorer and less sweet compared with Sukiyaki	364	8	✓		✓
Kaiseki	The sophisticated way of Japanese dining, usually elaborately prepared cuisines served artistically in a formal dining room	305	7	✓		✓
Kappo	Multi-coursed high-end Japanese cuisine	122	3	✓		✓

Respondents reported the categories among the above 16 listed restaurants (1 = yes, 0 = no) of dining during their stay in Osaka. The source of description: Osaka Convention and Tourism Bureau and Japan National Tourism Organization.

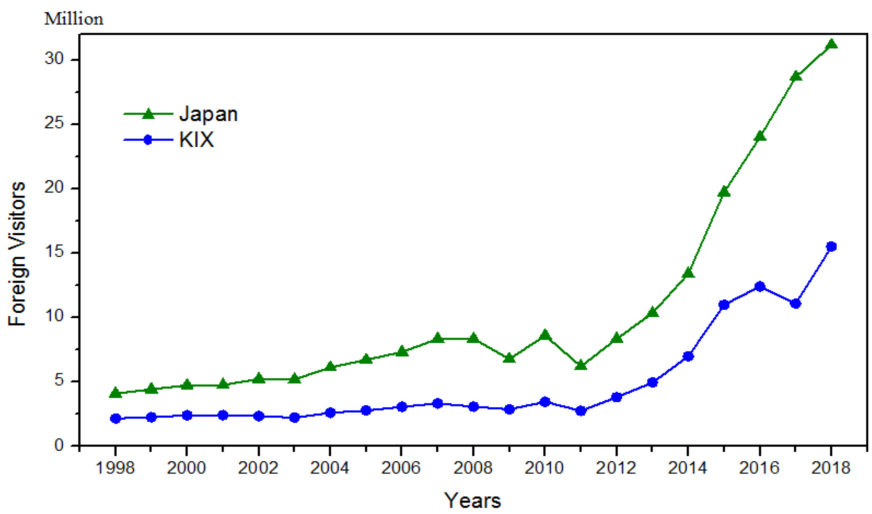


FIGURE 1 | Trends of foreign visitors to Japan and Kansai International Airport (KIX). Osaka Convention and Tourism Bureau (OCTB), and New Kansai Airport Company Co., Ltd.

of food choices. Tourists from high-UAI cultures are more likely to consume luxury cuisines, whereas driven by curiosity, those from lower ones are more likely to be novelty-seeking in food by exploring the local cuisines and inexpensive daily food in the local markets (Hsieh and Chang, 2006). Third, we offered a methodological contribution by synthesizing two empirical studies using different data sources: TripAdvisor and the official tourist survey of the destination tourism authority in addressing the research problem. In design is innovative and robust in that it adopts a machine learning netography approach and triangulates the findings with those from a secondary dataset of large-scale surveys from the tourism authority of the destination. We provided a new, detailed framework on how to use hierarchical Latent Dirichlet Allocation and several other algorithms supplemented with manual interpretation to derive insightful findings from User-Generated Content. Finally,

the results of this study offered important implications for destination marketing.

LITERATURE REVIEW

Cross-Cultural Factors and Food Tourism

Food is considered an essential part of a culture, and the food preferences or evaluations of tourists are shaped by their cultural background (e.g., Jia, 2020). Food consumption is not just to satisfy our physiological needs but also to social and psychological needs. Dining provides opportunities for individuals to socialize, and to develop a sense of cultural identification, which is also a source for developing cultural links between different countries (Jia, 2020).

The study of Hofstede (1980) initially proposes four cultural dimensions in the cultural framework: "Power Distance," "Uncertainty Avoidance," "Individualism-Collectivism," and "Masculinity-Femininity." The work of Hofstede (2001) later adds the Confucian dynamic of "Long-term versus Short-term Orientation" and combines the dimension of "Indulgence versus Restraint." As argued by Hofstede (2001), these cultural dimensions are the shared assumptions among members of a particular cultural group, and people from different cultural backgrounds will have different views about what is appropriate in various situations. Our work focuses on the two dimensions of Uncertainty Avoidance and Individualism-Collectivism.

Uncertainty Avoidance refers to the extent to which uncertainty is undesirable and people attempt to avoid it (Hofstede, 2001). Members of high-UAI cultures feel threatened with uncertain or unknown environments and have a strong need for clarity and security. Formality, written rules, or unwritten social norms provide certainty and a sense of security (De Mooij and Hofstede, 2002). Compared with people from low-UAI cultures, they are less open to new experiences and appear to be conservative. In the context of gastronomic consumption, high-UAI consumers are less likely to try new cuisines, have a limited range of food choices (Tse and Crotts, 2005). However, the research of Seo et al. (2012) find that foreign expatriates in South Korea who are from high-UAI cultures tend to perceive Korean foods as expensive and dine out less often than those from low ones, and they do not find significant differences between the two groups in attitudes, understanding, preference, satisfaction, and behavioral intentions with regards to Korean food or restaurants.

Individualism-Collectivism refers to the degree to which the welfare of the individual is valued more than the group (Hofstede, 2001). Members of the individualistic society are "me-oriented"). Their personal interests are seen as more important than group interests. They see themselves as independent from each other. The social networks in individualistic societies are rather loose. Members value their personal belief and their behaviors are guided more by their own interests and preferences than group ones (Oyserman et al., 2002). In contrast, members of collectivist society are "we-oriented," they value the interests and social norms of their group. The social networks are fairly tight in a collective society, collectivists value the opportunity of interpersonal interaction and group membership is an important aspect of their identity (Gilboa et al., 2020). In addition to themselves and immediate families, collectivists also care about friends and other members of their group. Their behaviors are usually guided by group expectations and social norms (Torelli and Shavitt, 2010; Cao et al., 2021; Zhou et al., 2021). Collectivistic cultures emphasize the positive emotional value of culinary consumption on social occasions as a driving force of negotiating and fostering social relationships, bridging communication, and reinforcing a sense of belonging (Kim et al., 2020). Specifically, dining out together when traveling abroad can deepen interpersonal affection (Kim and Eves, 2012), and to the benefit of building new social relations and strengthening social bonds (Mak et al., 2012).

Overall, several studies have compared Western tourists and Asian tourists and suggested that Asians are less willing to challenge novel and unfamiliar cuisines while traveling abroad. The study of Cohen and Avieli (2004) indicate that Asians tend to be less novelty-seeking and more dependent on restaurants that provide their home cuisines. Japanese tourists are less inclined to culinary novelty-seeking when compared with American and Canadian tourists (Sheldon and Fox, 1988), and Koreans have a strong preference for their national cuisines (March, 1997). Within the western cultures, French customers (high-UAI) are more accepting of recommendations from waiters than those from English-speaking countries who (low-UAI) prefer to make consumption decisions by themselves (Cohen et al., 2009). Nevertheless, there are variations among Asian or Western cultures and food consumption behavior.

The cultural framework created by Hofstede has been widely applied in various studies of international business and management to explain a range of phenomena, including the difference between countries/regions at national, organizational, and individual levels. From the micro perspective, most studies focused exclusively on UAI and IDV, two dimensions that have become widely accepted in different fields of studies and have generated stable and reliable results at individual outcomes (Sekiguchi, 2006; Shavitt and Barnes, 2020; Watts et al., 2020). In food tourism literature, Jia (2020) found a link between individualism /collectivism and restaurant evaluation as U.S. tourists (individualism) tend to focus on occasion-related topics, while Chinese tourists (collectivism) tend to discuss more food-related topics. From the macro perspective, a series of reviews of the literature suggests that "Power Distance" and "Masculinity-Femininity" have theoretical relevance for the empirical research at the organization or/and country levels (Kirkman et al., 2006, p. 310, 2017), and as this study focuses on the individual level, these two dimensions are not examined in this study. Additionally, "Indulgence versus Restraint" is theoretically relevant at the organization level as well and relatively less applied to empirical studies, and "Long-term versus Short-term Orientation" is most relevant to Asian cultures (Dimitratos et al., 2011), not suited for studies focusing on multinational tourists. Therefore, these two dimensions are not examined in this study, either.

Travel Companions and Their Impact on Culinary Experience

The presence of a travel companion can impact tourist behavior and decision-making in a foreign unfamiliar destination, travel companion can assist in decision-making through providing information and mental support, which reduces risk perception and enhance satisfaction. The travel companion might be friends or peers, family members, and colleagues, etc. Significantly research had examined the differences in behaviors when the consumer is alone versus with someone. In the Marketing literature, the impact of shopping companions has been well examined, including the influence of spending (Yim et al., 2014), shopping experience (Li X. et al., 2021). Additionally, the study of Borges et al. (2010) identified the type of shopping companion significantly impacts on hedonic shopping value, shoppers express more positive emotional effect and hedonic shopping motivation of accompanied by friends in relation to either shopping with family members or alone. In the context of tourism, travel companions have been repeatedly examined as a control variable (Li and Katsumata, 2020). Little research qualifies the mediating or moderating effects of travel companions (Su et al., 2020). More specifically, the outcome of differences among the type of travel companions has been neglected in the tourism literature. Thus, this research questions the moderating effects of travel companions on the relationship between national culture and culinary consumption by qualifying the type of person tourist travels with, e.g., partner vs. family vs. friend vs. colleague.

STUDY 1: EXPLORING TOURIST CULINARY EXPERIENCE THROUGH SOCIAL MEDIA ANALYTICS

Study 1 attempted to provide a better understanding of what types of culinary experiences matter most to tourists from different cultural backgrounds. Specifically, we applied the User-Generated Content posted on the travel platform TripAdvisor.com to answer the following two research questions.

(a) *Are there any differences in culinary experiences between tourists from high and low Uncertainty Avoidance groups?*
(b) *Are there any differences in culinary experiences between tourists from high and low Individualism-Collectivism groups?*

Social Media Analytics in Tourism Research

The breathtaking growth of social media has attracted increasing attention from researchers in marketing and tourism (Jia, 2020; Sun, 2021; Sun et al., 2021). Tourism scholars focus on three fields regarding the content: "What is the mining"; "who post the content"; and "why do they post?" (Leung et al., 2019). Due to the nature of our study, we explore the "who posts the reviews" (what cultures those tourists are from) and "what are the reviews" (various experiences of tourists). Previous studies have proposed multiple frameworks for these two tasks. For example, the study of Vu et al. (2019) utilize restaurant reviews to analyze tourist dining preferences. The recent development of machine learning and artificial intelligence models enables researchers to deal with the limitations of traditional methods. Various Natural language processing models are available as well, such as sentiment analysis (Alaei et al., 2019) and topic modeling (Jia, 2020). However, the results generated from machine learning models are at an aggregated level, losing the fine details at the individual, micro-level, which are valuable to generate in-depth knowledge. Moreover, although the sample sizes of social media contents are normally much larger than those collected from traditional research methods, yet the representativeness of the samples is limited to those who posted the comments, while those who did not are missed out. Therefore, our research integrates both traditional and machine learning methods to complement each other.

Data Crawling and Cleaning

A total of 36,091 pieces of User-Generated Content commenting on restaurants in Osaka were retrieved by applying ScrapeStorm (2019), a crawler software. Each review contained *restaurant names, cuisines, review comments, user location,* whereas topics are not relevant to the restaurant and culinary services were removed, and reviewers whose places of origin are Japan are further removed. After the data cleaning, 7,803 reviews remained which were posted by tourists from 86 countries. The data was divided according to the places of origin of the reviewers into four cultural groups using the two dimensions of UAI and IDV. More specifically, the median of the cultural score calculated from 86 countries in this study, if the assigned score of a country is higher than the median of the assigned culture score, we categorize the country as high-UAI (IDV) group. **Table 2** shows the locations and proportion of reviewers, and **Table 3** shows the data distribution of these four groups.

Data Analysis

The unstructured review data were transformed to generate the *corpus* and *vocab* by performing a series of Natural Language Processing procedures as follows. First, we only extracted reviews posted in English as the hierarchical Latent Dirichlet Allocation algorithm could only process English. This step was followed by using the text tokenization algorithm in the Natural Language Processing package (Loper and Bird, 2002), in which the reviews were split into words called tokens. An algorithm was applied to convert all tokens to lower case and the PortStemmer module in the package converted those tokens into root form. For example, "service," "servicing," "services," and "serviced" mean the same thing, accordingly, stemming those words into "service" can improve the performance of the topic modeling algorithm. According to Vu et al. (2019), English noun words normally refer to interested entities, and therefore only nouns have been retrieved from the stemmed tokens. Further, the stop words were removed, which are normally in English sentences, whereas most of the time are meaningless for User-Generated Content analysis, such as "will," "you," "I," etc. The Natural Language Toolkit package (Loper and Bird, 2002) collected usual stop words and

TABLE 2 | The top 20 locations and proportions of reviews.

Country	No. of reviews
United States	1272
Singapore	1007
Australia	895
Great Britain	605
Hong Kong	584
Philippines	382
Malaysia	354
Canada	335
Thailand	291
Indonesia	231
China	177
Korea South	145
Italy	136
Switzerland	129
Taiwan	129
France	118
Netherlands	109
Spain	106
Germany	97

TABLE 3 | Data distribution by cultural groups.

Cultural groups	No. of reviews	Proportion (%)
High-UAI	812	10
Low-UAI	7161	90
High-IDV	4208	53
Low-IDV	3765	47

we added some extra words into the list, such as the name of the restaurant, "place" and "restaurant." After that, the tokens were loaded to the *corpus* and *vocab* variables and utilized in the topic modeling.

In this study, hierarchical Latent Dirichlet Allocation was adopted to explore User-Generated Content commenting on restaurants in Osaka by the international tourists who reside in different outbound markets. Hierarchical Latent Dirichlet Allocation is a non-parametric extension of Latent Dirichlet Allocation developed by Blei et al. (2010). It is an unsupervised topic modeling algorithm to cluster natural languages into various topics, such as reviews or comments. Hierarchical Latent Dirichlet Allocation has been commonly used in the marketing disciplinary (Toubia et al., 2019; Jia, 2020) and with two advantages compared with the traditional one: (a) instead of manually providing the topic number K in Latent Dirichlet Allocation algorithm, hierarchical Latent Dirichlet Allocation can generate topics automatically without given any topic number parameter; and (b) hierarchical Latent Dirichlet Allocation algorithm can present the topics in a hierarchical structure. In this study, we used the hierarchical Latent Dirichlet Allocation package written by Reades (2019) in Python 3. The final results were then transformed and visualized in the work of Flourish (2020).

Findings

By adopting scored cultural dimensions of Hofstede (2015) based on the home cultures of reviewers, we utilized the algorithm to classify the reviews in four different cultural groups: high/low-UAI; high/low-IDV. The distribution of the User-Generated Content is shown in **Figures 2A,B**.

Culinary Experience of High/Low Uncertainty Avoidance Group

High Uncertainty Avoidance Group

This group contained 812 pieces of User-Generated Content from 32 countries/regions, and the detailed information is shown in **Figure 3**. The top five keywords under the main topics are including *sushi, food, menu, time,* and *staff*. The keywords indicate that *sushi* is the most popular cuisine among tourists from high-UAI cultures. The *menu* is another important keyword when foreign tourists reviewed those restaurants. Most tourists mentioned whether they can understand the Japanese language and choices on a menu. The keyword *time* mainly refers to the frequency of enjoying the favorite food of an individual. *Staff* is mainly indicating service quality.

The sub-topics extracted from the hierarchical Latent Dirichlet Allocation algorithm show that other major topics discussed by the high-UAI group include *fish*, *beef*, *crab*, *Udon*, and *Gyoza* (dumplings). Tourists also frequently mentioned their hedonic culinary experience including words such as *wonderful*, *nice*, *relaxed*, *love*, *favorite*, and *right*. For example, an Italian tourist posted, "The sushi was wonderful and handmade in front of our eyes!". Moreover, tourists in this group frequently mentioned travel companions within sub-topics. A Belgian tourist reviewed as "Maybe it's just our taste, but neither my husband and I liked it."

Low Uncertainty Avoidance Group

This group contained 812 pieces of comments from 54 countries/regions, and **Figure 4** visualizes the hierarchical structure of the topics generated from the hierarchical Latent Dirichlet Allocation algorithm. The top five keywords under the main topics are including *okonomiyaki*, *dinner*, *time*, *eat*, and *wait*. It shows that tourists from low-UAI cultures are more likely to consume the okonomiyaki (a popular Japanese street food). The meaning of the three keywords *dinner, time* and *eat* are straightforward and similar to the keywords discussed by high-UAI tourists. Moreover, tourists in this group frequently mentioned *waiting*, which is mainly about the waiting time of being served including the queuing time. According to the results of the hierarchical Latent Dirichlet Allocation algorithm, this group also contains sub-topics, including *food*, *sushi*, *menu*, *staff*, and *beef*.

Comparison Between High/Low Uncertainty Avoidance Groups

The two groups showed different food preferences. According to the classification in **Table 1**, the high-UAI group focused on luxury cuisines such as fish, beef, and crab, whereas the low ones

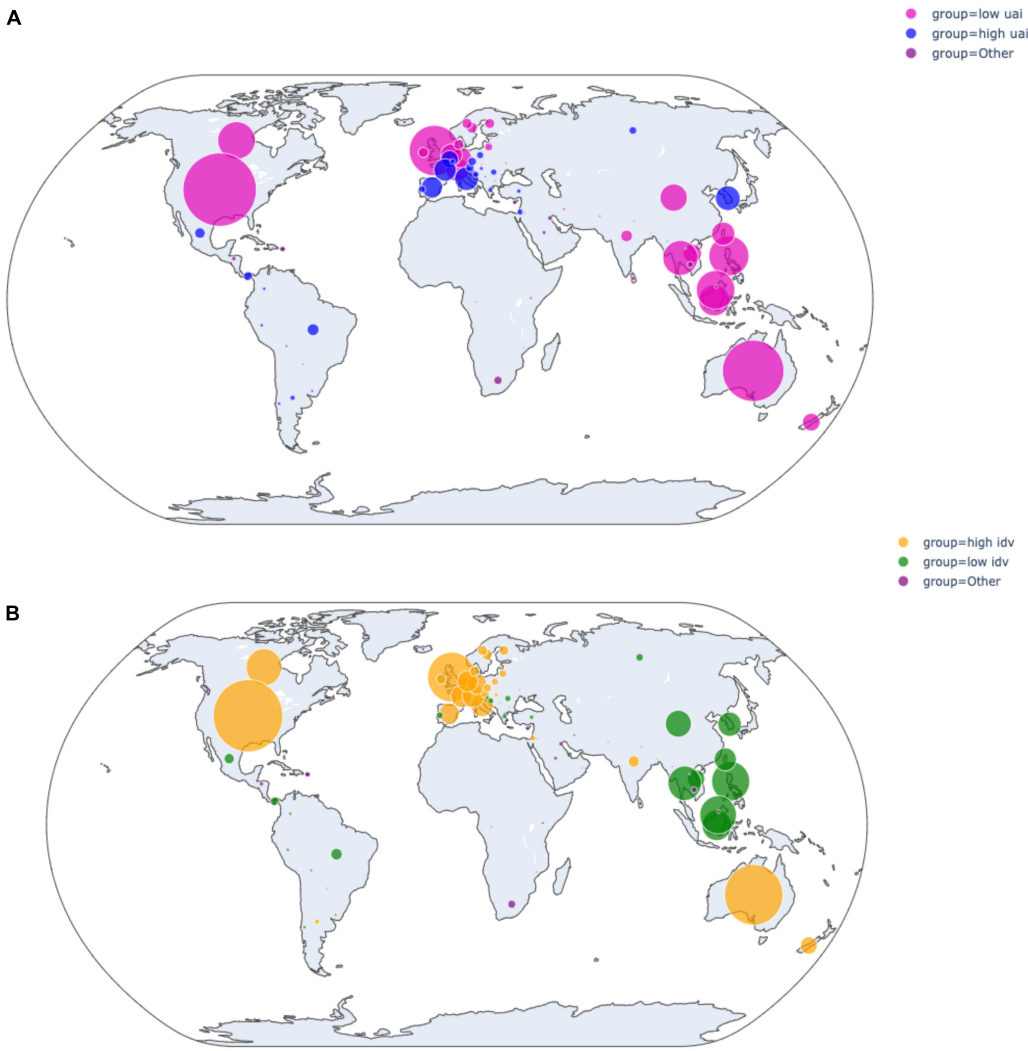


FIGURE 2 | (A) Distributions of reviews from high and low-UAI. **(B)** Distributions of reviews from high and low-IDV.

focused on daily local cuisines, such as *okonomiyaki*. Moreover, the high-UAI group seemed to dine out with travel companions (e.g., sister or husband) and had a greater range of food discussed than the low ones, such as *fish*, *udon*, *crab*, *pork*, and *gyoza*. Nevertheless, there are several common topics in both groups, such as staff and customer services.

Culinary Experience by High/Low Individualism-Collectivism

Individualism Group

This group contained 4,298 pieces of User-Generated Content from 30 countries/regions, and **Figure 5** presents the topic visualization. The keywords in the root topics discussed by this group are *beef*, *okonomiyaki*, *wait*, *meat*, and *eat*. The most popular Japanese cuisines for this group are *beef* and *okonomiyaki*. According to the User-Generated Content, the two most popular and expensive kinds of beef are Matsuzaka Beef and Kobe Beef. *Okonomiyaki* is one of the most popular cuisines among tourists in collectivist groups. The results also showed that, for the individualism group, waiting time is the major issue in their culinary experience. In addition to the main topic, the sub-topics show that the tourists in this group paid much attention to staff and services.

Collectivism Group

This group contained 3,765 pieces of User-Generated Content from 56 countries/regions. Keywords under the main topics are *beef*, *set*, *price*, *dining*, and *food*. **Figure 6** presents the topic visualization. The results indicate the most popular food is *beef*. The second keyword *set* suggests that this cultural group focuses on the food in the set. The keyword *price* suggests that price is another hotly discussed topic. The sub-topics suggest that tourists from collectivistic cultures include *menu*, *customer service*, and *placing orders*, which are largely related to language and customer services.



FIGURE 3 | Topics discussed by the group high-UAI.

Comparison Between High/Low Individualism-Collectivism Group

The differences between these two cultural groups are noteworthy. The root topics of the two groups indicate that tourists from individualistic cultures pay much attention to the quality of the food and the waiting time before they were served. However, collectivism focuses more on economic aspects, such as price or set, than the other group does.

Study 1 revealed the various topics discussed by tourists from different cultures. However, the data are limited to User-Generated Content in English, leaving out those in other languages. In addition, the level of statistical significance for the differences is not known. Study 2 aimed to develop and empirically test the relationships between the two cultural dimensions and the culinary consumption behavior of international tourists.

STUDY 2: HYPOTHESIS DEVELOPMENT AND EMPIRICAL TESTING

Study 2 developed and tested a conceptual model of the culinary experiences of international tourists by the two cultural dimensions of UAI and IDV with different types of companions (partner versus family versus couple versus friend versus colleague), as shown in **Figure 7**. We focused on the

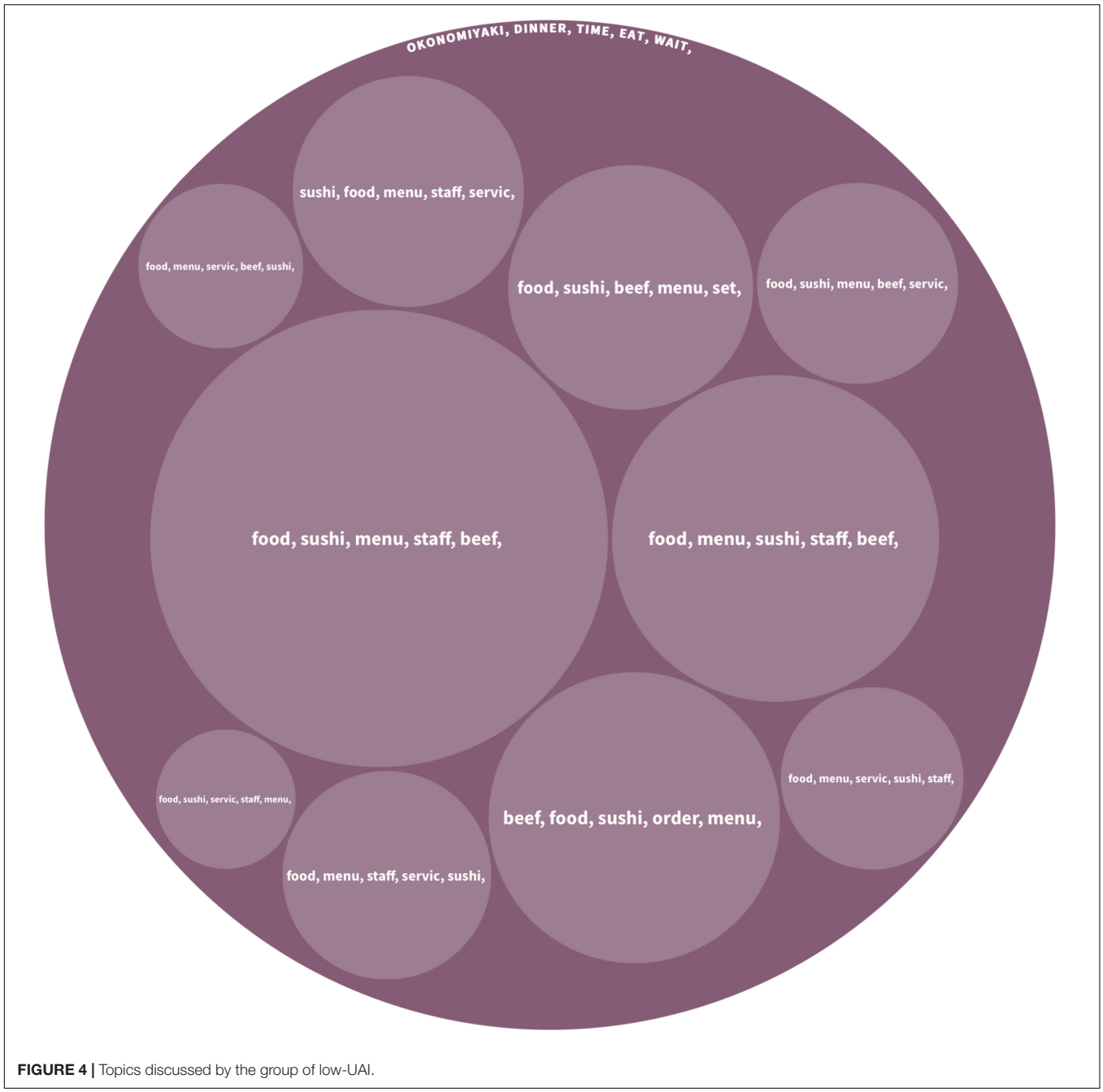


FIGURE 4 | Topics discussed by the group of low-UAI.

category-specific culinary consumption of international tourists (luxury versus daily cuisines) and the range of culinary selection.

Hypothesis Development

Cultural Influence and Culinary Consumption

As discussed earlier, previous studies have suggested that tourists from different cultural backgrounds show different food preferences at a travel destination. Since tourists from risk-avoiding cultures have a strong need for clarity and security in an unfamiliar environment, traditional restaurants that offer formal dining, purity in food, or luxury cuisines are more favored than the informal dinner environments such as street food and night markets (De Mooij and Hofstede, 2002). They may try to reduce risk by consuming familiar cuisines, tourism-oriented food, or luxury cuisines in a sheltered environment (Cohen and Avieli, 2004). Since tourists from novelty-seeking cultures tend to show high interest in local dishes, visiting local markets and eating at roadside stalls or night markets, which indicates that they are likely to consume daily cuisines at overseas travel destinations.

H1a: *Tourists from high-UAI cultures are more likely to consume luxury cuisines.*

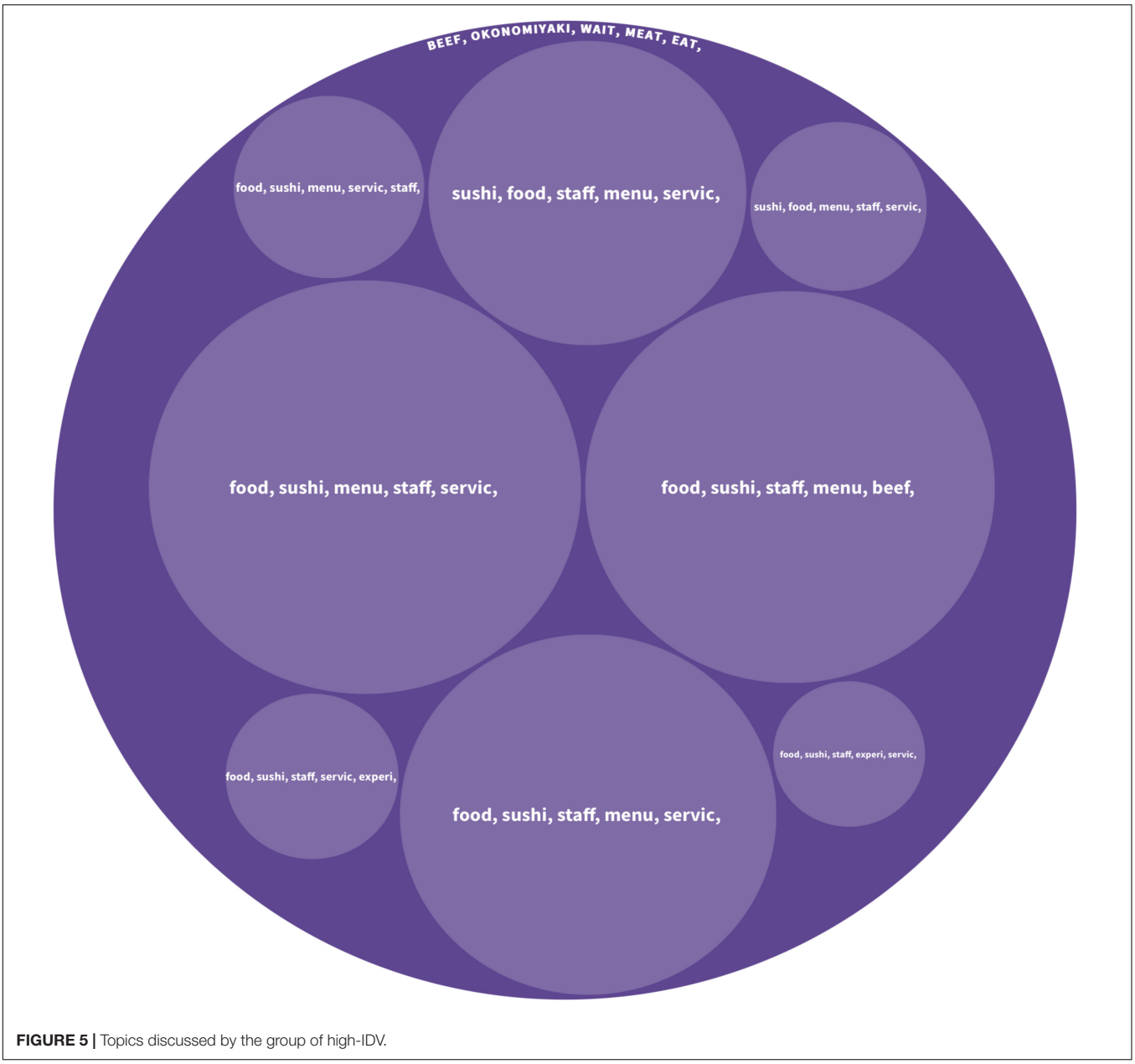


FIGURE 5 | Topics discussed by the group of high-IDV.

Tourists from low-UAI cultures are more likely to "play with risk," and more likely to be attracted by local cuisines at venues such as night markets, which are mostly inexpensive daily food (Hsieh and Chang, 2006). Pizam and Sussmann (1995) find that tourists from Japan, France, and Italy tend to avoid local food at travel destinations, while those from the U.S. tend to patronize local restaurants. Such results seem to be correlated with the ratings of UAI: Japanese, French, and Italian have a high-UAI score than Americans (Hofstede, 2015). According to the cultural framework, tourists from low-UAI cultures are more risk-seeking, enjoy adventure-seeking activities, thus they are likely to try various cuisines (Tse and Crotts, 2005), thereby increasing their culinary variety-seeking behaviors at overseas travel destinations. Therefore, we hypothesized that:

H1b: *Tourists from low-UAI are more likely to consume daily cuisines.*

H1c: *Tourists from low-UAI are more likely to increase their range of food consumption.*

The motivation of tourists behind dining out is highly influenced by their lifestyles and cultural backgrounds (Chang et al., 2011). Members of collectivist societies are recognized as "we-oriented," and they value more the interests and social norms of their group than personal ones. Collectivists also value the opportunity of interpersonal interaction and group membership as an important aspect of their identity (Bakir et al., 2020). Apart from their immediate families, collectivists also care about friends and other members of their group,

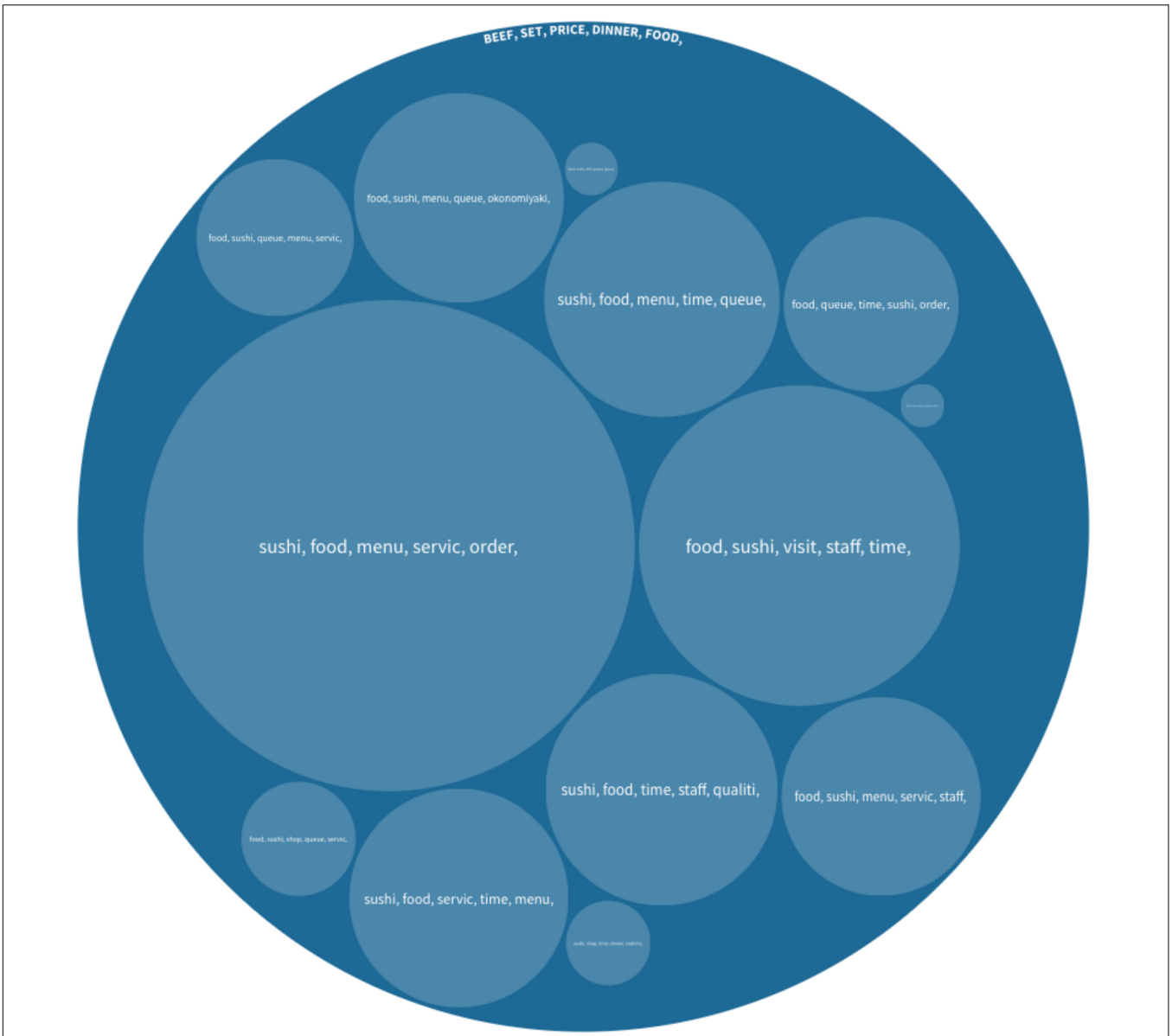


FIGURE 6 | Topics discussed by the group of low-IDV.

and their behaviors are usually guided by group expectations and social norms (Torelli and Shavitt, 2010). Thus, tourists from collectivistic cultures may take the culinary preferences of their travel companions into their own consumption sets and increase the culinary consideration sets, and thus leading to greater culinary variety-seeking behaviors. Accordingly, we proposed the following hypothesis:

H2: *Tourists from collectivistic cultures are more likely to increase their range of culinary selections.*

The Moderating Effect of Travel Companions

Social impact theory indicates that other people present in each context will impact the decision-making of individuals (Latané, 1981). Most dining takes place in the presence of companions, and therefore social factors significantly affect dining, such as dining companions (Cruwys et al., 2015). In both the travel and the daily settings, food consumption is not only to satisfy our physiological needs, which is also inherently a vital social interaction experience, and social influence has long been recognized as a key factor of impacting the consumption decisions of individuals (Yim et al., 2014). Specifically, in the travel set, the main role of dining is for social and psychological needs. For example, dining provides opportunities for individuals to socialize, and to develop a sense of cultural identification in the travel destinations (Jia, 2020). Travel activities are accompanied by a greater level of uncertainty than daily lives, but the presence of a travel companion alleviates the anxiety of accompanied

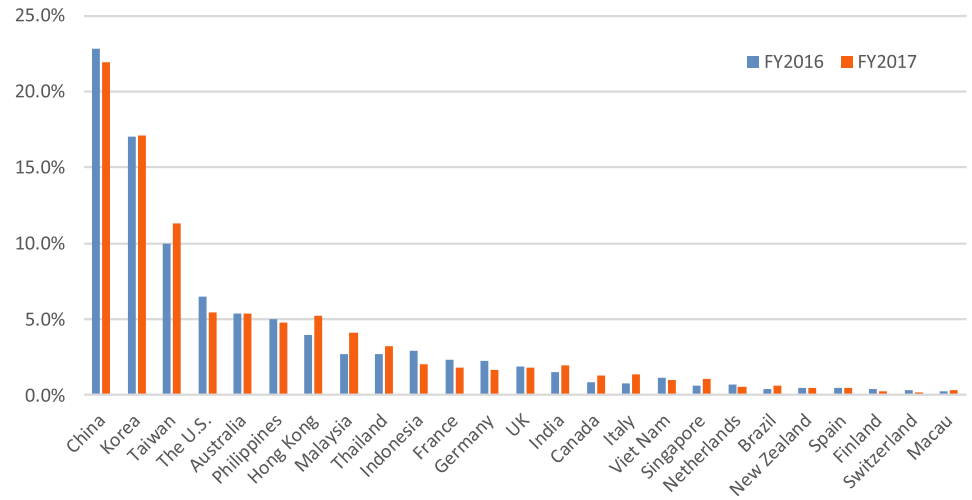


FIGURE 7 | Share of nations/regions of international tourists to Osaka. Total samples of FY2016 (n = 4,474) and FY2017 (n = 4,647); FY, fiscal year.

tourists, and in turn positively influences participation in challenging tourism activities (Su et al., 2020). Specifically, for tourists, dining at unfamiliar travel destinations may be full of uncertainty. In particular, tourists from high-UAI cultures are less risk-taking, avoiding adventure-seeking activities, and thus they are less likely to try unfamiliar or high-risk cuisines, such as night market food, when traveling overseas (Tse and Crotts, 2005). The presence of companions can prompt impulse consumption (Yim et al., 2014), and thus travel companions may prompt tourists to try unfamiliar or risky cuisines. Moreover, previous studies have identified that higher exposure to social stimulus in the marketing environment leads to an increase in the likelihood of impulse consumption (Clauzel et al., 2019; Chen et al., 2021; Katakam et al., 2021). Bevelander et al. (2011) uncover that the peers induced willingness to try unfamiliar cuisines. Thus, we proposed the following hypotheses:

H3: *UAI has a stronger effect on daily cuisines consumption in the presence (vs. absence) of travel companions.*

H4: *UAI has a stronger effect on the range of culinary consumption in the presence (vs. absence) of travel companions.*

Previous research identified that the larger the group of diners, the higher the individual spends (Clauzel et al., 2019), and people tend to present a positive social image in the presence of others (Otterbring, 2021). Tourists from collectivistic cultures tend to place greater emphasis on companions. For example, China is classified as a collectivistic culture and Chinese tourists tend to accomplish activities in a group and thus show greater tolerance to crowdedness than tourists from individualistic cultures (Kim et al., 2010). In a collectivist culture, dining out with family members, friends, and colleagues is an important means for building and maintaining social relationships. Those from a collectivist culture pay more attention to building a close-knit framework, harmony, and emotional attachment by getting along with the group and avoiding being alienated (Hui and Triandis, 1986). Compared with solo travelers, group travelers need to make collaborative consumption decisions and based on the social facilitation theory, group tourists tend to balance individual preferences in the group consumption decision-making process (Su et al., 2020). The study of Herman et al. (2003) found that groups can encourage individual culinary consumption. Additionally, under the case of individuals more concerned with maintaining social harmony, and in turn, the influence of social factors increased (Exline et al., 2012). Accordingly, we proposed the following hypothesis:

H5: *In the presence of travel companions, tourists from collectivistic cultures are more likely to have a greater range of culinary selections than tourists from individualistic cultures.*

Moreover, the work of Clauzel et al. (2019) reported that the number of guests at a party and the relationships among these guests significantly influence food consumption behavior. Further, in the case of set menus, couples are the greatest consumers while those who take meals alone account for the minimal number of orders. Similarly, Cheng et al. (2013) revealed that in the presence of an opposite-gender companion, a consumer is more likely to purchase impulsively. Accordingly, we proposed:

H6: *In the presence of an* opposite-gender *partner, tourists from collectivistic cultures are more likely to consume a greater range of culinary selections than tourists from individualistic cultures.*

Previous studies identify that the perceived social distance within the group members significantly determines the effects of the social influence on the final consumption decisions (Akerlof, 1997; Cheng et al., 2013). However, the nature of the social influence effect is determined by the values of companions. For example, family members and friends may discourage impulsive consumption by avoiding wastefulness and extravagance, while

socially more distant peer shoppers are less likely to come up with comparable concerns for long-term consequences. Thus, socially more distant peers may trigger unplanned purchases that satisfy hedonic goals and spontaneity (Luo, 2005). In the context of dining, social pressure induces more food intake (Exline et al., 2012), for example dining with colleagues and unfamiliar travelers may predict more interpersonal concern compared with friends and family members. Accordingly, we proposed the following hypothesis:

H7: *In the presence of socially more distant travel companions, tourists from collectivistic cultures are more likely to consume a greater range of culinary selections than tourists from individualistic cultures.*

Data and Methods

The data for Study 2 was based on two secondary sources, one data was from the original work of Hofstede (2015), and the other one was obtained from the Osaka Convention and Tourism Bureau covering for 2 years. Data for the primary independent variables, the cultural dimensions of UAI and IDV were adopted from the original work of Hofstede (2015), the survey respondents were assigned the score based on their place of origin. Among those 112 centuries and regions, the score of UAI ranged from 8 the lowest (Singapore) to 112 the highest (Greece).

Data for other variables were obtained from the Osaka Convention and Tourism Bureau (OCTB) who organized seasonal surveys that were administered to international tourists from over 60 countries, from 2016 to 2018 in the international departure hall of Kansai International Airport. The survey was originally written in Japanese and was then translated to five languages by experts (English, Japanese, Simplified Chinese, Traditional Chinese, and Korean), and conducted during eight periods as shown in **Table 4**. The survey consists of 37 questions, including social demographics (age, gender, and nationality), travel attributes (packaged tour or not, travel experience, length of stay in Osaka, and travel companions), and travel activities (purchased items, culinary consumption, sightseeing spots, and entertainment activities). The self-administered seasonal questionnaire was administered to 9,141 random samples of tourists from different countries/regions to Osaka, Japan. Moreover, 194 samples were eliminated in the empirical analysis due to missing cuisine content or national information, remaining 8,947 samples. Additionally, OCTB also surveyed international tourists whether stayed and dined in Osaka. The culinary consumption behaviors of international tourists tend to be homogeneous, this is caused by the airport context-based dining is fewer selection options compared with center city. Therefore, samples that without staying in Osaka just departing from Kansai Airport were also eliminated in the analysis and finally remained 5,438 usable samples.

To concretely explore the culinary consumption of international tourists, a multiple-choice question with 23 choices encompassing all possible restaurant categories was designed. Those 23 types of restaurants include both Japanese cuisines and non-Japanese cuisines, Japanese cuisines mainly eat separately, while non-Japanese cuisines, such as Chinese cuisines often shared. Considering the type of food that may have influences on food sharing behaviors, to address this critical issue, we conducted the analysis by omitting non-Japanese cuisines to make sure the robustness of the results. Finally, based on the 16 restaurant categories, this study designed three dependent variables (*Japanese daily food*, *Japanese luxury food*, and *the total number of cuisines consumed*). The detailed information of cuisines is presented in the first column of **Table 1**. If at least one of the cuisines was selected, it was assumed that respondents had consumed the respective food and the value of "1" was assigned for consumed categories, otherwise "0." Travel companions (*partners*, *family*, *friends*, and *others*) were treated as moderating variable strings. In addition, we define the composite variable to simplify the discussion. Let *companion* = 1 if a respondent travels with either partner, family, friends, and/or colleague (other).

TABLE 4 | Survey overview (n = 9,141).

Start date	Last date	Samples
July 19, 2016	July 30, 2016	1452
October 31, 2016	November 11, 2016	1036
January 19, 2017	January 30, 2017	957
March 10, 2017	March 21, 2017	1029
May 23, 2017	June 3, 2017	1008
August 31, 2017	September 11, 2017	1384
November 30, 2017	December 11, 2017	1236
February 22, 2018	March 5, 2018	1039

Because packaged tour or not, travel experiences, consumption per day, and length of stay are expected to have different culinary consumption patterns and extent of culinary knowledge, we control for these effects a consumption per day (total spending/nights of stay in Japan); packaged tour or not (tour = 1; individually = 0); first/repeat trip to Osaka (first time = 1; repeat = 0); length of stay in Japan/Osaka (0–7 nights = 0–7, 8–13 nights = 10.5; 14 or more = 14). The control variables are also including the age, gender (woman = 1), satisfaction (very dissatisfied = 1; very satisfied = 7), and revisit intention (strongly disagree = 1; strongly agree = 5) of the respondents.

Results

A total of 5,438 usable responses were obtained for data analysis, with 3703 excluded due to missing cuisine content or nationality information, or without staying in Osaka. **Table 5** shows the summary statistics of the variables. In the sample, roughly 50% of tourists were from three Asian countries/regions, China (22%), South Korea (17%), and Taiwan (10%) followed by the U.S. (6%). **Figure 8** presents the shares of nations/regions of international tourists to Osaka from 2016 to 2018.

Results for the Main Effect

We used the binomial logit model and Poisson regression model to estimate the national/regional culture on culinary preference for luxury cuisines, daily cuisines, and total culinary consumption. Those analyses were conducted in R (version

TABLE 5 | Summary statistics and correlation matrix ($n = 5,438$).

	Mean	*SD*	Lux	Daily	Total	UAI	IDV	Comp	Spent	Age	Gen	1st	Pack
Luxury foods	0.786	0.410											
Daily foods	0.938	0.241	0.162*										
Total experiences	4.741	2.622	0.476*	0.379*									
UAI	0.000	1.000	0.000	0.039*	0.046*								
IDV	0.000	1.000	−0.093*	−0.155*	−0.139*	−0.053*							
Companion	0.814	0.389	0.079*	0.125*	0.098*	−0.035*	−0.220*						
Consumption per day (log)	5.378	1.833	−0.019	−0.032*	−0.043*	−0.185*	0.056*	0.003					
Age (log)	3.226	0.394	0.002	−0.150*	−0.093*	−0.076*	0.203*	−0.041*	0.080*				
Gender (female = 1)	0.530	0.499	−0.002	0.067*	−0.016	−0.107*	−0.165*	0.135*	0.036*	−0.068*			
First Trip (first trip = 1)	0.133	0.340	−0.012	−0.057*	−0.095*	−0.158*	−0.063*	0.109*	0.075*	0.044*	0.017		
Package (tour = 1)	0.612	0.487	−0.018	−0.035*	−0.035*	−0.035*	0.045*	0.043*	0.044*	−0.101*	0.029*	0.021	
Stay nights	3.780	2.004	0.181*	0.133*	0.353*	−0.091*	0.000	−0.072*	−0.187*	−0.045*	−0.007	−0.170*	−0.039*

UAI, Uncertainty avoidance; IDV, Individualism/Collectivism.
$^*p < 0.05$.

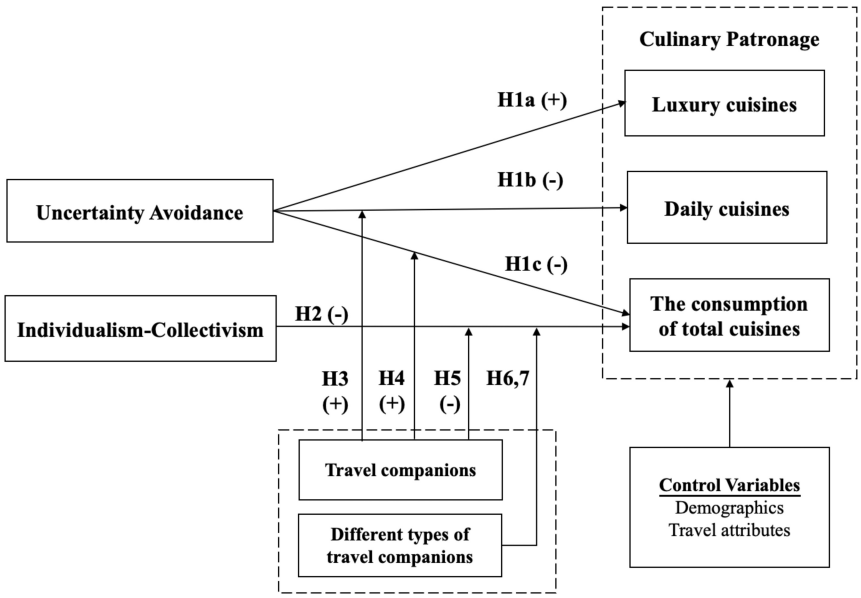


FIGURE 8 | Conceptual framework.

4.0.5)[1]. The binomial logit model is often used as a vector of random variables to a binomial random variable (Coull and Agresti, 2015). We used the binomial decision data of tourists which was grouped culinary data consisting of counts of successes in luxury cuisines group or daily cuisines group. Accordingly, the binomial logit model was an appropriate method to test H1a, H1b, and H3. Additionally, we applied the Poisson regression model to estimate the influence of national/regional culture on the total culinary consumption of tourists. Poisson regression is often used for modeling count data (Cameron and Trivedi, 1990), and therefore this model is feasible to test H1c H2, H4, and H5, and the results are shown in **Table 6**. There were some other candidate models, such as the binomial probit model instead of the logit model, and the negative binomial regression instead of the Poisson regression. However, the logit model and Poisson regression model provided robust results and was widely used for binomial dependent variables and non-negative integer dependent variables. We examined the model based on the relationships that our hypothesis should indicate.

First, we examined the overall fitness of the models. According to AIC shown in **Table 4**, the overall fitness of the without interaction model (M1-0) is better than with interaction model (M1-1) to explain Luxury cuisine consumption, while with interaction models (M2-1, M3-1) are better to explain Daily and Total consumption. Therefore, we examine the result of models M1-0, M2-1, and M3-1. Consistent with hypothesis H1a, the relationship of UAI with the consumption of Japanese luxury cuisines remained positive and significant at a 10% level (M1-0, $\beta = 0.063, p < 0.1$). However, the hypothetic negative relationship between UAI and consumption of Japanese daily cuisines was

[1]https://cran.r-project.org/web/packages/

TABLE 6 | Estimation results of the binomial logit and Poisson regression models (n = 5,438).

Dependent variables	M1-0 Luxury			M1-1 Luxury			M2-0 Daily			M2-1 Daily			M3-0 Total			M3-1 Total		
Model	**Logit**			**Logit**			**Logit**			**Logit**			**Poisson**			**Poisson**		
	Est	***SE***		**Est**	***SE***		**Est**	***SE***		**Est**	***SE***		**Est**	***SE***		**Est**	***SE***	
(Intercept)	−0.477	0.330		−0.477	0.330		5.818	0.593	***	5.840	0.595	***	1.217	0.062	***	1.205	0.062	***
County culture																		
UAI	0.063	0.035	+	−0.016	0.074		0.196	0.065	**	0.020	0.106		0.040	0.007	***	0.028	0.016	+
IDV													−0.071	0.007	***	−0.048	0.013	***
Travel Companion																		
Companion	0.548	0.084	***	0.541	0.084	***	1.133	0.129	***	1.149	0.130	***	0.173	0.017	***	0.179	0.018	***
Control variables																		
Consumption per day	0.031	0.019	+	0.032	0.019	+	0.025	0.032		0.029	0.032		0.017	0.004	***	0.017	0.004	***
Age	0.092	0.087		0.091	0.087		−1.479	0.154	***	−1.494	0.155	***	−0.074	0.016	***	−0.073	0.016	***
Gender	−0.059	0.069		−0.056	0.069		0.372	0.121	**	0.377	0.122	**	−0.047	0.013	***	−0.046	0.013	***
First trip	0.108	0.102		0.115	0.102		−0.327	0.157	*	−0.301	0.158	+	−0.080	0.020	***	−0.079	0.020	***
Package	−0.067	0.070		−0.067	0.070		−0.439	0.127	***	−0.441	0.127	***	−0.027	0.013	*	−0.027	0.013	*
Stay nights	0.268	0.020	***	0.268	0.020	***	0.315	0.037	***	0.318	0.037	***	0.099	0.003	***	0.099	0.003	***
Interactions																		
UAI*Companion				0.101	0.083					0.275	0.133	*				0.015	0.017	
IDV*Companion																−0.031	0.016	*
AIC	5418.3			5418.8			2207.9			2205.7			24578.4			24577.4		

UAI, uncertainty avoidance; IDV, individualism/Collectivism; Est, estimates; SE, standard error.
*+p < 0.1, *p < 0.05, **p < 0.01, ***p < 0.001.*

not supported (M2-1, β = 0.020, $p > 0.1$). Therefore, Hypothesis 1b is not supported. H1c aims to estimate the influence of UAI negatively affects the range of culinary consumption, whereas the result is in the opposite direction of H1c (M3-1, β = 0.028, $p < 0.1$), and thus H1c is not supported. Moreover, results reveal that tourists from collectivistic cultures are more inclined to consume a broad range of culinary types at the destinations (M3-1, β = −0.048, $p < 0.001$), and the results are consistent with what we hypothesized, thus H2 is supported.

Results Examining the Effects of Different Types of Companions

Afterward, we applied the Poisson regression model to examine H6 and H7, and the main aim was to examine whether different types of travel companions (partner, family, friend, and others) have varied impacts on the relationship between collectivism and consumption of daily cuisines.

To test the hypotheses H6 and H7, we referred to the results of model M4-1 which was well fitted (lower AIC) for the dependent variables compared with M4-0. H6 was hypothesized that the social presence of a partner significantly moderates the relationship between collectivism and the range of culinary consumption (M4-1, β = −0.07, $p < 0.001$), and thus H6 was supported. Additionally, H7 was hypothesized that the presence of socially more distant travel companions significantly moderates the relationship between collectivism and the range of culinary consumption (M4-1, β = −0.110, $p < 0.01$), and thus H7 was supported. Results for the moderating effects of different types of travel companions are shown in **Table 7**. While the results of all hypotheses are presented in **Table 8** and **Figure 9**.

DISCUSSION AND CONCLUSION

Two empirical studies with different types of data and methods show the cross-cultural differences of tourist culinary experiences and behaviors at Osaka, based on UAI and IDV. Study 1 reveals the differences in the topics discussed by the two cultural dimensions. First, the high-UAI group show more interest in discussing topics related to luxury cuisines, whereas the low ones focused on daily local cuisines. Moreover, tourists from the high-UAI group seemed to dine out with travel companions (such as sister, husband) and had explored a greater range of food than the low ones. Second, tourists from individualistic cultures focused on food quality and waiting time, whereas tourists from collectivistic cultures centered on economic aspects, such as price or set food.

Study 2 reveals that tourists from high-UAI cultures tend to consume luxury cuisines, while those from lower ones are more inclined to consume local novel and inexpensive cuisines. Moreover, tourists from collectivistic cultures appear to have a greater range of culinary choices. Specifically, tourists from

TABLE 7 | Estimation results of the Poisson regression models ($n = 5,438$).

Dependent variables	M4-0 Total cuisines			M4-1 Total cuisines		
Models	**Poisson**			**Poisson**		
	Estimates	***SE***		**Estimates**	***SE***	
(Intercept)	1.256	0.062	***	1.233	0.063	***
Country culture						
UAI	0.042	0.007	***	0.026	0.014	.
IDV	−0.074	0.007	***	−0.052	0.013	***
Travel companions						
Partner	0.191	0.022	***	0.202	0.023	***
Family	0.156	0.017	***	0.163	0.018	***
Friend	0.133	0.017	***	0.140	0.017	***
Others	0.059	0.036	.	0.052	0.037	
Demographics						
Consumption per day	0.016	0.004	***	0.017	0.004	***
Age	−0.079	0.017	***	−0.076	0.017	***
Gender	−0.048	0.013	***	−0.043	0.013	***
First trip	−0.076	0.020	***	−0.076	0.020	***
Package	−0.026	0.013	*	−0.026	0.013	*
Stay nights	0.098	0.003	***	0.098	0.003	***
Interactions						
UAI × Partner				0.004	0.022	
UAI × Family				0.004	0.017	
UAI × Friend				0.038	0.017	*
UAI × Others				0.017	0.036	
IDV × Partner				−0.070	0.020	***
IDV × Family				−0.013	0.018	
IDV × Friend				−0.005	0.018	
IDV × Others				−0.110	0.040	**
AIC	24572.9			24562.6		

UAI, uncertainty avoidance; IDV, individualism/collectivism.
$^{+}p < 0.1$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

high high-UAI cultures accompanied by friends induce them to patronage a greater range of local cuisines and "play with safe" of changing inexpensive daily food. Tourists from collectivistic cultures along with the presence of travel companions (partner versus family versus friend versus colleague) show a greater range of food choices than those traveling alone. The travel attributes information further reveals that repeat-visitors showed a stronger patronization of Japanese daily cuisines than did first-time visitors; younger tourists appear greater variety-seeking behavior in unfamiliar cuisines. This research thus provides significant theoretical and practical implications.

Theoretical Implications

Our research thus offers several important theoretical implications for advancing food tourism literature by revealing the cultural differences in tourist culinary exploration behaviors. Additionally, this study focuses on how social facilitation impacts national culture and the culinary consumption behaviors of tourists to shed light on how interpersonal factors impact the consumption decision-making of tourists.

First, our study uncovered that the national culture of UAI and IDV has an impact on multiple aspects of tourist culinary exploration, including the consumption of luxury versus daily cuisine, and the range of culinary consumption. Tourists from high-UAI cultures are more likely to consume luxury cuisines, given that they have a stronger need for clarity and security, and formal dining environments provide a sense of assurance (De Mooij and Hofstede, 2002). Tourists from low-UAI cultures are more risk-taking, enjoy adventure-seeking activities, and thus they are more likely to try novelty cuisines (Tse and Crotts, 2005). In contrast, tourists from high-UAI cultures tend to be risk-avoiding, and they tend to avoid unfamiliar cuisines, and specifically distant the street food and the food in night markets. Usually, compared with luxury cuisines, daily cuisines may less secure, especially raw dishes and/or cold dishes. Therefore, tourists from high-UAI cultures are more likely to consume Japanese luxury cuisines than daily cuisines. However, tourists from higher-UAI cultures tend to have a greater range of culinary consumption, which indicates that a high level of food security or high-end offering, such as luxury cuisines and/or high food quality tends to induce the culinary consumption of tourists. Our results contrast with the common assumption that tourists from high-UAI cultures have a smaller range of culinary consumption (Tse and Crotts, 2005), which is a Hong Kong-based context, Hong Kong cuisines were profoundly influenced by Chinese cuisines; thus, tourists from different regions (i.e., the United States, mainland China, Taiwan, and Singapore) come with different levels of prior knowledge on Hong Kong food, and the food culture of tourists greatly influences their food perception and evaluation of destination cuisines (Chang et al., 2011).

Second, the study results indicated that individualism/collectivism has a different influence pattern, in that tourists from collectivistic cultures showed a greater range of food consumption than those from individualist cultures. This finding can be explained by their tendency of collectivist preference to travel with family members, friends, and other travelers rather than alone, and can also be explained by their value for social bonds with travel companions. The results are in line with the collectivist value which emphasizes the importance of dining to maintain or improve relationships with others (Hui and Triandis, 1986).

Third, our findings identified that travel companion moderate the relationship between national culture and culinary consumption. Prior studies examined the novelty culinary-seeking behaviors of the international tourists (Tse and Crotts, 2005) or the uncertainty avoidance of immigrants on their attitudes toward local foods (Seo et al., 2012), while the literature on how cultural background affect the culinary consumption behaviors of tourists is relatively neglected. Our findings shed insight on those tourists from low-UAI cultures are more likely to consume a greater range of local daily cuisines (novelty culinary-seeking behaviors) while dining with travel companions. Additionally, in the presence of travel companions, tourists from collectivistic cultures will have

TABLE 8 | Result of hypotheses estimation.

Hypothetic relationship	Expectations	Results	
H1a: High-UAI to luxury food choice	UAI: Positive	Positive	Supported
H1b: Low-UAI to daily food choice	UAI: Negative	N.S.	Not supported
H1c: Low-UAI to total food choice	UAI: Negative	Positive	Not supported
H2: Collectivism to total food choice	IDV: Negative	Negative	Supported
H3: Companion moderating of high-UAI to daily food choice	UAI: Positive	Positive	Supported
H4: Companion moderating of high-UAI to total food choice	UAI: Positive	N.S.	Not supported
H5: Companion moderating of collectivism and total food choice	IDV: Negative	Negative	Supported
H6: Partner moderating of collectivism and total food choice	IDV: Negative	Negative	Supported
H7: Others moderating of collectivism and total food choice	IDV: Negative	Negative	Supported

a significant effect on the consumption of a wider range of culinary selections than tourists from individualistic cultures. The social facilitation of eating seems to be working in such a situation (Luo, 2005). Dining together helps to create an atmosphere of relaxation and a positive mood, and food becomes more palatable, leading to greater exploration of the local food (Kim and Huang, 2021). There is also a "time extension" effect when people eat together (De Castro et al., 1990), and social interaction reduces self-monitoring, thus tourists may engage more in the exploration of food (Bellisle and Dalix, 2001).

Fourth, our study contributed to the literature in identifying the moderating effects of different types of travel companions on the relationship between national culture and culinary consumption. The moderating effect of opposite partners and less familiar others are both positive and significant, while the two are distinct in terms of social distance. Firstly, the results of this study indicate tourists from collectivistic cultures show a greater range of culinary consumption when accompanied by opposite partners, the finding is in line with Townsend and Levy (1990), their findings heightened preference for opposite partners with resources is expected to be more attractive. Indeed, females perceived men as more desirable when they exhibit signals to resource access (Dunn and Searle, 2010). In the literature on consumer behavior, Cheng et al. (2013) reveal that an opposite-gender companion is more likely to induce impulse consumptions. Clauzel et al. (2019) report that the proportion of set menus ordered by a couple is mostly maximized, while it is minimized for those who take meals alone. Our study further revealed that those tourists from collectivistic cultures dining with socially more distant travel companions (such as colleagues and unfamiliar travelers) would increase the total number of culinary consumptions. Our findings are consistent with the existing literature of Luo (2005), which states that companions with far social distance less tend to come up with comparable concerns for long-term consequences, thus socially more distant peers may trigger impulsive consumption by satisfying hedonic goals and spontaneity. Our findings also connected with the findings of Jaffe et al. (2019) in that social distance positively and significantly influences the consumption of individuals regarding diversity.

Finally, our study further revealed a statistically significant relationship between travel experiences and culinary exploration behaviors, including positive relationships between travel experiences and novelty-seeking and variety-seeking behaviors on culinary exploration. This is consistent with the findings of Mak et al. (2012) that with more overseas travel experiences, tourists generally have a broader exposure to novel and foreign cuisines.

Managerial Implications

This study used both online and offline large and real international samples to conduct the cross-cultural comparison of the culinary consumption of tourists (e.g., luxury versus daily versus variety-seeking behaviors). The findings provided destination managers with a better understanding of the culinary preferences of international tourists and choice context and develop marketing communication strategies effectively. This study has several practical implications for destination marketing management.

First, the study findings suggested that luxury cuisines together with excellent service and environment should be leveraged to attract repeat tourists from high-UAI cultures. In the case of Japanese cuisines, tourism marketers should promote Kaiseki, Fugu, crab, and similar traditional local luxury cuisines to fascinate tourists from Belgium, Greece, Portugal, and other high-UAI scored travel markets.

Second, this study could provide practical implications for operators to extend travel companions to induce a greater range of culinary consumption. Our findings reveal that those tourists from collectivistic cultures are more likely to consume a greater range of cuisines when accompanied by partners and other companions (such as colleagues and unfamiliar travelers). Accordingly, marketers should promote local cuisines and food-related activities to tourists from collectivistic cultures based on the types of travel companions. For example, the recommendation of local alcohol or special cuisines to the international tourists accompanied by a couple and or colleagues would be desirable. Therefore, travel destinations that are rich in culinary resources should leverage those resources to attract tourists from collectivistic cultures, including China, South Korea, and Russia. Moreover, tourists from high-UAI cultures also increase the likelihood of daily cuisines in the context of dining with travel companions. Accordingly, increasing the trust perception of local cuisines is also expected to attract the patronization of tourists from risk-avoiding cultures.

Finally, repeat visitors showed a stronger patronization of Japanese daily cuisines than did first-time visitors. Accordingly, marketers should promote more Japanese

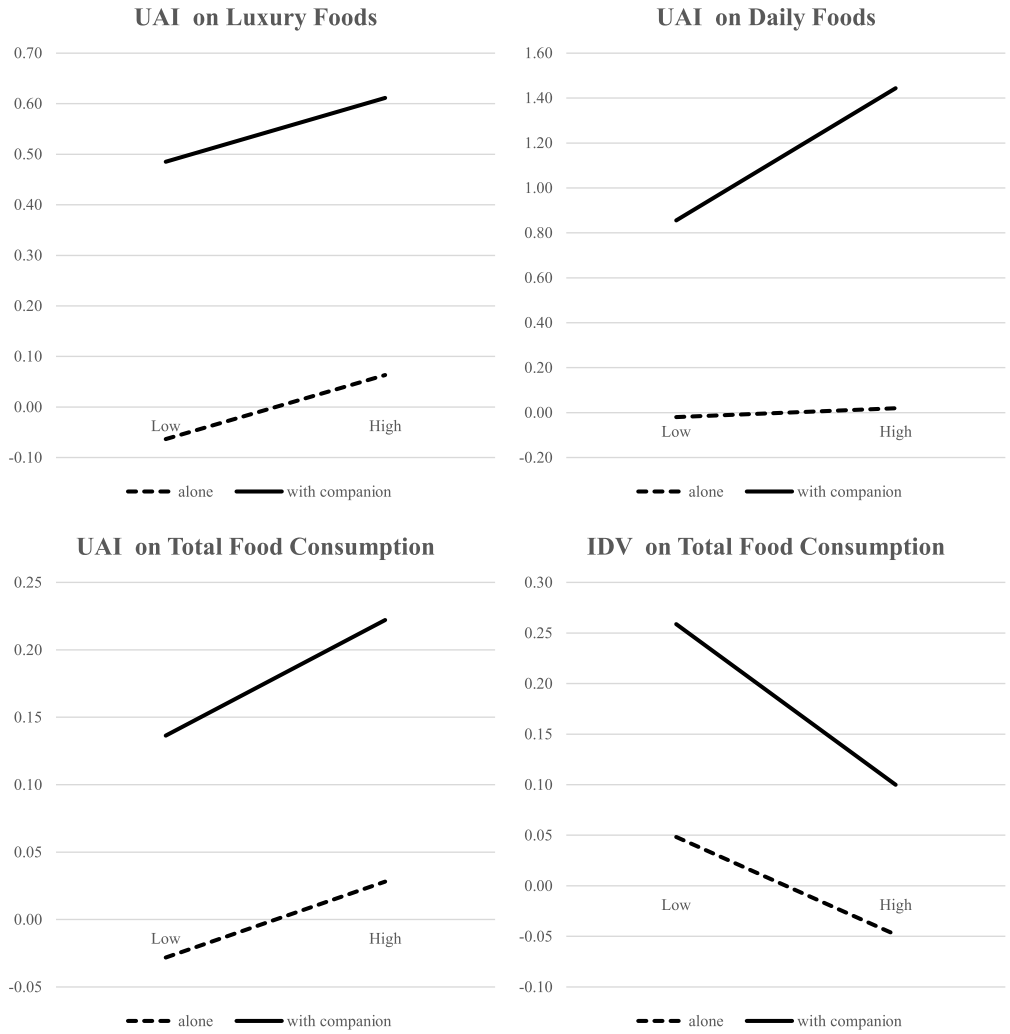


FIGURE 9 | The moderating effect of travel companion. UAI, uncertainty avoidance; IDV, individualism-collectivism; Low IDV, collectivism; High IDV, individualism.

daily foods to the highly repeated travel markets, including Hong Kong, Korea, Singapore, and Taiwan. More specifically, younger visitors have a clear tendency to enjoy diverse and unfamiliar cuisines. Therefore, this study provides valuable insights to policymakers to increase financial outcomes. Promoters could develop food travel packages based on travel companions, travel experiences, and age data.

Limitations and Future Research Directions

Although the current study provided important contributions to applying food tourism as a means of promoting a destination and attracting tourists, there were still certain limitations that should be considered. First, the sample of Study 1 is limited to the User-Generated Content in English. Despite the Chinese tourists with the largest market shared in Japanese inbound tourists, the count of comments by Chinese tourists was much low compared with their proportions. Thus, further research using Chinese social media would provide greater insights. Second, this research focused solely on Osaka Japan, and, therefore, the conclusions might not be generalized. Future research should extend this model to more host countries and regions where food tourism is one of the leading tourism industries to determine the generalizability of the cross-national results. Third, this study was limited to identifying multinational cultures on the culinary consumption of inbound tourists from the macro level, and future research should explore the intrinsic psychological factors of individuals through the additional methodology. Fourth, the cultural distance might significantly impact the culinary knowledge and language familiarity of tourists, and, in turn, impact their culinary consumption, the survey did not cover the information on the host country language skills of respondents and their prior food knowledge of the various culinary offerings. Therefore, future research may include the language skills of the host country and

prior food knowledge as controls in the research model. Finally, the design of the survey methodology also needed to be improved. We would be able to obtain more appropriate results by using the share of food consumption, rather than the binary question of "ate" or "did not eat" for luxury food and daily food, as in this study.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because the data is under a non-disclosure agreement. Requests to access the datasets should be directed to the corresponding authors.

ETHICS STATEMENT

Ethical review and approval was not required for the study in accordance with local legislation and institutional requirements. Written informed consent was not required in accordance with local legislation and institutional requirements.

AUTHOR CONTRIBUTIONS

BL and YW contributed to overllall quality and supervision the empirical work. SK and XL contributed to the second part of empirical work (i.e., the regression work), to the analysis of the results, and to the writing of the first draft. YL contributed to the data collection and the implementation of the second part of empirical work. WG contributed to bridging two main parts of the empirical analyzes and polishing the manuscript. All authors discussed the results and commented on the manuscript.

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Corrigendum: National Culture and Culinary Exploration: Japan Evidence of Heterogenous Moderating Roles of Social Facilitation

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The authors apologize for these errors and state that they do not change the scientific conclusions of the article in any way. The original article has been updated.

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The Effect of Baby Food E-Store Image (for Ages 0–3) on Consumers' Purchase Intention

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This research aims to investigate the influence of baby food e-store image (for ages 0–3) on consumers' purchase intention, mainly based on the stimulus-organism-response (S-O-R) model. Perceived value is additionally tested as a mediator of the relationship between baby food e-store image and consumers' purchase intention. An online questionnaire survey was conducted among consumers of baby food e-stores that specialize in ages 0–3. The final sample comprised 584 valid responses. To test the hypotheses in the relationships among latent variables, structural equation model analysis was used in this study. The findings showed that design image, order fulfillment image, communication service image, and security image of baby food e-stores have positive effects on consumers' perceived value, while perceived value mediates the relationship between baby food e-stores and consumers' purchase intention. As a result, more perceived value would be created between online stores and their consumers with a higher level of value. Two managerial implications derived from this study explain how to manage baby food e-stores and how to promote online baby food undertakings. Particularly, consumers' perceived emotional and functional value can be shaped by four dimensions of baby food e-store image, e-store design image, order fulfillment image, communication service image, and security image, which finally determines their purchase intentions. The originality and value of this study enriches the importance of consumers' perceived value in the field of online store image. Moreover, this study demonstrates that baby food e-store image increases consumers' perceived value and purchase intention.

Keywords: S-O-R framework, baby food e-store image, perceived value, purchase intention, mediating effect

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INTRODUCTION

China's three-child policy has accelerated the arrival of the "baby boom" across the country, and the rapidly growing number of newborn babies in China has introduced a stable target consumer group in the maternal and baby markets. According to the monitoring data of the annual comprehensive analysis of China's Internet Maternal and Child Market 2019, the number of births in 2016 rose to 17.86 million, of which the second child accounted for more than 50% of these births.

Since then, favorable policies for childbirth have been introduced continuously (National Bureau of Statistics, 2021). The increase in the number of newborn babies and the increase in the proportion of second child and third childbirths indicate that the maternal and baby products market will continue to expand in the next few years. Consequently, that both physical store sales and online platform sales will likely show a rapid growth trend (Xinhua News Agency, 2021). Monitoring data from Analysys Enfodesk, a major market tracking company, shows that the retail scale of maternal and baby online retail in 2019 reached $ 77.6 billion (Analysys Enfodesk, 2020).

Many businesses have seen potential opportunities in the online baby product market and have settled on e-commerce platforms to establish online baby food stores. With the development of smartphones and 4G/5G networks, online shopping for maternal and baby products has infiltrated the lives of the general public. New concepts of nurturing and consumption upgrades have caused consumers to have higher requirements for baby food products. Furthermore, online shopping channels for baby food products are diversified. Therefore, in the face of the ever-changing industry structure and the fierce competition in the e-commerce environment, online baby food store operators must conform to development trends of the e-commerce era and effectively use Internet tools to enhance the image of the online store and increase customer stickiness. Through the establishment of high-quality and stable customer relationships, profitability and sustainable development can be achieved.

One of the purposes of this study is to expand the baby food e-store image and ensuing consumer behaviors in the context of the Internet. Hence, it is proposed that perceived emotional value and perceived functional value mediate the relationship between baby food e-store image and purchase intention. In addition, to develop the framework of stimulus-organism-response (S-O-R), a more comprehensive and rigorous understanding of the influencing factors of consumers' by the baby food e-store image is needed. The findings of this study are expected to extend the S-O-R framework, perceived value and provide practical implications for the development of the baby food e-store image and strategies for the "ages 0–3" market segment.

This study contributes to the literature in several ways. First, by examining the existing research on online store images, it was found that most literature focuses on adults, and there was little research on babies (ages 0–3 years old). This study focuses on the baby food e-store image (for ages 0–3) in online stores selling baby food and expands the research scope of online store image. Second, most of the previous studies in the field of online store image do not consider the different dimensions of online stores. This study divides the baby food e-store image into four dimensions, enriching the research dimension of baby food e-store image. Third, this study explores multiple mediating effects of the two dimensions of perceived value, which enriches the research on perceived value. This is an important application of structural equation model (SEM) research methods. Fourth, this study applies the S-O-R model to the study of the baby food e-store image, which is an expansion of the application field of the S-O-R framework.

This study consists of five parts. The theoretical background of this study follows the introduction and is presented in the second section. The third section encompasses the research framework and hypotheses development. Research methods and data analysis are analyzed in detail in the fourth section, and the final section discusses the findings and highlights of the theoretical and practical implications for researchers and companies, as well as suggestions for future research based on the limitations of this study.

THEORETICAL BACKGROUND

The Stimulus-Organism-Response Framework

An S-O-R paradigm is applied for the framework building of this research, and there are three reasons for choosing this paradigm. Firstly, though the S-O-R paradigm was initially used in the field of online psychology, marketing researches also demonstrated that consumers' consumption behaviors could be influenced by internet stimuli, such as store atmospheric cues, social culture (Eroglu et al., 2003; Mazaheri et al., 2011). Especially for the Chinese people who are collectivism dominated in the multicultural social environment would be more sensitive to various environmental cues (Shobeiri et al., 2018). Thus, the S-O-R paradigm could be adapted in this research to investigate the China's consumers' responses to external stimulus. Secondly, within the S-O-R paradigm, consumers' internal state, such as emotion, also have effect on their approaches or avoidance actions when they accept the multisensory input from external environment as well as stimuli input from online retailers (Eroglu et al., 2003). Some researches use S-O-R paradigm to explain consumers' consumption behaviors stimulated by various external environments, and some predictions have been made by using S-O-R paradigm (Russell and Mehrabian, 1974; Wu et al., 2020). Therefore, S-O-R model could be used to explain the relationship among infants food e-store image of aged 0–3, perceived values and consumers' purchase intention. The research carried out by Shobeiri et al. (2018) also experimentally provided evidences showing that consumers' internal process could play the mediation role in the relationship between external environment stimuli and consumers' consumption behavior. So, one aim of this study is exploring how the perceived value as the mediation variable has put the effect in the relationship between the infants food e-store image of aged 0–3 and consumers' purchase intention. Thirdly, considering the continuous expansion and deepening of China's internet industry, related studies which focus on investigating into which features could capture consumers' true intentions, satisfy their inner needs and further increase their online consumer behaviors, have shown high research importance and practical significance within the Chinese online marketing management framework (Eroglu et al., 2003; Chai et al., 2017; Li et al., 2020). So it is appropriate to apply the S-O-R paradigm to this study for examining the relationship between the infants food

e-store image of aged 0–3 and consumers' purchase intention. To sum up, the S-O-R paradigm is an effective and straightforward method for this study to discuss the consumers' responds to internet behaviors by examining the perceived value as a mediator on the relationship between infant food e-store image of aged 0–3 as multisensory stimulus and consumers' purchase intention.

Baby Food E-Store Image (for Ages 0–3)(S)

In recent years, the online commerce market has developed rapidly, and the image of online stores has attracted the attention of consumers and academia. Research on the image of online stores will become an important supplement to the theory of store image. Aladwani et al. (2002) developed four indicators to judge consumers' perceptions and perceptions of online stores, including online store technology, design image, store content, and quality. Ranganathan and Ganapathy (2002) summarized the characteristics of retail online stores, and concluded that the dimensions of online store image include five dimensions: design, information content, services, goods, and security. Helmefalk (2016) summarized the traditional store image and pointed out that the dimensions of online store image can be divided into seven dimensions: familiarity, ease of use, online store type, pleasure, usefulness, trust, and settlement ability; Heijden and Verhagen (2004) also divided the online store image into seven dimensions according to the psychological attributes of the store image, which included ease of use, the usefulness of the store, style, pleasure of shopping, trust, online store solutions, and familiarity with online stores. Jin and Park (2006) divided the online store image into six dimensions, including web design image, communication image, order fulfillment image, product image, security image, and promotion image based on the functional attributes of the online store. In consideration of the current online environment in China and the characteristics of integrated B2C online stores, and to reflect consumers' perception of the functionality of online stores, this study shall refer to the research results of Jin and Park (2006), by considering the current baby food e-store image and dividing the image into four dimensions. These dimensions include the image of the e-store design, the image of order fulfillment, the image of communication services, and the image of security and confidentiality.

Perceived Value (O)

From the perspective of consumer psychology, Zeithaml (1988) pointed out that perceived value is the comparison between the customer's benefits and the cost paid during the buying and selling process. Monroe (2012, p.145) believed that perceived value is "the ratio between perceived gains and perceived losses." He maintained that consumers' perception of value is manifested as a comparison between perceived product quality or perceived benefits and perceived costs; based on previous studies, this study combines the characteristics of China's online baby food stores and maintains that perceived value is not only the comparison of the income and the cost but also the consumers' expectations and feelings for a specific product or service.

In the existing literature, it is relatively common to use a single-dimensional, single-item scale to measure consumers' perceived value. However, many scholars believe that perceived value is quite complex, and a single item measurement method cannot adequately meet research needs. Sheth et al. (1991) proposed five factors that affect perceived value, including emotional value, functional value, social value, conditional value and epistemic value. Yan (2019) divided the perceived value dimensions into six dimensions: social value, cognitive value, price and quality, satisfaction, image value, and emotional value. A scale of 33 items was used to measure the perceived value of educational services. However, Wang et al. (2019) believed that potential risks in the process of purchasing products or services should also belong to the dimension of customer perceived value and that it is a third dimension independent of perceived quality and price. Hallem and Barth (2011), based on the research of Sheth et al. (1991), divided consumers' perceived value into two dimensions: emotional value, and functional value. Emotional value refers to the utility that customers perceive when purchasing goods or services. Functional value includes two aspects: price and quality. Price refers to the rational price paid by consumers for purchasing goods or services, and quality refers to the utility of the perceived quality and functionality of the product. This study focuses on the dimensions and maturity scales of Hallem and Barth (2011), combined with the views of domestic experts and scholars, to measure the perceived value of consumers and conduct an in-depth study of the perceived value of online consumers in China.

RESEARCH MODEL AND HYPOTHESES

Conceptual Framework

Based on the theoretical basis of this research, this research based on S-O-R paradigm, combines infants food e-store image of aged 0–3, perceived value, and purchase intention establishes the research model of this research, as shown in **Figure 1**.

Research Hypotheses

The Relationship Between E-Store Design Image and Perceived Value

Online shop web design is the design of the art and functions involved in the online shop, which mainly includes the pages' art design, layout and level, color and style, and search function, as well as advertising space, membership services, and other content. Web page design should conform to the habits of online consumers and reflect convenience and selectivity. Page and program design should have practical and convenient functions, and the overall tone and layout should appeal to consumers (Yun and Linda, 2007). Other considerations could include features such as detailed product descriptions, a sharing and communication platform for consumers, convenience, accurate search functions to help consumers quickly find the products they need. Chang and Chen (2008) pointed out that most of the failed online stores are a result of the online store design deviating from the habits of online consumers, causing consumer rejection. The landing page of an online store is the first step in

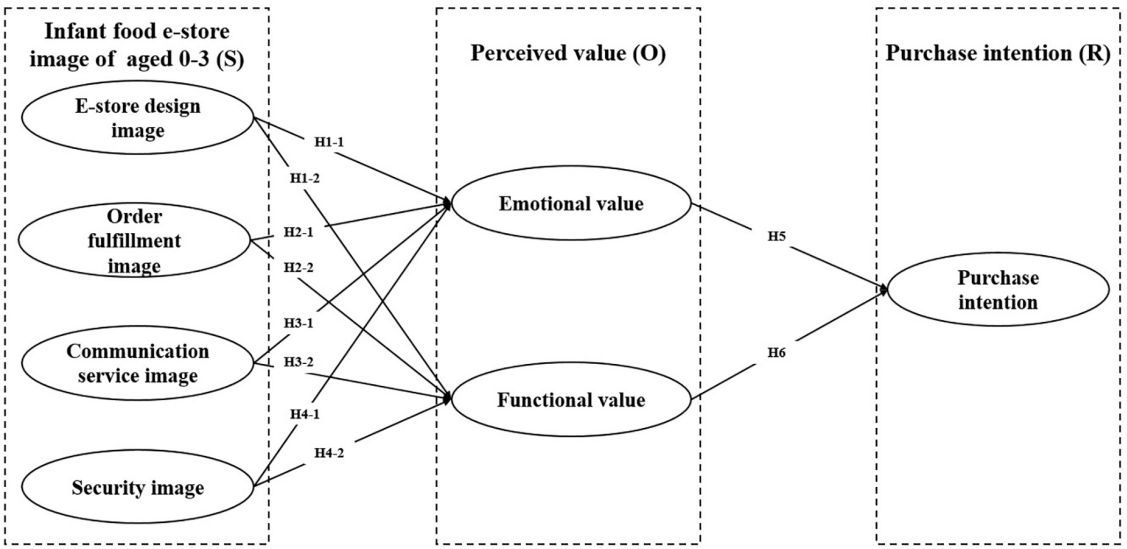


FIGURE 1 | Conceptual framework.

the consumers' experience and is a prerequisite for consumers to decide whether to continue using the online store; therefore, web design is an important factor in determining whether consumers will continue to browse the online store. Exquisite webpage design has an impact on consumers' vision. Pleasing webpage design helps consumers feel comfortable and richly functional webpage design helps consumers enjoy the process, which will generate the desire to continue browsing and searching the online store, thus enhancing the emotional value for consumers. By contrast, poorly designed and poorly functional webpages hinder consumers' desires and buying interest. Therefore, this study proposes the following hypotheses:

H1-1: E-store design image has a significant positive impact on emotional value.
H1-2: E-store design image has a significant positive impact on functional value.

The Relationship Between Order Fulfillment Image and Perceived Value

Beth et al. (2011) emphasized order fulfillment should be a consistent quality of e-commerce platform websites to fulfill their promise to customers. Shu and Yang (2011) indicated that online stores that arrange delivery for customers at a fixed time or at a promised time reduce consumers' perceived risks; therefore, consumers can save a lot of time and energy without worrying about whether the seller will deliver the goods on time. Furthermore, Hu et al. (2008) pointed out that if the promises announced by e-commerce platform companies on the website can be implemented well, their image will have a positive impact on consumers, thereby enhancing consumers' perception of the functional value of online stores. If the promises of online stores cannot be fulfilled well, consumers will feel deceived by dishonest and inconsistent promises, which will weaken consumers' perception of functional value. When the online store's behavior is consistent with or exceeds its promise, consumers will love and connect with this type of online store more emotionally. Emotional value will be enhanced by the improvement of the online store's order-fulfillment image. On the contrary, if the image of order fulfillment is poor, the emotional value of consumers will be weakened, causing consumer resistance, which in turn will affect their purchase behavior in online stores. Therefore, this study proposes the following hypotheses:

H2-1: Order fulfillment image has a significant positive impact on emotional value.
H2-2: Order fulfillment image has a significant positive impact on functional value.

The Relationship Between Communication Service Image and Perceived Value

Unlike physical stores, consumers and online store sales staff cannot directly communicate face-to-face but can send text narratives and pictures through chat software. This kind of information transmission method can be easily distorted by external noises, resulting in deviations in understanding. Therefore, the image of the communication service should include the service attitude of the customer service staff of the online store, ensuring questions are answered timely and professionally, consumer suggestions can be accepted, and consumers can accurately be provided with the information they need. Alkalbani and Hussain (2021) pointed out that trust is generated through frequent communication and exchange between buyers and sellers. In an online shopping environment, consumers cannot communicate frequently with online stores or experience face-to-face communication; therefore, it is difficult to establish trust in the online environment. Therefore, online shop customer service staff should focus on the consumer's point of view and receive online consumer communications in a polite,

honest, patient, and enthusiastic manner, so that consumers feel respected, valued, and satisfied. This will produce a pleasant shopping experience, and as a result, consumers' emotional value will increase. Therefore, this study proposes the following hypotheses:

H3-1: Communication service image has a significant positive impact on emotional value.
H3-2: Communication service image has a significant positive impact on functional value.

The Relationship Between Security Image and Perceived Value

Kutty (2020) maintained that security and confidentiality are necessary measures for e-commerce platforms to protect consumer privacy information and online transactions. Eriksson et al. (2021) pointed out that consumers who purchase goods online do not have personal contact with the online store or physical objects, so they feel the existence of transaction risks. Consumers are mainly worried about the following aspects: whether personal information is easily leaked, whether the payment method for online transactions is safe, whether there is a risk of stolen funds, whether the online store has clear commitments and compensation measures, and whether the online store has adopted advanced technology to improve shopping safety. Patil and Sudhir (2020) suggested that the image of security and confidentiality is the basis for easy shopping and an important guarantee for consumers to make safe online consumption. Therefore, this study proposes the following hypotheses:

H4-1: Security image has a significant positive impact on emotional value.
H4-2: Security image has a significant positive impact on functional value.

The Relationship Between Perceived Value and Purchase Intention

From the perspective of consumers' psychology discovered through many empirical studies, Zeithaml (1988) concluded that during the shopping process, the greater the benefits consumers perceive about products or services, the higher their perceived value, which in turn promotes their willingness to purchase goods or services. Peng et al. (2019) pointed out that the real driving factor of consumers' purchasing behavior is perceived value. Chae et al. (2020) believes that the perceived value of the Internet is the comparison of online consumers' benefits and payments. When consumers believe that the benefits of a product or service are greater than the benefits they have paid, the perceived value is positive, resulting in purchase willingness. When the perceived benefit is far greater than the cost, the willingness to buy will be stronger. From the perspective of online consumers, purchase intentions or behaviors are derived from their demand for goods or services. In the online shopping process, consumers will perceive the functional value of the desired goods or services, which will affect their willingness to buy in online stores. In addition, consumers also have certain preferences during the purchase process, which includes consumers' emotional factors. In other words, under the same conditions, consumers choose their favorite products or services. Therefore, based on customer value theory, this study proposes the following hypotheses:

H5: The perceived value of emotional value has a significant positive impact on consumers' purchase intentions.
H6: The perceived value of functional value has a significant positive impact on consumers' purchase intentions.

The Mediating Effect of Perceived Value

An online store's image is the psychological perception of consumers in the process of online shopping. Like perceived value, online consumers' perception of an online store is also a subjective feeling at the psychological level, that is, whether they have a sense of identity with the online store's image, whether they agree that the online store's image has a certain value, and whether they are willing to accept the online store. Therefore, the image of an online store will resonate with online consumers' perception of value, which in turn affects the perceived value. Consumers' good perception and high overall evaluation of online stores are derived from a good online store image, which is followed by an increase in consumer perceived value (Han and Kwon, 2009). Florence et al. (2020) pointed out that what customers buy and consume is not products but value. Most consumer behaviors are driven by value, which is a key factor in determining customer purchasing behavior. Monroe (2012) suggested that consumers' purchase intentions are based on their cognitive value. Consumers will compare the actual price of goods or services with their own quality during the shopping process and determine the purchase intention through the measurement of value. In summary, the image of online stores affects consumers' perceived value, which in turn affects consumers' willingness to buy. Therefore, this study proposes the following hypotheses:

H7: Emotional value plays a mediating role between online baby food store image and consumers' purchase intention.
H8: Functional value plays a mediating role between online baby food store image and consumers' purchase intention.

Research Methodology

Instrument

To ensure content validity, the items used to measure the constructs were adapted from extensive literature and modified to fit the study context. Measurement items for online store design image, order fulfillment image, communication service image, and security image were adapted from Jin and Park (2006) and Ranganathan and Ganapathy (2002). Measurement items for the perceived value of emotional value and functional value were adapted from Wang et al. (2019). Purchase intention was measured using three items adapted from Zeithaml (1988).

As the original items were in English, we conducted a back-translation to ensure translation validity. First, a researcher whose native language was Chinese translated the source items from English into Chinese. Next, another researcher independently translated these items back into English. Subsequently, the two researchers compared the two English versions and jointly

revised the first Chinese version of the items. We then invited a panel of experts in the Internet consumer behavior field to examine the face validity of the survey instrument. Based on their feedback, minor modifications were made to improve the comprehensiveness and user-friendliness of the measurement items. A pre-test of the survey instrument was conducted to validate the instrument conceptually. The final survey questionnaire is presented in **Appendix A**. All items were measured on a 7-point Likert scale, ranging from 1 (not agree at all) to 7 (absolutely agree).

Data Collection

To ensure the external validity of the research and to ensure the representativeness of the survey sample, the survey scope of this study is limited to online baby food stores (for ages 0–3) in China. Only users who had participatory experience with online baby food stores (for ages 0–3) were included in this survey. Therefore, the representativeness of the sample was ensured for the survey. A survey was conducted through an online crowdsourcing platform in China, which provides functions equivalent to Amazon Mechanical Turk. The online survey platform used in this study was the most representative of China, thus ensuring the sample was representative of the survey method. The survey was conducted between August 1, 2021, and August 31, 2021. A total of 650 responses were received over a 4-week period. A total of 584 responses were used for subsequent analyses after 66 incomplete and invalid responses were excluded. Data were analyzed for statistical tests of the measurement model and hypotheses using IBM SPSS Statistics 24.0 and IBM AMOS Graphics 24.0. AMOS Graphics is a visual statistical program especially used for structural equation modeling, path analysis, and confirmatory factor analysis (CFA). AMOS Graphics not only overcomes the limitations of large sample conditions but also provides the standard error of path analysis indirect effects, which is particularly useful in the use of mediation effects. Therefore, AMOS Graphics was selected to analyze the SEM. **Table 1** summarizes the demographic characteristics of the participants. Participants were relatively balanced in gender distribution, and the majority (44.9%) of the participants were between 21 and 30 years of age. Most participants were professionals and civil servants (51.5%). Furthermore, 33.2% of participants use online baby food stores (for ages 0–3) several times a week.

TABLE 1 | Demographics of survey respondents (N = 584).

Demographics	Category	Frequency	%
Gender	Male	278	47.6
	Female	306	52.4
Age	Below 20	42	7.2
	21–30	262	44.9
	31–40	178	30.5
	41–50	71	12.2
	50 or above	31	5.3
Occupation	Office worker	113	19.3
	Civil servant	142	24.3
	Professional (Professor, Doctor, Lawyer, etc.)	159	27.2
	Homemaker	77	13.2
	Other	93	15.9
Use frequency	Several times a day	97	16.6
	Once per day	91	15.6
	Several times per week	194	33.2
	Several times per month	167	28.6
	Basically not used	35	6.0

DATA ANALYSES AND RESULTS

Reliability and Validity

Following the two-step approach recommended by Anderson and Gerbing (1988), we first examined the measurement model to verify the reliability and validity of the instrument and then assessed the structural model.

We performed both principal component factor analysis and CFA to assess the reliability and validity of the scales. The Kaiser–Meyer–Olkin (KMO) statistics for the sample were 0.815, indicating that the data were amenable to factor analysis (Kaiser, 1974). All indicators loaded on the expected factors and were higher than 0.6, while loadings on other factors for all indicators were lower than 0.4, suggesting good convergent and discriminant validity (Chin et al., 1997).

Construct reliability and validity were further examined using the CFA. As shown in **Table 2**, the Cronbach's α and composite reliability (CR) values for each construct ranged from 0.809 to 0.946, both of which were above the suggested threshold of 0.7 (Straub et al., 2004) and exhibited a satisfactory level of reliability. For construct validity, both convergent and discriminant validity were examined. Convergent validity was confirmed by examining the average variance extracted (AVE) and indicator loadings. As shown in **Table 2**, all AVE values were higher than the recommended level of 0.5 (Fornell and Larcker, 1981). The standard loadings of all items were above the desired threshold of 0.7 and significant at 0.001. This indicates a good convergent validity (Chin et al., 1997).

After examining the measurement validity and reliability, the proposed hypotheses were tested using AMOS. After modifying the original model, the actual and recommended values of the model fit indices are listed in **Table 3**. The fit indices of the model were better than the recommended thresholds, demonstrating a good fit between the model and the data.

Discriminant validity was assessed by comparing the square root of AVE for each construct with the correlations between that construct and other constructs (Fornell and Larcker, 1981). **Table 4** indicates that the square roots of the AVEs (diagonal elements) were larger than the inter-construct correlations depicted in the off-diagonal entries, suggesting adequate discriminant validity.

Hypotheses Testing

After examining the measurement validity and reliability, we tested the proposed hypotheses using AMOS. **Table 5** and

TABLE 2 | Results of confirmatory factor analysis (CFA).

Construct	Indicator	Standard loading [a]	Cronbach's α	CR	AVE
E-store design image	EDI 1	0.791	0.873	0.873	0.697
	EDI 2	0.865			
	EDI 3	0.846			
Order fulfillment image	OFI 1	0.898	0.866	0.870	0.691
	OFI 2	0.832			
	OFI 3	0.757			
Communication service image	CSI 1	0.836	0.877	0.880	0.649
	CSI 2	0.853			
	CSI 3	0.692			
	CSI 4	0.830			
Security image	SEI 1	0.773	0.821	0.822	0.606
	SEI 2	0.829			
	SEI 3	0.731			
Emotional value	EMV 1	0.788	0.913	0.917	0.788
	EMV 2	0.946			
	EMV 3	0.921			
Functional value	FUV1	0.790	0.863	0.863	0.613
	FUV 2	0.814			
	FUV 3	0.790			
	FUV 4	0.735			
Purchase intention	PI 1	0.811	0.809	0.811	0.589
	PI 2	0.711			
	PI 3	0.777			

χ^2 = 2.531, CFI = 0.955, TLI = 0.946, NFI = 0.928, and RMSEA = 0.051. [a]All standard loadings were significant at p < 0.001.

TABLE 4 | Measures of the model fit.

Fit index	X^2/df	RMSEA	GFI	CFI	NFI	TLI
Recommended range	<3.84a	<0.08b	>0.90a	>0.90a	>0.90a	>0.90a
Model value	2.917	0.057	0.902	0.941	0.913	0.932

RMSEA, root mean square error of approximation; GFI, goodness of fit index; CFI, comparative fit index; NFI, normed fit index; TLI, non-normed fit index. a, According to Bentler and Bonett (1980) and Lee et al. (2012); b, According to Browne and Cudeck (1989) and Lee et al. (2012).

Figure 2 indicate that 14 of the 15 hypothesized relationships are supported. E-store design image significantly influenced emotional value (H1-1, β = 0.149, $p < 0.001$), significantly influenced functional value (H1-2, β = 0.223, $p < 0.001$). The order fulfilment image significantly influenced emotional value, supporting H2-1 (β = 0.212, $p < 0.001$), significantly influenced functional value, supporting H2-2 (β = 0.235, $p < 0.001$). Communication service image significantly influenced emotional value, supporting H3-1 (β = 0.123, $p < 0.01$), significantly influenced functional value, supporting H3-2 (β = 0.101, $p < 0.05$). The security image significantly influenced emotional value (H4-1, β = 0.145, $p < 0.05$), significantly influenced functional value (H4-2, β = 0.183, $p < 0.01$). Emotional value (β = 0.158, $p < 0.001$), and functional value (β = 0.212, $p < 0.001$) positively influenced purchase intention, thereby supporting H5, and H6.

Mediating Effect Testing

Emotional value and functional value mediate the effect of e-store design image, order fulfillment image, communication service image, and security image on consumers' purchase intention, and the bootstrapping approach was used to test this mediating effect (Preacher and Hayes, 2008). Use and testing of the mediating effects are the main trends in management studies. In SEM, the conceptual model of this study belongs to the multiple mediator model, with two mediating variables (emotional and functional). The analysis of SEM based on bootstrapping can overcome the shortcomings of traditional testing methods, such as the Sobel test in dealing with small sample sizes and small mediating effect values and can bring multiple mediating variables into the model at the same time to gain a deeper understanding of complex management phenomena (Cheung and Lau, 2008). This method can estimate the mediation effect more accurately when a multiple mediator model is used (Muthén, 2010). **Table 6** shows that the mediating effect of emotional and functional value on the relationship among e-store design image, order fulfillment image, communication service image, security image, and consumers' purchase intention are significant with a 95% bootstrap confidence interval, excluding zero. This finding suggests that emotional value and functional value mediate the effect of e-store design image, order fulfillment image, communication service image, and security image on consumers' purchase intention.

TABLE 3 | Results of discriminant validity testing.

Construct	M	S.D.	1	2	3	4	5	6	8
E-store design image	4.193	1.943	***0.835***						
Order fulfillment image	4.147	1.977	0.258	***0.831***					
Communication service image	4.680	1.766	0.208	0.116	***0.806***				
Security image	4.133	1.517	0.114	0.203	0.272	***0.778***			
Emotional value	4.477	1.828	0.243	0.279	0.194	0.183	***0.888***		
Functional value	3.475	1.821	0.345	0.335	0.197	0.228	0.152	***0.783***	
Purchase intention	3.717	1.580	0.216	0.177	0.287	0.301	0.326	0.333	***0.767***

Diagonal bold italics entries are square roots of AVE; all others are correlation coefficients. M, mean; SD, standard deviation.

TABLE 5 | Results of hypotheses testing.

Research hypothesis	Path value	S.E.	*t*-value	*p*-value	Support
H1-1: E-store design image → Emotional value	0.149	0.040	3.712	***	Yes
H1-2: E-store design image → Functional value	0.223	0.041	5.501	***	Yes
H2-1: Order fulfillment image → Emotional value	0.212	0.045	4.674	***	Yes
H2-2: Order fulfillment image → Functional value	0.235	0.045	5.202	***	Yes
H3-1: Communication service image → Emotional value	0.123	0.046	2.677	0.007**	Yes
H3-2: Communication service image → Functional value	0.101	0.045	2.252	0.024*	Yes
H4-1: Security image → Emotional value	0.145	0.065	2.250	0.024*	Yes
H4-2: Security image → Functional value	0.183	0.064	2.859	0.004**	Yes
H5: Emotional value → Purchase intention	0.158	0.038	4.212	***	Yes
H6: Functional value → Purchase intention	0.212	0.039	5.388	***	Yes

<0.05; **<0.01; and *<0.001. n.s., not significant.*

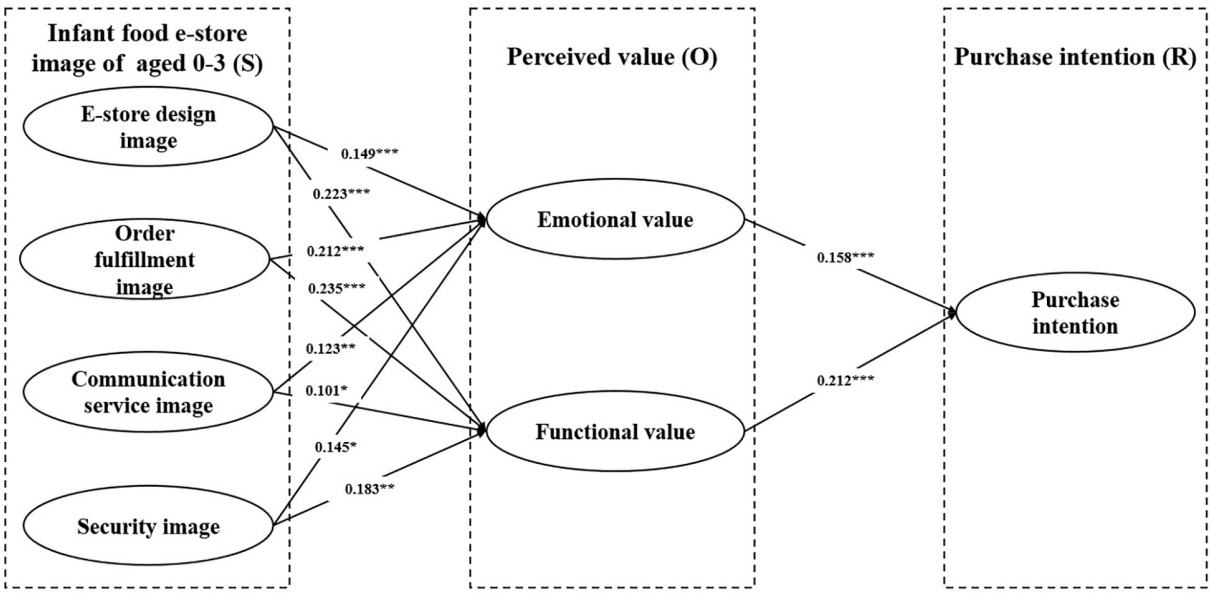


FIGURE 2 | Results of the research model tests. *$p < 0.05$, **$p < 0.01$, and ***$p < 0.001$; n.s., non-significant at the 0.05 level.

DISCUSSION AND IMPLICATIONS

Discussion of Findings

The results show that the 14 hypotheses in this study are all supported. First, the e-store design image, order fulfillment image, communication service image, and security image have a significant positive effect on emotional value and functional value. This shows that baby food e-store image (for ages 0–3) has different effects on consumers' perceived value. The research conclusion shows that improving online store image is an effective way to improve the perceived value of online consumers.

Second, consumers' perceived value of emotional value and functional value has a significant positive effect on consumers' purchase intention. According to the "Customer Value" theory, consumers' purchase intention depends on their perceived value. Therefore, this study believes that improving the functional value and emotional value of baby food e-stores is also an effective way to improve consumers' purchase intentions.

Third, perceived value can have a significant mediating impact on the purchase intention of consumers of baby food e-stores. According to the "S-O-R" theory, consumers are "stimulated" by the image of baby food online stores for ages 0–3, and the "response" of purchase intention is generated through the mediating role of perceived value. The results show that baby food e-store image not only has a significant positive impact on perceived value but also on purchase intention.

Theoretical Implications

In terms of academic research contribution, this study successfully confirmed the suitability of the S-O-R model in explaining the influence of baby food e-store image on perceived value and consumer purchase intention. First, few studies have empirically examined baby food e-stores for ages 0–3, which makes this segment of the market a new research field. This study explores the role of perceived values in influencing customers' purchase intention in baby food e-stores based on

TABLE 6 | Results of mediating effect analysis.

Constructs	Mediator variables	Effect	SE	CIs	*p*-value	Hypothesis
E-store design image	Emotional value	0.060	0.014	[0.035, 0.092]	0.001**	H7-1
	Functional value	0.089	0.018	[0.058, 0.129]	0.001**	H8-1
Order fulfilment image	Emotional value	0.077	0.017	[0.047, 0.113]	0.001**	H7-2
	Functional value	0.094	0.019	[0.061, 0.136]	0.001**	H8-2
Communication service image	Emotional value	0.056	0.016	[0.029, 0.092]	0.001**	H7-3
	Functional value	0.060	0.018	[0.030, 0.099]	0.001**	H8-3
Security image	Emotional value	0.071	0.021	[0.035, 0.120]	0.001**	H7-4
	Functional value	0.090	0.024	[0.049, 0.144]	0.001**	H8-4
	95% Bootstrap confidence intervals for indirect effect					

$^{**}p < 0.01$.

the S-O-R framework, which enriches the research in the field of baby food e-store image and provides a new direction for future research.

Second, few studies have established the link between baby food e-store image (for ages 0–3) and consumer perceived value perspective. This study introduces the theory of perceived value into the field of baby food e-stores and proposes the importance of perceived value. Moreover, a theoretical model is constructed with the consumer perceived value as the mediator variable, which is helpful for future research on the perception of baby food e-stores (for ages 0–3).

Third, this study was carried out based on the S-O-R model, and the findings indicate that e-store design image, order fulfillment image, communication service image, and security image are indirect predictors of consumers' purchase intention. On the premise of summarizing the image of the baby food e-store and drawing lessons from previous research, multi-dimensionally studied the influencing factors of purchase intention. The establishment and verification of this research model can provide a reference for future research. Therefore, this study expanded the application field of the S-O-R model and improved the body of knowledge about perceived value.

Practical Implications

This study offers useful managerial implications from three perspectives. First, we comprehensively improve the overall image of baby food e-stores (for ages 0–3) and enhance the competitive advantage of online stores. Today's Internet shopping market is booming, bringing unlimited vitality to the entire national economy and social development. This study found that baby food e-store image has a positive impact on perceived value, and perceived value has a positive impact on online consumers' purchase intention. Therefore, to enhance their competitive advantage, baby food e-stores must be committed to improving the overall image of online stores and establishing a distinctive online store.

Second, we implement targeted business service plans to meet the online shopping needs of online consumers. From the perspective of realizing and satisfying consumers' purchasing intention, baby food e-stores need to grasp the psychological and behavioral characteristics of different consumers. To ensure the quality of the products or services, they should provide superior products. Furthermore, they should attach importance to the image of communication services and provide quality customer service to online consumers. In addition, they should pay attention to the image of order fulfillment, fulfillment of promises, and operate honestly.

Third, this study enhances the value perception of online consumers and implements a humanized business philosophy. Baby food e-stores must first provide products or services that meet the actual needs of consumers and grasp the actual needs of consumers. In the process of communicating with online consumers, online shops should pay attention to emotional communication with consumers, and they should fully understand the actual thoughts, psychological intentions, and behavioral intentions of online consumers.

Limitations and Future Research

The limitations of this study should be considered before generalizing the findings. First, this study was conducted with data collected from a baby food e-store (for ages 0–3) in China. The results of this study might be different if the model was retested in a different context or a different cultural environment. In the future, scholars should further test and validate our findings in different contexts and cultural environments. Second, this study considered four dimensions of baby food e-store image as independent variables. It is necessary to identify and determine, at a meticulous level, other dimensions manifested like e-store design image, order fulfillment image, communication service image, and security image. Future research could replicate this study using experiments to control for other baby food e-store image dimensions. Finally, given the scope of this study, other variables were not included in the model. Future studies could extend our model to include different consumer psychological variables as mediators or moderators, including consumers' goals and needs, achievement motivation, and baby food e-store activity involvement.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Normal School, Changshu Institute of Technology. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

CJ designed the study and drafted the initial manuscript. XS and LW collected the data, performed the statistical analysis, and drafted the initial manuscript. XS contributed to the revised manuscript. All authors discussed the results and contributed to the final manuscript.

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APPENDIX A

Construct	Item
E-store design image	1. The design of the online store left a good impression on me.
	2. The online store has detailed product introduction, picture displays, and purchase process.
	3. The content news of the online store is updated from time to time.
Order fulfillment image	1. The online store promises to deliver goods in a short time.
	2. The online store offered "freight insurance" for customers.
	3. The goods are received intact without damage.
Communication service image	1. The customer service staff of the online store are warm and polite.
	2. The customer service staff of the online store have sufficient professional knowledge.
	3. The online store will consider accepting customers' suggestions.
	4. The online store will show concern to me in the form of SMS, telephone, e-mail, etc.,
Security image	1. My personal information is confidential in this online store.
	2. Credit card and payment media information is secure.
	3. The online store has a good reputation and can guarantee goods.
Emotional value	1. I feel happy when purchasing goods in this online store.
	2. I like to purchase the goods of the online store.
	3. The goods in this online store can meet my spiritual needs.
Functional value	1. I can choose the right goods in this online store.
	2. The quality of the goods in this online store can be trusted.
	3. The goods or services of the online store have practical value.
	4. The quality of the goods in this online store is up to standard.
Purchase intention	1. I am more likely to buy in this online store than other stores.
	2. I will continue to buy goods in this online store.
	3. I would recommend the goods and services of the online store to my relatives and friends.

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"Scapegoat" for Offline Consumption: Online Review Response to Social Exclusion

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Previous research has mostly focused on Internet use behaviors, such as usage time of the Internet or social media after individuals experienced offline social exclusion. However, the extant literature has ignored online response behaviors, such as online review responses to social exclusion. To address this gap, drawing on self-protection and self-serving bias, we proposed three hypotheses that examine the effect of offline social exclusion on online reviews, which are verified by two studies using different simulating scenarios with 464 participants. The results show that when individuals are socially excluded offline, regardless of where the exclusion comes from (businesses or peers), they will be more likely to give negative online reviews. In addition, brand awareness moderates the effect of offline social exclusion on online reviews. Specifically, if the brand is less known, compared with social inclusion, offline social exclusion will lead individuals to give more negative online reviews; conversely, for well-known brands, no significant difference exists in the online reviews between social exclusion and inclusion.

Keywords: social exclusion, online review, self-protection, self-serving bias, brand awareness

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INTRODUCTION

With the rapid development of online shopping, an increasing number of individuals have been using online platforms to book restaurants, movies, and ball games, among others. After their offline consumption, individuals will give their reviews on such online reservation platforms. These online reviews play an extremely important role in the attitude of customers, which indicates that merchants value these reviews considerably. Online reviews are important for businesses, especially how to create a good offline consumption experience to avoid negative online reviews, which has become a great problem faced by merchants. However, the content of experience of individuals during offline consumption is highly diverse, especially when it comes to contact with groups or individuals in the consumption scene, which is often full of uncertainty. For example, a man booked a long-awaited steak set meal online to celebrate his birthday alone. When he arrived at this restaurant on time, he came across his best friends who were also having a party here, and immediately he felt he has been excluded by his friends. In this case, although the steak meal of this restaurant suited his taste well, he still gave a negative review to his dinner booking on the platform just for being excluded. The restaurant may have nothing to do with the situation of the man, but he has already left a negative review of the restaurant on the platform. Can merchants avoid such an accident, being scapegoats for the unfortunate experience of customers that is irrelevant

to the shops? This study addresses this issue by examining the effect of offline social exclusion on online reviews.

Many researchers have examined the influence of offline social exclusion on online behaviors. For example, social exclusion results in frequent use of the Internet by individuals (Lin et al., 2017). In addition, in comparison with those who have not experienced social exclusion, individuals who have experienced it prefer to use social networking sites (SNS; Lin et al., 2017), communicate online with a stranger of the opposite sex (vs. playing online games; Gross, 2006), use new media (i.e., computational media communication; Tom Tong and Walther, 2011), use social media to seek associations (Ahn and Shin, 2013), and seek revenge on the site (Chen, 2012). The extant research has mostly focused on Internet use behaviors, such as using the Internet or online social media after individuals experienced offline social exclusion, that is, the effect of social exclusion on online behaviors. However, these studies have not discussed what happens to online reviews after encountering social exclusion. To address this gap, this study examines how offline social exclusion influences online reviews.

On the basis of self-protection and self-serving bias theories (Miller and Ross, 1975; Mezulis et al., 2004) and attribution theory (Kelley, 1967), this study proposes that offline social exclusion has a significant negative influence on online reviews of individuals. Given that individuals often attribute unfortunate events to the situation rather than to themselves, they tend to attribute to consumption scenarios once they encounter social exclusion, which leads to negative reviews to merchants on online platforms. In addition, given that brand awareness can affect the perception of quality of consumers (Lu et al., 2014), it also moderates the effect of offline social exclusion on online reviews. Specifically, when a shop brand has a low profile, individuals will judge by what they experience during offline consumption, which indicates that offline scenarios lead has a positive effect on reviews. Thus, when individuals feel that they are socially excluded during offline consumption, they will attribute it to the offline scenario and then give negative reviews. By contrast, when a shop brand has a high profile, as perceiving high quality, individuals attribute negative emotions to themselves rather than the shop. That is, regardless of whether individuals encounter social exclusion, they will not give negative online reviews.

This article is structured as follows. The first section introduces the theoretical background and research hypotheses. The second and third sections present Studies 1 and 2, which examine the main effect and the moderated effect of brand awareness, respectively. The fourth section includes the conclusion, the theoretical and managerial implications, and research limitations.

THEORETICAL BACKGROUND AND RESEARCH HYPOTHESES

Social Exclusion and Online Behavior

Social exclusion refers to a state of being isolated or excluded from other individuals or groups (Williams et al., 2000). Many studies have investigated the effect of social exclusion on consumer behavior. For example, in comparison with ambiguous rejection, explicit rejection can lead to less emotional toil (Freedman et al., 2016). When consumers encounter social exclusion, they tend to prefer nostalgic products (Loveland et al., 2010; Xu and Jin, 2020) and purchase products strategically, such as buying products that symbolize membership of a group (Mead et al., 2011) and ones with more visual density (Su et al., 2019). When people feel that they are socially excluded, they prefer to select the brand that will help them become similar to the group (Dommer et al., 2013), some unique products (Echo Wen et al., 2014), green products (Guo et al., 2020), and retails with crowded space to purchase (Thomas and Saenger, 2020). Furthermore, they tend to pursue financial opportunities with greater risks that earn more potential profits (Duclos et al., 2013), more conspicuous consumption behaviors (Liang et al., 2018), and more transfer behaviors (Su et al., 2017) when they are in a social exclusion condition. In addition, social exclusion can influence females more than males on negative attitudes and the sense of control of merchants (Hwang and Mattila, 2019).

Social exclusion has been proven to decrease prosocial behaviors, such as less inclination to help or cooperate with them (Twenge et al., 2007), which prevents them from sharing the experience to others. However, when it comes to the Internet, offline social exclusion can affect the online behaviors of an individual (Lu and Sinha, 2017). For example, in comparison with those who have not experienced social exclusion, individuals who experience it prefer to use SNS to share this terrible experience (Lin et al., 2017). These people are more likely to communicate online with a stranger of the opposite sex (vs. playing online games; Gross, 2006) or use new social media (i.e., computational media communication; Tom Tong and Walther, 2011; Mourey et al., 2017) to seek associations (Ahn and Shin, 2013). In order to release this kind of pressure, they will seek revenge on the site (Chen, 2012), recover the threat of ownership through the use of SNS such as Facebook (Knausenberger and Echterhoff, 2018), or ease their mood when communicating with an online chatbot (de Gennaro et al., 2019). Some scholars also found that offline social exclusion could lead to present prosocial behaviors (Lutz and Schneider, 2020) and spend longer time on font colors in SNS (Lee and Chiou, 2013). These extant studies have indicated that social exclusion affects Internet use behavior. However, they do not consider the influence of offline social exclusion on online response behavior, such as online reviews. To address this gap, this study discusses the effect of offline social exclusion on online reviews.

Antecedent Variables of Online Reviews

Consumers often search the reviews on online platforms because they believe that most of the reviews are credible (Chen and Xie, 2008; Allard et al., 2020). Online reviews refer to the feedback that reflects the feeling of an online purchase experience, which is divided into negative and positive ways. Positive online reviews lead to more sales through enhancing the positive attitude and expectation of this company, whereas negative online reviews can decrease the evaluations and purchase intention (Ho-Dac et al., 2013; Chevalier and Mayzlin, 2018; Liu, 2018; Guerreiro and Rita, 2020). In addition, some scholars have proposed the

boundary conditions of the effects of negative and positive online reviews on product choice. For example, Reich and Maglio (2019) found that positive online reviews that contain a fail purchase experience in another place can be more persuasive than common positive reviews. Rocklage and Fazio (2020) proposed that positive online reviews can arouse positive emotions when it comes to hedonic products rather than functional products. In addition, Berger et al. (2010) found that negative online reviews can enhance the short-term sales of an unknown brand because these reviews help increase the awareness of this brand. Allard et al. (2020) found that unfair negative online reviews (i.e., a negative online review that does not reflect the real condition) help arouse the empathy and then the positive response of consumers. Therefore, the extant research has focused on the moderated effect of the two types of online review on the attitudes and choices of consumers.

Some scholars have examined the motives for consumers to read or write online reviews. Hennig-Thurau et al. (2004) investigated the motives of writing online reviews from the perspectives of focus-related utility, consumption utility, and approval utility, which present the eagerness to interact with others, pursue economic rewards, and help other consumers. Ghazi (2017) found that the motives for writing positive and negative online reviews are extremely different. For positive reviews, consumers are willing to write online reviews that can help the company and other consumers, whereas for negative reviews, consumers tend to vent their negative emotions and some warnings through online reviews. On the basis of incentive programs for online reviewers, Liu et al. (2019) proposed that those who have already written several reviews will pay more effort to pursue the reward from the company, and a large number of online reviews will eager others to participate in this process. Moses et al. (2018) examined the effect of different self-construal on participating in online reviews and designed an interactive online feature to figure out the social motives for writing reviews. Dixit et al. (2019) proposed that subjective norms and behavior control can be used to predict the motive of writing online reviews. However, to the best of our knowledge, no research has taken offline social exclusion as the antecedent variable on online reviews, although offline social exclusion is an overly common scene in the offline consumption environment when individuals use online platforms to book something and consume offline.

Social Exclusion and Online Reviews

Attribution theory proposes that people will attribute their unfortunate experience to the external environment or themselves (Kelley, 1967). Styles of individual attribution depend on internality, that is, attributing to internal or external factors (Hymel et al., 1985; Newall et al., 2009). In contrast, according to self-protection or self-serving bias theory, most people tend to attribute success to themselves and failure to the situation (i.e., denial of self-responsibility; Miller and Ross, 1975; Mezulis et al., 2004) because people are willing to protect their self-concept positively (Campbell and Sedikides, 1999), which is defined as those who have different stable and definite characters in the phenomenal field (Syngg and Combs, 1949). Especially, people who pursue a goal independently (Sedikides et al., 1998) and feel more self-threat (i.e., a feeling that is generated by questioning, challenging, or mocking favorable ideas) will generate self-serving bias and self-protection. That is, more self-threat feeling can lead to more self-serving bias and self-protection (Campbell and Sedikides, 1999). In addition, social exclusion has been proved to result in less prosocial behavior (Twenge et al., 2007; Kiat et al., 2018) and impaired cognitive functioning (Baumeister et al., 2002), which is the same as self-threat (Gaspar, 2012; Thomas and Saenger, 2020). Therefore, on the scene of offline–online consumption, once consumers encounter offline social exclusion in a consumption situation, given that individuals usually attribute unfortunate events to the situation rather than to themselves, they tend to attribute the negative result to the consumption scenario (i.e., the shop), which will result in dissatisfaction with the consumption and finally more likely to give negative online reviews to the shop than in social inclusion. By contrast, if consumers come across social inclusion during consumption, then they will be less sensitive and responsive to consumption scenarios due to the lack of self-service bias or self-protection awareness than in social exclusion. Therefore, consumers generally do not give negative online reviews when they experience social inclusion.

On the basis of the above reasoning, the following hypotheses are formulated:

H1: Consumers are more likely to give negative online reviews to the shop when they are in offline social exclusion conditions than in social inclusion conditions.

H2: Situational attribution mediates the influence of social exclusion on online reviews.

Brand Awareness

Brand awareness represents the influence of merchants among groups of consumers. In other words, brand awareness equals the recognition level of a brand name based on perceptual frequency, regardless of product categories (Hellofs and Jacobson, 1999). For example, among brands of sport equipment, Little Sheep and Haidilao Hot Pot (two Chinese brands) are widely recognized for high quality and satisfaction in service and products. However, in terms of service satisfaction, Haidilao Hot Pot is more widely recognized and has a greater brand reputation than Little Sheep, which implies that its brand awareness is higher. Moreover, this difference in brand awareness will affect the perceptions and behavior of consumers (Oh, 2000). Therefore, brand awareness may affect the relationship between offline social exclusion and online reviews.

The influence of brand awareness on consumers depends on the perception of brand quality. The investment of brand awareness is expected to produce reward, but a brand with low quality will decrease the benefit of this investment; thus, high-quality brand has dynamics and can afford to improve and finally reach high brand awareness (Kirmani and Rao, 2000; Erdem et al., 2018). A well-known brand is most likely to attract the attention of consumers and is likely to be perceived as high quality (Dodds and Monroe, 1985; Teas and Agarwal, 1997). In

addition, when consumers are not familiar with the products, they tend to purchase products of well-known brands because well-known brands make consumers think that the brand is popular and can satiate their psychological demands (Hellofs and Jacobson, 1999). On online behavior of booking consumption, consumers tend to pay attention to the brand awareness of consuming service or products and judge the popularity of the merchant by using brand awareness. When a shop brand has a high profile, as perceiving the high quality of the service or products and great popularity of the shop, customers attribute negative emotions to themselves rather than the shop. Therefore, when the shop brand is well known, consumers are less likely to give negative online reviews regardless whether they encounter social exclusion.

On the contrary, if the shop brand awareness is less known, then the trust of consumers toward the merchants will be extremely low because they have little knowledge of these brands (Lu et al., 2014), and they tend to attribute the low brand awareness to the low quality of products and services provided (Kirmani and Rao, 2000). Therefore, consumers tend to have more self-protection and self-serving bias consciousness with the merchant of a less-known brand than of a well-known brand. Thus, if any problem occurs during offline consumption, even when it is caused by the consumers, then the merchants will be the most to be blamed. Therefore, when consumers encounter social exclusion during offline consumption of online booking products or services with low brand awareness, they will blame it on the merchants and give negative online reviews, no matter if the exclusion comes from their peers or consumption experience.

H3: Brand awareness moderates the effect of social exclusion on online reviews.

Specifically, when the shop brand is less known, consumers who are in offline social exclusion condition will give more negative online reviews to the shop than in a social inclusion condition. Nevertheless, when the shop brand is well known, no significant influence exists on online reviews between social exclusion and social inclusion.

The theoretical framework of this study is presented in **Figure 1**.

STUDY 1

The purpose of Study 1 is to verify the negative effect of offline social exclusion on online reviews (i.e., H1) and the mediating effect of situation attribution in this effect (i.e., H2). Study 1 uses the way of scenario simulation to manipulate offline social exclusion; specifically, individuals are rejected by peers or waiters in the restaurant.

Methods

A total of 166 undergraduates (93 females) were recruited and given extra course credit for their participation. The average age of the participants was 21 years ($SD = 1.34$). The participants were randomly assigned to a 2 (implementer of social exclusion: peer vs. waiter) × 2 (social exclusion: exclusion vs. inclusion) between-subjects design.

When the participants arrived at the experimental site, they were informed to read the materials of offline consumption experience (see **Supplementary Appendix 1**) and were then required to complete a survey aiming at improving the online booking platform service. To increase the credibility of the survey and achieve better experimental results, the participants were told that the survey was launched by a famous online booking platform in cooperation with a professor, aiming at collecting opinions about their online platform. After reading the materials of the offline consumption experience, the participants were asked to imagine that they were really in that scene where the reading materials show. Then, they were asked to complete a paper-and-pencil questionnaire about the scene and online platform.

The participants were initially asked to rate the level of being rejected in the offline consumption scenario (1 = very low, 7 = very high). Then, the participants were told to rate four items related to the restaurant, which include "how you feel with the taste of the reserved restaurant?" "how you feel with the environment of the reserved restaurant?" "how you feel with the service of the reserved restaurant?" (1 = very dissatisfied, 7 = very satisfied), and "what is your assessment to the restaurant you booked?" (1–7 stars); the scores of these items were averaged to the evaluation of the restaurant. In addition, the participants were asked to complete the scale of situational attribution. That is "how much the situation affects you in the restaurant scene?" (1 = very low, 7 = very high).

Data Analysis and Results

Manipulation Check

As expected, in comparison with being accepted by the peer or waiter, the participants felt more rejected when they were rejected [$M_{exclusion} = 4.76$, $SD = 1.28$ vs. $M_{inclusion} = 3.80$, $SD = 1.43$,

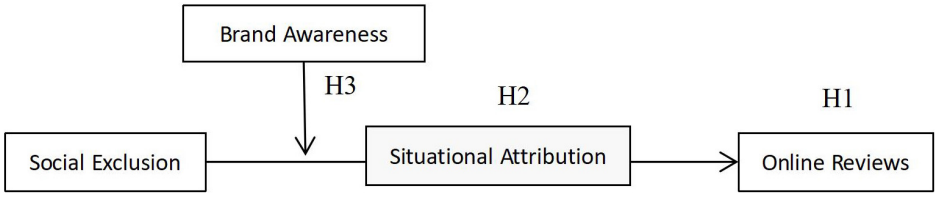


FIGURE 1 | Framework of research hypotheses.

TABLE 1 | ANOVA analysis of study 1.

Variable	SS	df	MS	*F*	*p*
Social exclusion	59.69	1	59.69	63.46	0.000
Implementer	1.45	1	1.45	1.54	0.217
Social exclusion × Implementer	0.03	1	0.03	0.03	0.853

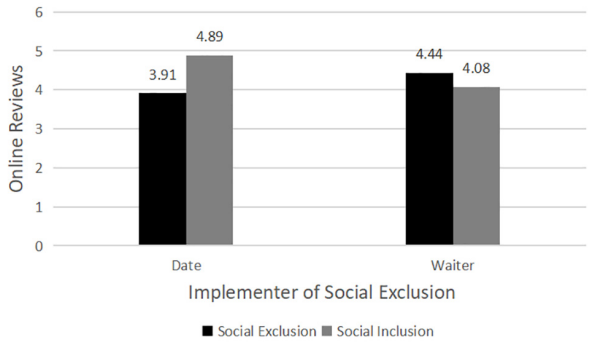


FIGURE 2 | The impact of social exclusion on online reviews (study 1).

$F(1,188) = 23.78$, $p = 0.00$, Cohen's $d = 0.707$]. Thus, the manipulation of offline social exclusion was successful.

Hypothesis Testing

The results of ANOVA analysis of online review (Cronbach's alpha = 0.89) revealed that the main effect of offline social exclusion on online reviews [$F(1,186) = 63.46$, $p = 0.000$] was significant, which indicated that there existed significant differences in online reviews of restaurants given by individuals who have encountered social exclusion. Moreover, the implementer of social exclusion had no significant main effect on online reviews [$F(1,186) = 1.54$, $p = 0.217$]. In addition, the interaction terms of social exclusion and the implementer had no significant effect [$F(1,186) = 0.03$, $p = 0.853$], indicating that the interaction between social exclusion and the implementer of social exclusion did not affect online reviews (see **Table 1**).

The results of further analysis showed that the participants in dating failure scenario (social exclusion from date) gave more negative online reviews to the restaurant compared with dating success scenario [social inclusion from date; $M_{exclusion} = 4.03$, $SD = 1.25$ vs. $M_{inclusion} = 5.12$, $SD = 0.70$, $F(1,91) = 27.21$, $p = 0.000$, Cohen's $d = 1.076$]. Likewise, the participants in the service failure scenario (social exclusion from waiter) tended to give more negative online reviews to the restaurant compared with service success scenario [social inclusion from waiter; $M_{exclusion} = 3.83$, $SD = 1.04$ vs. $M_{inclusion} = 4.97$, $SD = 0.80$, $F(1,95) = 37.13$, $p = 0.000$, Cohen's $d = 1.229$]. As a result, H1 was supported (see **Figure 2**).

The results of ANOVA analysis showed that the main effect of offline social exclusion on situational attribution was significant [$M_{exclusion} = 5.05$, $SD = 1.50$ vs. $M_{inclusion} = 3.06$, $SD = 1.37$, $F(1,188) = 90.55$, $p < 0.01$, Cohen's $d = 1.385$]. In other words, in comparison with social inclusion, when the participants were socially excluded, they were more likely to attribute to the situation. By using Model 4 as suggested by Hayes (2013), a bootstrapping analysis found that situational attribution mediated the effect of offline social exclusion on online reviews, indirect effect on online reviews through situational attribution [$B = 0.909$, 95% confidence interval (CI): (0.667, 1.196), not including zero], and a direct effect on online reviews that was not through situational attribution [$B = 0.214$, 95% CI: (−0.463, 0.034), includes zero]. This result showed that situational attribution mediated the effect of offline social exclusion on online reviews. Therefore, H2 was supported.

Discussion

The results of Study 1 showed that in comparison with social inclusion, the participants were more likely give negative reviews to the restaurant when they encountered social exclusion, whether it came from their peer or the waiter (H1), which also indicated that personal experience and service quality considerably affected the online reviews. Study 1 also verified that situational attribution mediated the effect of offline social exclusion on online reviews (H2).

STUDY 2

Study 2 aims to verify that brand awareness moderates the effect of offline social exclusion on online reviews (H3). Specifically, when the shop is less known, consumers who are in an offline social exclusion condition will more likely give negative online reviews to the shop than in a social inclusion condition. However, when the shop is well known, no significant effect exists on online reviews between social exclusion and social inclusion. To achieve this goal, we use the same process with different scenes in Study 1 and add the manipulation of brand awareness into the scenario.

Methods

A total of 218 undergraduates (122 females) were recruited and given monetary compensation for their participation. The average age of the participants was 21 years ($SD = 1.34$). The participants were randomly assigned to a 2 (brand awareness: less known vs. well known) × 2 (social exclusion: exclusion vs. inclusion) between-subjects design.

By using the same process in Study 1, when the participants arrived, they were informed to read the materials of offline consumption experience (see **Supplementary Appendix 2**) and then need to complete a survey. Different from Study 1, Study 2 used hotpot restaurants by using two restaurant names, namely, Haidilao (well known as a hotpot restaurant in China) and Xiaofuzi (unknown hotpot restaurant). Then, the participants were asked to complete the same questionnaire used in Study 1, except an additional item used to check the manipulation of brand awareness was included, that is, "What do you think of the reputation of the restaurant?" (1 = is very low, 7 = very high).

Data Analysis and Results

Manipulation Check

As expected, the response of the participants to the brand awareness of the hotpot restaurant of Haidilao was higher than

TABLE 2 | ANOVA analysis of study 2.

Variable	SS	df	MS	*F*	*p*
Social exclusion	5.491	1	5.491	5.421	0.021
Brand awareness	1.093	1	1.093	1.079	0.300
Social exclusion × Brand awareness	24.379	1	24.379	24.067	0.000

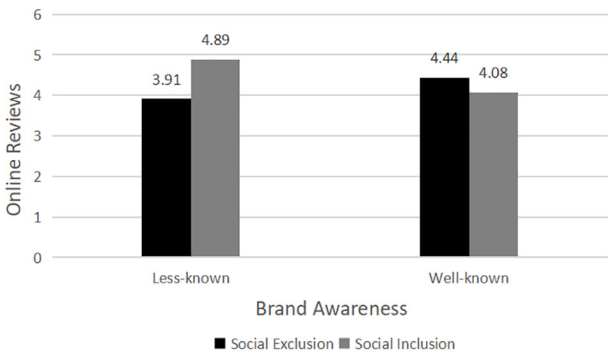


FIGURE 3 | The impact of brand awareness and social exclusion on online reviews.

Xiaofuzi [$M_{Haidilao}$ = 5.18, SD = 1.17 vs. $M_{Xiaofuzi}$ = 3.07, SD = 1.62, $F(1,216) = 120.23$, $p < 0.01$, Cohen's d = 1.493]. In comparison with social inclusion, the participants felt more exclusive when they were in social exclusion [$M_{exclusion}$ = 4.81, SD = 1.53 vs. $M_{inclusion}$ = 3.48, SD = 1.71, $F(1,216) = 36.40$, $p < 0.01$, Cohen's d = 0.82], which confirmed the success of the experimental manipulation scenarios.

Hypothesis Testing

We conducted an ANOVA with offline social exclusion and brand awareness as independent variables and the online reviews (Cronbach's alpha = 0.88) as the dependent variable. The results revealed that there existed a main effect of social exclusion on online reviews [$F(1,214) = 5.42$, $p < 0.05$]. In addition, no main significant effect of brand awareness was observed on online reviews [$F(1,214) = 1.08$, $p > 0.3$]. Most importantly, a significant interactive effect of social exclusion and brand awareness existed on online reviews [$F(1,214) = 24.07$, $p < 0.01$; see **Table 2**].

The results of further analysis showed that the participants would more likely give negative online reviews to the restaurant encountering social exclusion (vs. social inclusion) when the restaurant is less known [$M_{exclusion}$ = 3.91, SD = 1.13 vs. $M_{inclusion}$ = 4.89, SD = 0.91, $F(1,108) = 25.37$, $p < 0.01$, Cohen's d = 0.955]. In contrast, when the restaurant was well known, no significant difference in online reviews [$M_{exclusion}$ = 4.44, SD = 0.93 vs. $M_{inclusion}$ = 4.08, SD = 1.04, $F(1,106) = 3.44$, $p > 0.05$, Cohen's d = 0.365] was observed between social exclusion and social inclusion. Therefore, H3 was supported (see **Figure 3**).

Discussion

Using the same process of Study 1, Study 2 verified that brand awareness moderated the effect of offline social exclusion on online reviews using the restaurant scene. Specifically, if the restaurant is less known (Xiaofuzi), then, the participants who were socially excluded were inclined to give the restaurant more negative online reviews compared with being socially inclusive. In contrast, if the restaurant is well known (Haidilao), no significant difference was observed in online reviews of the restaurant between social exclusion and social inclusion. These results showed that brand awareness plays an important role in the effect of social exclusion on online reviews.

GENERAL DISCUSSION

Conclusion

At present, people are increasingly relying on online platforms or social media to make online reservations before offline consumption, such as restaurants, movies, hotels, and tours. Then, after offline consumption, consumers will post reviews on the online platform as feedback of the experience. With the development of online shopping, more and more consumers prefer to book online before offline consumption. The effect of offline consumption on online reviews has also attracted more attention of researchers. By simulating offline dating consumption scenarios, this study examines the influence of offline social exclusion on online reviews. By using two experiments, this work finds that consumers who experience offline social exclusion will more likely give negative online reviews to the shop than in a social inclusion condition. In addition, brand awareness moderates the effect of social exclusion on online reviews. Specifically, if the brand of the shop is less known, customers tend to give more negative reviews after encountering social exclusion compared with encountering social inclusion. However, if the brand of the shop is well known, no significant difference exists in online reviews given by customers between social exclusion and social inclusion conditions.

Theoretical Contributions

First, this study further expands the literature on the effect of offline behavior on online response behavior, which examines the effect of offline social exclusion on online reviews. Previous research has mostly focused on the Internet use behaviors, such as using the Internet or social media after individuals are socially excluded. For example, compared with those who have not experienced social exclusion, when individuals encounter social exclusion, those with high social anxiety prefer to use SNS. After manipulating social exclusion on participants, Knausenberger and Echterhoff (2018) found that participants could recover the threat of ownership brought by social exclusion through the use of SNS such as Facebook. The study of Lee and Chiou (2013) also showed that when under a social exclusion condition, after the inclusion motivation was aroused, individuals spent longer time addressing the font color used in SNS. When adolescents encounter social exclusion (vs. not encounter), online communication with a stranger of the opposite sex (vs. playing online games) can help them recover from the negative effect of social exclusion because online communication can supplement the self-esteem of young people and help them perceive the value of a relationship (Gross, 2006). According to the research results

of Tom Tong and Walther (2011), new media (i.e., computational media communication) provides daters with new ways to express their love and refusal, mainly including, (1) one-click rejection and (2) no response. Moreover, the results of Chen (2012) showed that being rejected online (such as being rejected in SNS) will lead to negative emotions in self-reports and revenge on the site and the rejection group. Furthermore, men have a stronger desire for revenge than women. The results of Ahn and Shin (2013) showed that the use of social media not only can help people to avoid social loneliness but also help them seek associations. In terms of avoiding social loneliness, social media can replace face-to-face communication, whereas in terms of seeking associations, the use of social media can enhance face-to-face communication. The above studies suggested that social exclusion affects the Internet use behavior, especially in the recovery process of psychological threats brought by social exclusion. However, these studies did not consider the influence of social exclusion on online reviews. Therefore, the present study focused on the influence of offline social exclusion on online reviews, which enriches the existing research.

Second, the present study further expands the mediating mechanism on the effect of offline social exclusion on the online behavior of an individual. As the existing studies have mostly used the recovery of psychological threat as the mediating mechanism, the present work found that situational attribution plays a mediating effect between offline social exclusion and individual behavior. Previous studies have suggested that social exclusion affects individual behavior mainly through four major belonging needs, namely, attribution needs, self-esteem need, control need, and the need for a meaningful existence (Williams et al., 2000). The extant research has mostly used one of the four belonging needs as the mediating mechanism for the influence of social exclusion on individual behavior. For example, Ward and Dahl (2014) argued that attribution needs explain how social exclusion leads to the preference of consumers for products from luxury brands. Duclos et al. (2013) found that self-esteem needs explain how social exclusion leads to individual preference to risky financial investment. Jaehoon and Shrum (2012) found that control needs can explain how social exclusion leads to individual show-off consumption behavior. Different from these studies, on the basis of situational attribution and self-serving bias theories, this study found that situational attribution may explain the influence of social exclusion on online reviews. As consumers encounter social exclusion, they attribute their unfortunate experience to the consumption scenarios, which leads to negative online comments.

Finally, this study enriches the literature on the antecedent variables on online reviews by taking offline social exclusion as one important factor. Numerous studies have investigated the antecedent variables on online reviews. For example, Ghazi (2017) found that the motives for writing positive and negative online reviews are different. Liu et al. (2019) proposed that those who have already written several reviews will pay more effort to pursue the reward from the company, and a large number of online reviews will eager others to participate in this process. Moses et al. (2018) examined the effect of different self-construal on participating in online reviews and designed an interactive online feature to figure out the social motives for writing reviews. However, to the best of our knowledge, no research takes offline social exclusion as the antecedent variable on online reviews, whereas offline social exclusion is an overly common scene in the offline consumption environment when individuals use online platforms to book something and consume offline.

Practical Contributions

The two practical implications of the present study are as follows.

On the one hand, offline consumption experience often influences online reviews, in which, the present study finds that offline social exclusion leads to negative online reviews. As mention before, the example at the beginning of this study, being rejected by a woman in the restaurant may only lead to a negative online review of the man, as he attributes the unfortunate experience to the consumption scenario. To avoid such negative online reviews, storekeepers need to be careful about their services and products when serving consumers offline, such as the attitude of the waiter or waitress and responding speed to the needs of customers. By improving product and service quality, storekeepers can reduce the probability of customers attributing the failure of life of consumers to the store.

On the other hand, the present research finds that the brand awareness of stores can offset the effect of offline social exclusion on online reviews. Therefore, offline and online shops, especially those who are booked online and consumed offline, should improve their brand awareness through various methods, such as advertising and word-of-mouth marketing, which can reduce negative online reviews caused by the personal experience of consumers.

Limitation and Future Research

There still exist some limitations in the present study. First, this study uses a fictional scenario to manipulate offline social exclusion, which may not reflect the actual consumption experience in reality. A short-time interval exists between scenario manipulation and measurement in the laboratory. In reality, after offline consumption, it may take some time to give online reviews on the online platform. Therefore, future research can use another method to manipulate the offline scenario or control the time interval, which may lead to a different result.

Second, in this study, most of the participants are university students, which indicates that the hypothesis can be verified adequately, but it still needs more participants from a different culture to be tested in these hypotheses. Under different cultural backgrounds, individuals may have different feelings toward relationship orientation. For example, consumers with different cultural tendencies have different reactions to brand scandals (Wei et al., 2013; Liang et al., 2018), which can be an important factor that influences the results in this study. Future research can exploit this factor to further test our hypothesis.

Finally, there may exist another mediating mechanism in the present study, which can explain the influence of offline social exclusion on online reviews. On the basis of self-protection and self-serving bias, this study proposes that situational attribution

plays a mediating mechanism in the effect of offline social exclusion on online reviews. However, there may exist other mediating mechanisms to explain this effect, such as cognitive focus (Liang et al., 2021), psychological reactance (Liang et al., 2021), and cognitive need demand (Dong et al., 2018). These mechanisms need to be further examined in future research.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethics Committee of Guangxi University. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

SL, YWa, and YaC contributed to the conception of the manuscript and helped to perform the analysis with constructive discussions. YuC and ZZ performed the experiment. YWu and SL contributed significantly to analysis and manuscript preparation. YWa and ZZ performed the data analyses and wrote the manuscript. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.783483/full#supplementary-material

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Government Regulation, Executive Overconfidence, and Carbon Information Disclosure: Evidence From China

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Climate change has put countries around the world under great pressure to reduce greenhouse gas emissions. Chinese government has proposed that China will strive to peak carbon dioxide emissions before 2030 and achieve carbon neutrality before 2060. A low-carbon lifestyle is becoming a new trend in China. Therefore, the products of firms that actively respond to climate change are more popular for consumers in China. In the Internet era, the carbon information disclosed by firms has become an important way for consumers to understand the behavior of firms in responding to climate change. In the existing literature on the influencing factors of carbon information disclosure, the psychological factors of executives are seldom investigated. Using a sample of Chinese listed firms in low-carbon pilot provinces and cities during the period of 2015–2019, this study explores the influence of government regulation and executive overconfidence on the quality of carbon information disclosure. The results show that government regulation has a significantly positive impact on the quality of carbon information disclosure. The results also reveal that executive overconfidence negatively affects the quality of carbon information disclosure. Moreover, executive overconfidence negatively moderates the relationship between government regulation and the quality of carbon information disclosure. Our findings make a significant contribution to the role of executive's psychological factors in firm's behaviors and provide new insights and policy implications for government, firms, consumers, and other stakeholders.

Keywords: carbon information disclosure, government regulation, executive overconfidence, low-carbon pilot provinces and cities, climate change

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INTRODUCTION

During the industrial revolution, capitalism was liberated from the handicraft industry and entered the stage of transition to the machine industry. Since then, major changes have taken place in the economic development mode of various countries, and the increase in production efficiency has promoted the rapid development of industry. However, industrial development has brought many adverse effects to the environment at the same time. For example, the large-scale use of fuels has caused carbon emissions level to reach new highs, which in turn led to global climate

change, and extreme weather appeared more and more frequently (Todea et al., 2013). The global climate is experiencing significant warming, and the harm of the greenhouse effect is appearing gradually. How to alleviate climate change scientifically and effectively has aroused widespread concern in the political and scientific circles of the world. In order to combat the detrimental consequences of the climate change phenomenon, in 2016, by signing the Paris Agreement, governments from around the world established specific environmental targets to reduce the level of greenhouse gas emissions and to limit global warming to well below 2, preferably to 1.5°C, compared to pre-industrial levels (Siri and Zhu, 2019).

As the largest developing country in the world, China is actively making unremitting efforts to address the issue of climate change. China made a significant US. China Joint Presidential Statement on Climate Change on 25 September 2015, pledging to lower carbon dioxide emissions per unit of GDP by 60–65% from 2015 level by 2030 (Liu and Li, 2019). Chinese economic development goals have changed from purely pursuing GDP growth to pursuing the balanced development of all aspects of the national economy. In order to fulfill its promises as scheduled, Chinese government attaches great importance to the control of domestic carbon emissions and vigorously advocates green and low-carbon production methods and lifestyle, and China has issued a series of low-carbon policies, such as the "Comprehensive Working Programme on Energy Conservation and Emission Reduction for the 13th Five-Year Plan Period" and the "Interim Rules for Carbon Emissions Trading Management."

Firms are an important source of carbon emissions, and their carbon emissions are more likely to be concerned by the government and the public. The governments around the world implement various policies to control or reduce carbon emissions of firms, such as carbon tax and green subsidies (Martelli et al., 2020). Firms' carbon emissions data and low-carbon behaviors are shown through the disclosure of carbon information. Firms can regularly release carbon information through the media to create a good image of green and low-carbon to the local governments and attract consumers to buy their products. With the development of the Internet and big data technologies, the accounting, management, and disclosure of firms' carbon emissions data are becoming more efficient and low-cost. Therefore, more and more firms are willing to use carbon information disclosure as a marketing strategy. In this context, it is of great significance to study the impact of government regulation on the disclosure of firms' carbon information.

According to the theory of legitimacy, government regulatory can limit firms' behavior and prevent firms from sacrificing environmental performance in order to maximize profits (Hafezi and Zolfagharinia, 2018). In addition to the external factors, such as government regulation, internal factors also affect the behaviors of firms. Existing studies rarely explore the impact of government regulation on firms' carbon information disclosure behavior. Although existing studies have investigated the effects of some internal factors, such as firms' characteristics and corporate governance factors, on firms' carbon information disclosure (Ben-Amar et al., 2017; Kouloukoui et al., 2019; He et al., 2021a,b), few studies examine the effects of executives' characteristics on firms' carbon information disclosure.

Based on legitimacy theory and behavioral finance theory, this study analyzes the impacts of government regulation and executive overconfidence on the quality of firms' carbon information disclosure and explores the moderating role of executive overconfidence in the relationship between government regulation and the quality of firms' carbon information disclosure. This study makes the following contributions to the existing literature. First, to the best of our knowledge, this study is the first to empirically investigate whether executive overconfidence may influence the quality of firms' carbon information disclosure. Existing research has explored the influence of executive overconfidence on corporate performance, decision making, and corporate governance, but they provide little evidence on the impact of executive overconfidence on firms' carbon information disclosure.

Second, this study extends existing research on government regulation. The impact of government regulation has always been the hot topic of academic research. Existing research on government environmental regulation mainly focuses on the type, impacts, and effectiveness of government regulation. However, there is no consistent research conclusion on its impact on firms' carbon information disclosure.

Third, to the best of our knowledge, this study is the first to explore the moderating role of executive overconfidence in the governance effect of government regulation. Overconfident executives probably make irrational decisions, which in turn will affect the firms' strategic choices, but the previous literature provides little evidence on the influence of executive overconfidence on the governance effect of government regulation. This study finds that executive overconfidence can negatively moderate the relationship between government regulation and the quality of carbon information disclosure.

Finally, focusing on the Chinese context, China has not a mandatory carbon information disclosure policy, and the carbon information disclosed by firms is voluntary. Thus, executives have a lot of choice when they make carbon information disclosure decisions. As the Chinese government is increasingly paying attention to environmental issues, such as climate change, this study can better investigate the influence of government regulation and executive overconfidence on carbon information disclosure.

The other parts of this paper are arranged as follows: Section "**Literature Review**" provides the literature review. Section "**Theory and Hypotheses**" proposes the theory and hypotheses. Section "**Materials and Methods**" discusses the empirical research design. Section "**Results**" presents the analysis of the empirical results, and Section "**Conclusion, Implications, and Limitations**" presents the conclusion, implications, and limitations.

LITERATURE REVIEW

Government Regulation and Environmental Information Disclosure

In the process of economic development, environmental pollution has caused negative spillover effects, which have a significant impact on sustainable development. In order to achieve the dual goal of coordinated development of economy and

environment, the government will adjust corresponding economic activities and implement environmental regulation. The existing research on government environmental regulation mainly focuses on the type, impacts, and effectiveness of environmental regulation (Ziegler et al., 2012; Cheng et al., 2017; Liu and Li, 2019). For example, existing studies have explored the effects of government regulation on firms' environmental performance (Akram et al., 2018; Lu, 2020; Wang et al., 2020), green technology innovation (Kammerer, 2009; Ai et al., 2021), sustainability, and corporate social responsibility strategies (Schmutz et al., 2020).

In most countries, especially in developing countries, firms' environmental information disclosure is voluntary. If there is no related policy issued by the government, the environmental information disclosed by firms will lack comparability and practicality. Strengthening environmental regulation can significantly improve the quality of firms' environmental information disclosure (Buhr and Freedman, 2001). The main reason for firms to disclose environmental information is the pressure from the government, shareholders, and other stakeholders. Government regulation, through the formulation of systems and rules, evaluates the corporate environmental responsibility status, and forms a restraining mechanism for decision making (Othman and Ameer, 2010). Government policies are an important motivation for firms' willingness to disclose carbon information (Tauringana and Chithambo, 2015).

However, the results of existing studies are inconsistent. Stanny (2013) found that when the regression model includes a previous disclosure variable, the regulatory factor becomes irrelevant. Confronting government environmental regulation, firms have either no behavioral response, or just a symbolic disclosure improvement, and the information disclosed is indiscriminate and invalid. The information disclosed may lack credibility, reliability, and be limited or misleading to information users (Tauringana and Chithambo, 2015). In addition, existing research often explores the combined effects of government regulation and other factors on environmental information disclosure, such as executives' political connections (Luo et al., 2017), which may also lead to inconsistent conclusions on the impact of government regulation on firms' environmental information disclosure.

Executive Characteristics and Environmental Information Disclosure

Existing studies on the impact of executive characteristics mostly focus on firm behavior, financial performance, and innovation, there are only a few studies focus on firms' environmental performance and information disclosure. The executive characteristics related to firm's environmental performance and information disclosure that have been explored are mostly physiological and social characteristics, such as age (Li et al., 2019), tenure of office (Lewis et al., 2014; Suárez-Rico et al., 2018), and educational background (Slater and Dixon-Fowler, 2010; Lewis et al., 2014). Overconfidence is an important psychological characteristic of executives. However, the impact of executive overconfidence on firms' environmental information disclosure is paid little attention.

Previous research mainly focuses on the economic consequences of executive overconfidence. Compared with rational executives, overconfident executives frequently implement mergers and acquisitions, especially when they have sufficient internal funds. As the level of overconfidence of executives increases, mergers and acquisitions also increase, especially diversified mergers. But the benefits of mergers and acquisitions implemented by overconfident executives will be lower (Malmendier and Tate, 2005; Andreou et al., 2019). Overconfidence can lead to behavioral deviations of executives. Overconfident or optimistic managers will overestimate future investment returns, overestimate the net present value (NPV) of investment projects, and invest in projects with NPV less than 0, leading to distortions in investment, resulting in over-investment (Heaton, 2002). Executives' optimism about their own capabilities and the future of firms makes them believe that external financing costs are too high, and they tend to use internal funds and debt capital to reduce investment costs. Therefore, they are likely to cause under-investment (Landier and Thesmar, 2009; Huang et al., 2011). As overconfident executives advocate freedom and liberation, are more radical, and have the courage and determination to carry out high-input, high-risk, and high-uncertain R&D activities, they are willing to accept challenges and increase R&D investment, enhance the firms' learning and absorptive capacity, enable the firm to maintain a high level of competition, and thus improve the firms' performance significantly (Hirshleifer et al., 2012; Hai et al., 2020).

The overconfidence of executives will also affect firms' information disclosure behavior. Overconfident managers prefer to publish earnings forecasts. The results of the forecasts are optimistic, and the scope of the forecast is narrower (Hribar and Yang, 2016). Because of the tendency to ignore the importance of internal control over financial reporting, overconfident managers will have a negative impact on the firms' infrastructure investment in implementing effective financial reporting information systems. The higher the degree of manager's overconfidence, the greater the possibility of restatement of the financial report (Lee, 2015). But there is little evidence on the impact of executive overconfidence on firms' environmental information disclosure, especially carbon information disclosure.

Based on the above, this study explores the impact of government regulation, executive overconfidence on the quality of firms' carbon information disclosure. This study has theoretical and practical values for studying the influencing factors of firms' carbon formation disclosure and for improving the governance effect of government regulation on firms' environmental information disclosure.

THEORY AND HYPOTHESES

Government Regulation and the Quality of Carbon Information Disclosure

The concept of "legitimacy" was introduced into the field of political science and studied systematically by Max Weber. Since then, "legitimacy" has gradually become the core concept and

mainstream paradigm of modern political science and sociology. In a social activity system composed of command and obedience, the normal operation of the social activity system requires the establishment and cultivation of a universal belief in the meaning of its existence, that is, the legitimacy of existence. Suchman (1995) used the concept of legitimacy to study organizational legitimacy. Suchman (1995) gave a more authoritative definition of legitimacy. Legitimacy is a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions. Legitimacy is a key resource for the survival of a firm, and it represents the legitimacy of the degree of cultural support obtained from the environment. Therefore, the firm needs legitimacy and needs to be recognized by the society for its goals, in order to develop its activities and better obtain other types of resources. If an organization does not adhere to the goals, methods and results recognized by the society, the operation of the organization will not succeed, or even the organization cannot survive. In addition, legitimacy is a dynamic resource that can change over time, so firms need to develop different strategies to obtain, repair, or maintain their legitimacy.

Legitimacy exists in people's consciousness, and human perception has a major impact on the perception of legitimacy. Therefore, information disclosure has become a basic element of the legitimacy strategy (Breton and Côté, 2006; Magness, 2006). When legitimacy is threatened, firms often increase the quality of information disclosure to gain legitimacy status. Even if a firm adapts to society's expectations of the environment, if the firm fails to show its compliance by disclosing environmental information, its legitimacy will also be threatened. Therefore, the information disclosure of firms can effectively maintain their own legitimacy. By changing their behaviors, they can show that their own values are consistent with social values in order to be recognized by the public (Deegan and Rankin, 1996). Factors, such as local legal system environment, economic development level, environmental protection awareness, and other factors, affect the local government's regulation of firms' environmental information disclosure. However, there are differences in regulatory powers in different regions (Liu and Li, 2019). The more local governments pay attention to the disclosure of environmental information, the greater the regulation of firms' environmental information disclosure will be. Under different levels of environmental regulation, firms will have different enthusiasm for carbon information disclosure, and different behavioral tendencies will appear in firms' decision making, resulting in different quality of carbon information disclosure. Therefore, we formulate the following hypothesis:

Hypothesis 1: Government regulation positively affects the quality of carbon information disclosure.

Executive Overconfidence and the Quality of Carbon Information Disclosure

For the first time, Burrell (1951) combined psychology and finance to do financial decision making research, and is regarded as the pioneer of behavioral finance. The most important psychological deviation in behavioral finance is overconfidence (Nkukpornu et al., 2020). Executives have the right to speak in important decisions of the firm and can decide major activities, such as investment, financing, mergers and acquisitions. Carbon information disclosure is also one of the executive's decisions. When making carbon information disclosure decisions, executives will balance benefits against risks, as well as benefits against costs. Carbon information disclosure cannot obtain economic benefits in the short term, and overconfident managers have higher risk appetite, which will reduce the firms' willingness to disclose carbon information to a certain extent (Tang et al., 2015). Overconfident executives are likely to underestimate the necessity or ability of stakeholders to provide resources, and thus neglect to exchange benefits with their stakeholders through carbon information disclosure to facilitate the further development of the firm. Overconfident executives may also overestimate the total amount of potential resources owned by the firm, overestimate their own ability to deal with the problem of insufficient firm resources (Aabo et al., 2021). Overconfident executives believe that they can control the development of things, so when making decisions, they tend to adopt more risky and aggressive methods, and the level of risk taking of their firms will be higher (Schumacher et al., 2020). Compared with overconfident executives, non-overconfident executives often disclose more carbon information because of risk aversion. Therefore, we formulate the following hypothesis:

Hypothesis 2: Executive overconfidence negatively affects the quality of carbon information disclosure.

Government Regulation, Executive Overconfidence, and the Quality of Carbon Information Disclosure

The negative effects of the environmental issues on the economy have become increasingly serious in China. Macroeconomic policies have focused on the development of low-carbon economy and paid attention to environmental issues. The concept of "low carbon" has gradually become popular. The government has begun to discover the importance of environmental information disclosure and has issued a series of laws, regulations to promote firms' environmental information disclosure. Mandatory policies require firms to meet the required environmental standards and penalize firms that fail to meet the standards. These penalties will increase the pollution cost of the firm and even affect the survival and development of the firm. Furthermore, the incentive system is introduced into the firms, and the firm that actively meets the standards and improves the environmental information disclosure is given rewards and government subsidies or preferential policies (Huang and Chen, 2015). Under such policies, government, investors, and the public are paying more and more attention to carbon emissions, the legality of carbon emissions has become an important condition for the sustainable development of firms. But overconfident executives rely on their own abilities too much, and ignore the constraints of objective conditions, they will make irrational decisions. The upper echelon theory believes

that confronting complex internal and external environments, managers cannot perceive environmental information at all levels and cannot have a comprehensive and objective understanding. Therefore, the personal characteristics of managers will affect their personal style and accounting behavior to a certain extent. They use their cognitive foundation and values to filter information, interpret the situation and make decisions, and then affect the strategic decisions and behaviors of firms (Hambrick and Mason, 1984). Overconfident managers usually believe that they have enough information to deal with future risk factors, believe that their judgments are correct, and thus overestimate the probability of success and underestimate the probability of failure (March and Shapira, 1987). Overestimating their own capabilities, and underestimating the risks of objective constraints, overconfident managers tend to ignore relevant policies that affect firms' information disclosure strategy.

Although the establishment of a carbon information disclosure system is important for the establishment and development of the carbon emission trading system in China, the quality of firms' carbon information disclosure is not high, and it is still in the stage of non-standard voluntary disclosure. Regarding the carbon information disclosure, executives have many choices. They can freely adjust the qualitative or quantitative carbon information disclosures according to the firm's conditions. As a result, the executive overconfidence is likely to inhibit the role of government regulation in improving the quality of firms' carbon information disclosure. Therefore, we formulate the following hypothesis:

> *Hypothesis 3*: Executive overconfidence negatively moderates the relationship between government regulation and the quality of carbon information disclosure.

MATERIALS AND METHODS

Sample and Data Sources

The initial samples of our study include all A-share listed firms in 10 low-carbon pilot provinces and cities in China between the years 2015 and 2019, which include Guangdong, Liaoning, Hubei, Shaanxi, Yunnan, Tianjin, Chongqing, Hainan, Beijing, and Shanghai. The above 10 provinces and cities basically cover the regions of South China, Northeast China, Central China, Northwest China, North China, Southwest China, and East China, which can comprehensively reflect the regional distribution of the quality of firms' carbon information disclosure in China. Firms in financial industry, and firms with missing data and marked with ST or *ST are excluded from samples. The final samples include 4,620 firm-year observations. The carbon information is derived from the firms' annual reports, social responsibility reports, and environmental reports or sustainability reports. The other data are from the CSMAR database.

Variable Definition

Dependent Variable

The dependent variable is the quality of carbon information disclosure. At present, there is no authoritative carbon information disclosure framework in China. We adopt the carbon information disclosure index (CDI) used in previous research to measure the quality of firm's carbon information disclosure (Liu et al., 2017). We use content analysis to evaluate the total score of 22 items. A score of one is assigned if a disclosure is related to items in CDI. The specific scoring criteria are shown in **Table 1**.

Independent Variables

One independent variable is government regulation. In order to reflect the environmental regulation status in different regions in China, we adopt the Pollution Information Transparency Index (PITI) to measure government regulation. PITI is published by the Institute of Public and Environmental Affairs (IPE) and the Natural Resources Defense Council (NRDC), and is under the guidance of "Regulations on Disclosure of Government Information" and "Measures for the Disclosure of Environmental Information" published by Chinese government. PITI is used to assess the level of pollution source information disclosure of environmental protection divisions of local governments in 113 Chinese cities (Tian et al., 2016). The number of cities

TABLE 1 | Items included in the carbon information disclosure index.

ID		Category/item
CC		**Climate change–related risks, opportunities and actions**
1	CC1	Risks associated with climate change
2	CC2	Description of the actions initiated or planned as a result of identification of risks associated with climate change
3	CC3	Opportunities associated with climate change
4	CC4	Actions initiated or planned as a result of identification of opportunities associated with climate change
GHG		**GHG emission accounting**
5	GHG1	Methodology used to calculate GHG emissions
6	GHG2	External verification/assurance status that applies to GHG emissions
7	GHG3	Total GHG emissions
8	GHG4	Breakdown of GHG emissions
9	GHG5	GHG emission intensity
10	GHG6	Strategies to reduce GHG emissions
11	GHG7	GHG emission reduction plans
12	GHG8	GHG emission intensity reduction
EC		**Energy consumption accounting**
13	EC1	Total energy consumption
14	EC2	Breakdown of energy consumption
15	EC3	Total renewable energy consumption
16	EC4	Breakdown of renewable energy consumption
17	EC5	Strategies to increase renewable energy use
18	EC6	Strategies to reduce energy use
ACC		**Climate change–related governance and accountability**
19	ACC1	Board committee responsible for climate change risk management
20	ACC2	How the board reviews progress on firms carbon performance
21	ACC3	Incentives for managing GHG emissions and energy use
22	ACC4	Staff development programs to encourage reduction of emissions and energy use

assessed has increased to 120 from 2013. As published by a third-party non-governmental organization, PITI can objectively reflect the implementation of relevant regulations of environmental information disclosure by local governments.

The other independent variable is executive overconfidence. The measures of this irrational psychological characteristic of executives used in previous research include executive earnings forecast bias (Huang and Yang, 2019), stock option (Banerjee et al., 2018; Lee et al., 2018), and mainstream media evaluation (Brown and Sarma, 2007; Hribar and Yang, 2016). To a certain extent, the level of salary reflects the self-confidence of senior managers. The senior managers are more likely to be overconfident when their abilities and salaries are higher. Moreover, the salary is relatively less interfered by system and industry factors, and can better reflect senior managers' ability and behavioral characteristics. Therefore, we use the salaries to measure executive overconfidence. Hayward and Hambrick (1997) use relative salary to measure CEO overconfidence. In this study, we also adopt relative salary to measure the degree of executive overconfidence. The relative salary is the sum of the salaries of the top three highest paid executives divided by the total salaries of all executives.

Control Variables

According to previous research, the factors we control include institutional investors (INS), creditor pressure (LOANS), political connection (PC), profitability (ROA), organizational structure (ORG), leverage (DEB), analyst coverage (ANALYST), duality (DUAL), educational background (MAJOR), board independence (INDE), and industry (IND) (Cho et al., 2017; Liu et al., 2020; Xiang and Birt, 2020). The industry is a dummy variable that equals to 1 if the firm belongs to a high carbon industry and 0 otherwise. The high carbon industries in this study include the following 10 industries: Production and supply of electric power and heat, Oil and gas extraction, Coal mining and washing, Chemical raw materials and chemical products manufacturing, Petroleum processing, coking and nuclear fuel processing, Ferrous metal smelting and rolling processing, Non-metallic mineral products, Non-ferrous metal smelting and rolling processing, Papermaking and paper products, Ferrous metal mining and dressing. The definitions of variables are shown in **Table 2**.

Model Design

In this study, ordinary least squares regression analysis is used to test our hypotheses. Model 1 is used to test the impact of government regulation on the quality of carbon information disclosure. Model 2 is used to test the impact of executive overconfidence on the quality of carbon information disclosure. Model 3 is used to test the impact of executive overconfidence on the relationship between government regulation and the quality of carbon information disclosure.

$$\begin{aligned} CDI = {} & \alpha + \beta_1 PITI + \beta_2 INS + \beta_3 LOANS + \beta_4 PC + \beta_5 ROA \\ & + \beta_6 ORG + \beta_7 DEB + \beta_8 ANALYST + \beta_9 DUAL \\ & + \beta_{10} MAJOR + \beta_{11} INDE + \beta_{12} IND + \sum \beta_i YEAR_i + \varepsilon \end{aligned} \quad (1)$$

$$\begin{aligned} CDI = {} & \alpha + \beta_1 OC + \beta_2 INS + \beta_3 LOANS + \beta_4 PC \\ & + \beta_5 ROA + \beta_6 ORG + \beta_7 DEB + \beta_8 ANALYST \\ & + \beta_9 DUAL + \beta_{10} MAJOR + \beta_{11} INDE \\ & + \beta_{12} IND + \sum \beta_i YEAR_i + \varepsilon \end{aligned} \quad (2)$$

$$\begin{aligned} CDI = {} & \alpha + \beta_1 PITI + \beta_2 PITI * OC + \beta_3 OC + \beta_4 INS \\ & + \beta_5 LOANS + \beta_6 PC + \beta_7 ROA + \beta_8 ORG + \beta_9 DEB \\ & + \beta_{10} ANALYST + \beta_{11} DUAL + \beta_{12} MAJOR \\ & + \beta_{13} INDE + \beta_{14} IND + \sum \beta_i YEAR_i + \varepsilon \end{aligned} \quad (3)$$

TABLE 2 | Variable definitions.

Variables	Symbols	Descriptions
Quality of carbon information disclosure	CDI	Carbon Information Disclosure Index
Government regulation	PITI	Pollution Information Transparency Index
Executive overconfidence	OC	The sum of the salaries of the top three highest paid executives/total salaries of all executives
Institutional investors	INS	Institutional investors' shareholding ratio
Creditor pressure	LOANS	The ratio of bank loans to total liabilities
Political connection	PC	Percentage of executives with political background
Profitability	ROA	The ratio of net profit to total assets
Organizational structure	ORG	A dummy variable that equals to 1 if the firm has an environment committee or a dedicated environment division and 0 otherwise
Leverage	DEB	The ratio of total debt to total assets
Analyst coverage	ANALYST	The number of analysts who made a profit forecast for a firm during the year
Duality	DUAL	A dummy variable that equals to 1 if the CEO is the board's chairman and 0 otherwise
Educational background	MAJOR	A dummy variable that equals to 1 if the major of the chairman or CEO is business or economic management and 0 otherwise
Board independence	INDE	Proportion of independent directors in the board of directors
Industry	IND	A dummy variable that equals to 1 if the firm belongs to a high carbon industry and 0 otherwise
Year	YEAR	Dummies for each of the 5 years from 2015 to 2019 inclusive

RESULTS

Descriptive Statistics

Descriptive Statistics of Carbon Information Disclosure Index

Table 3 provides the descriptive statistics of CDI. The results show that the quality of firms' carbon information disclosure in China is relatively low. In most years of the sample period, the average scores of firms' CDI are less than 1. Further analysis shows that 75.35% of the samples' CDI scores are 0 or 1, 23.57% of the samples' CDI scores are between 2 and 7, only 1.08% of the samples' CDI scores are higher than 8, which indicates that most of the sample firms have not disclosed or disclosed a little carbon information. In recent years, the Chinese government has issued a series of energy-saving and emission-reduction policies, and firms have paid more attention to low-carbon development.

The results of **Table 3** show a steadily growing trend of firms' CDI, indicating that the awareness of firms' carbon information disclosure has been continuously increasing. However, firms' CDI declined in 2019. This may be due to the outbreak of COVID-19 at the beginning of 2020, which has caused many interferences in firms' information disclosure. Emergencies, most of which are challenges to the assumption of firm' sustainable operation, will cause firm's business crisis. Confronting crisis, abnormal changes of firms' internal and external factors, operating rules, and development environment will threaten firms' survival in severe cases. Compared with the situation before the emergency, firms' information disclosure will change. The standard deviation of firms' CDI also shows a growing trend, indicating that the gap in sample firms' carbon information disclosure is more obvious.

The results of **Table 3** show that there are obvious differences in the quality of carbon information disclosure of firms with different industries and ownership. The average CDI of firms in high carbon industries is higher than that of firms in non-high-carbon industries, which meets the theory of legitimacy. Firms in high carbon industries have high carbon emissions and need to disclose more carbon information to manage the legality of firms and to reduce or avoid penalties related to environmental pollution. The average CDI of state-owned firms is higher than that of non-state-owned firms, which indicates that state-owned firms are more affected by government intervention. State-owned firms will implement low-carbon policies and disclose carbon information more actively.

TABLE 3 | Descriptive statistics of CDI.

Year	2015	2016	2017	2018	2019
Observation	881	976	1,029	844	890
Mean	0.9015	0.9529	0.9971	1.1576	0.9978
Standard deviation	1.5968	1.7055	1.7840	1.9756	1.6456
High carbon industries	1.3636	1.6311	1.7523	2.0294	1.5047
Non-high-carbon industries	0.8427	0.8729	0.9076	1.0377	0.9285
State-owned firms	1.5723	1.6436	1.7725	1.9233	1.6888
Non-state-owned firms	0.4816	0.5456	0.5869	0.7353	0.7411

TABLE 4 | Descriptive statistics of variables.

Variable	Obs	Mean	Std.Dev.	Min	Max
PITI	4,620	64.19	12.02	16.80	80.80
OC	4,620	0.444	0.131	0	1
INS	4,620	0.0679	0.0662	0	0.625
LOANS	4,620	0.246	0.206	0	0.917
PC	4,620	0.0420	0.0647	0	0.588
ROA	4,620	0.0437	0.0695	−1.068	0.384
ORG	4,620	0.0277	0.164	0	1
DEB	4,620	0.426	0.201	0.0174	1.345
ANALYST	4,620	9.960	10.04	1	75
DUAL	4,620	0.301	0.459	0	1
MAJOR	4,620	0.535	0.499	0	1
INDE	4,620	0.382	0.0611	0	0.800
IND	4,620	0.113	0.316	0	1

Descriptive Statistics of Other Variables

Table 4 shows the descriptive statistics of independent variables and control variables. The mean of government regulation, which is measured by PITI, is 64.19, with a minimum of 16.8 and a maximum 80.8, indicating that there is a large gap in government regulation between different regions in China. The mean of executive overconfidence (OC) is 0.444, indicating that the salaries of the top three highest paid executives accounts for approximately half of the total salaries of all executives in China. The mean of political connection (PC) is 0.042, indicating that there are only about 4% of the sample firms having political connection, and the degree of political connection of firms is not high in China. The mean of profitability (ROA) is 0.0437, with a minimum of −1.068 and a maximum of 0.384, indicating that most firms' profitability is positive. The mean of organizational structure (ORG) is 0.0277, indicating that only 2.77% of the sample firms have established an environment committee or a dedicated environment division, and governance structure of firms in China needs to be improved. The mean of duality (DUAL) is 0.301, indicating that the CEO and the board's chairman are the same person in about 30% of sample firms. The mean of educational background (MAJOR) is 0.535, indicating that more than half of the executives have got a degree in economics or management in China. The mean of industry (IND) is 0.113, indicating that there are about 11% of listed firms are in high carbon industries in low-carbon pilot provinces and cities in China. **Table 4** also shows that the data of institutional investors (INS), creditor pressure (LOANS), leverage (DEB), analyst coverage (ANALYST), and board independence (INDE) are quite different, but overall, most of the data are relatively stable.

Correlation Analysis

Table 5 shows the Pearson correlations for all the dependent, independent, and control variables. It is evident that the quality of carbon information disclosure is positively correlated with government regulation and is negatively correlated with executive overconfidence, as expected. There are also strong correlations between several control variables. However, none of the

TABLE 5 | Correlation analysis.

Variable	CDI	PITI	OC	INS	LOAN	PC	ROA	ORG	DEB	ANALYST	DUAL	MAJOR	INDE	IND
CDI	1.000													
PITI	0.077***	1.000												
OC	−0.166***	−0.001	1.000											
INS	0.070***	−0.037**	−0.055***	1.000										
LOANS	0.077***	−0.080***	−0.049***	0.011	1.000									
PC	0.070***	−0.022	0.037**	0.018	0.062***	1.000								
ROA	−0.013	−0.003	0.080***	0.068***	−0.206***	−0.017	1.000							
ORG	0.145***	0.020	−0.028*	0.024*	0.003	0.025*	0.032**	1.000						
DEB	0.239***	−0.037**	−0.163***	0.106***	0.405***	0.109***	−0.309***	0.015	1.000					
ANALYST	0.197***	0.084***	−0.063***	0.406***	−0.077***	0.037**	0.229***	0.064***	0.073***	1.000				
DUAL	−0.148***	0.041***	0.138***	−0.034**	−0.072***	−0.007	0.046***	−0.042***	−0.170***	−0.038**	1.000			
MAJOR	0.050***	0.009	0.009	0.040***	0.078***	0.095***	−0.015	0.017	0.106***	0.036**	−0.189***	1.000		
INDE	0.037**	0.025*	0.089***	0.001	−0.009	0.041***	−0.004	−0.047***	0.012	0.055***	0.105***	−0.020	1.000	
IND	0.134***	−0.076***	−0.042***	−0.023	0.199***	0.004	−0.013	0.007	0.063***	−0.002	−0.094***	−0.007	−0.005	1.000

***$p < 0.01$, **$p < 0.05$, and *$p < 0.1$.

correlations exceeded 0.5. **Table 6** shows that the values of variance inflation factor (VIF) are less than 2, and the values of tolerance are greater than 0.7, which indicates that multicollinearity is less likely to be a problem for our analyses.

Regression Results

The regression results are shown in **Table 7**. The coefficient of PITI in Model 1 is positive and significant at the 1% level, which indicates that the positive relationship between government regulation and the quality of carbon information disclosure is significant, and the government regulation can promote the quality of carbon information disclosure. This result confirms Hypothesis 1. This is consistent with the previous analysis. The survival and development need firms to comply with the regulations and policies developed by the government. Government's emphasis on environmental protection and governance promotes firms' carbon information disclosure by making firms to show their legitimacy. Therefore, an appropriate increase in government environmental regulation will have a significant impact on improving the quality of carbon information disclosure. The coefficient of OC in model 2 is negative and significant at the 1% level, indicating that the higher the degree of executive overconfidence, the lower the quality of carbon information disclosure. This result confirms Hypothesis 2. The result of Model 3 shows that the coefficient of the interaction term between PITI and OC is significantly negative, which indicates that executive overconfidence has a negative moderating effect on the relationship between government regulation and the quality of carbon information disclosure. This result confirms Hypothesis 3.

The regression results also show that the coefficients of PC, ORG, DEB, ANALYST, INDE, and IND are all significantly positive. The establishment of an environment committee or a dedicated environment division can increase the firms' responsibilities, and analyst coverage can put pressure on firms to make firms avoid risks, which can improve the quality of carbon information disclosure. INS and DUAL are negatively correlated with the quality of carbon information disclosure. LOANS, ROA, and MAJOR are not significantly correlated with the quality of carbon information disclosure in this study.

Robustness Tests

We carry out a number of analyses to ascertain the results' robustness. First, to investigate whether the results are sensitive to winsorization operation, we rerun our models by winsorizing data at the 1 and 99% levels, and the results (not shown) are similar to those shown in **Table 7**. Second, we use an alternative measure for government regulation (PITIA). PITIA is a dummy variable that equals to 1 if the value of PITI is larger than the median and 0 otherwise. The results using this alternative measure are shown in Column 1 and Column 2 of **Table 8**. These results confirm Hypothesis 1 and Hypothesis 3. Third, we use business climate index as an alternative measure of executive overconfidence (OCA). OCA is a dummy variable that equals to 1 if the business climate index is greater than 100 and 0 otherwise. The value of business climate index greater than 100 indicates that executives are optimistic about the firms' operating conditions and the macroeconomic environment (Zhang and Li, 2014). The results

TABLE 6 | Variance inflation factor test for variables.

Variable	VIF	Tolerance
PITI	1.20	0.8322
OC	1.06	0.9409
INS	1.25	0.8004
LOANS	1.27	0.7847
PC	1.03	0.9731
ROA	1.20	0.8302
ORG	1.01	0.9874
DEB	1.39	0.7192
ANALYST	1.35	0.7386
DUAL	1.10	0.9096
MAJOR	1.06	0.9405
INDE	1.03	0.9730
IND	1.06	0.9446

TABLE 7 | Multiple regression results.

Variable	CDI		
	Model 1	Model 2	Model 3
PITI	0.013*** (6.16)		0.013*** (5.79)
OC		−1.533*** (−8.16)	−1.511*** (−8.08)
PITI*OC			−0.037** (−2.41)
INS	−0.702* (−1.74)	−0.785* (−1.95)	−0.762* (−1.9)
LOANS	−0.175 (−1.34)	−0.196 (−1.50)	−0.155 (−1.2)
PC	1.031*** (2.76)	1.117*** (2.99)	1.185*** (3.19)
ROA	0.417 (1.11)	0.474 (1.26)	0.586 (1.56)
ORG	1.349*** (9.21)	1.336*** (9.14)	1.322*** (9.08)
DEB	1.870*** (13.43)	1.713*** (12.25)	1.724*** (12.38)
ANALYST	0.029*** (10.59)	0.029*** (10.46)	0.028*** (10.18)
DUAL	−0.372*** (−6.85)	−0.318*** (−5.85)	−0.330*** (−6.08)
MAJOR	0.007 (0.14)	0.023 (0.47)	0.023 (0.47)
INDE	1.095*** (2.77)	1.405*** (3.55)	1.364*** (3.46)
IND	0.674*** (8.67)	0.625*** (8.07)	0.662*** (8.57)
YEAR		control	
Constant	−1.236*** (−5.86)	0.108*** (0.58)	−0.593*** (−2.66)
Observations	4,620	4,620	4,620
Adjusted-R^2	0.1377	0.1430	0.1504

*** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

using this alternative measure are shown in Column 3 and Column 4 of **Table 8**. These results confirm Hypothesis 2 and Hypothesis 3. Fourth, we return our model by replacing the quality of carbon information disclosure with the decision of carbon information disclosure (CDIA). CDIA is a dummy variable that equals to 1 if the carbon information index is greater than 1 and 0 otherwise. This result is shown in Column 5 of **Table 8**. Although this result shows that there is no significant moderating effect of executive overconfidence on the relationship between government regulation and the decision of carbon information disclosure, the coefficients of government regulation and executive overconfidence are still significant at the 1% level. This result confirms Hypothesis 1 and Hypothesis 2.

Further Analysis

In China, state-owned firms have an important influence on the development of the national economy and have the mission of fulfilling their social responsibilities. According to the signaling theory, state-owned firms should actively disclose more social responsibility information. As the Chinese government pays increasing attention to environmental problems caused by climate change, a series of environmental protection policies have been issued. Compared with non-state-owned firms, state-owned firms are more likely to be directly affected by the government. Research shows that government regulation can promote the quality of carbon information disclosure of state-owned firms. For non-state-owned firms, the relationship between government regulation and carbon information disclosure is not significant (Liu and Li, 2019). In state-owned firms, executive overconfidence will increase the investment-cash flow sensitivity and increase investment. This effect of executive overconfidence is not significant in non-state-owned firms (Huang et al., 2011). Therefore, we further explore the impacts of government regulation and executive overconfidence on the quality of carbon information disclosure using samples with different ownership.

The regression results are shown in **Table 9**. We can find that the Government regulation (PITI) only has a significant positive impact on the quality of carbon information disclosure of state-owned firms but has no significant impact on that of non-state-owned firms. Executive overconfidence (OC) has a significant negative impact on the quality of carbon information disclosure of state-owned and non-state-owned firms, indicating that executives' risk perception can affect the firm's strategy and decision making, and inhibit the improvement of the quality of carbon information disclosure.

CONCLUSION, IMPLICATIONS, AND LIMITATIONS

Conclusion

This study examines the impacts of government regulation and executive overconfidence on the quality of firms' carbon information disclosure. The investigation is based on data from A-share listed firms in low-carbon pilot provinces and cities in China for the 2015–2019 period. The results provide evidence that the quality of firms' carbon information disclosure in China is generally low. Government regulation positively affects the quality of firms' carbon information disclosure. Executive overconfidence negatively affects the quality of firms' carbon information disclosure. Executive overconfidence negatively moderates the relationship between government regulation and the quality of firms' carbon information disclosure. Government regulation only has significantly positive impact on the quality of carbon information disclosure of state-owned firms. Executive overconfidence has a negative impact on both state-owned and non-state-owned firms.

Implications

On a practical note, this study has a number of implications for managers and policy makers. First, in view of the generally low quality of firms' carbon information disclosure in China, the government should improve the environmental information disclosure polices by the development of a mandatory carbon information disclosure rule, and a guideline for firms' carbon information disclosure to promote the quality of firms' carbon information disclosure.

TABLE 8 | Robustness test results.

Variable	CDI				CDIA
	Column 1	Column 2	Column 3	Column 4	Column 5
PITIA	0.272*** (5.6)	0.250*** (5.17)			
OC		−1.486*** (−7.93)			−0.761*** (−4.92)
PITIA*OC		−0.883** (−2.40)			
PITI				0.015*** (5.58)	0.006*** (3.44)
OCA			−0.967*** (−4.09)	−1.054*** (−4.40)	
PITI*OCA				−0.040*** (−2.74)	
PITI*OC					0.012 (0.98)
INS	−0.728 (−1.80)	−0.787* (−1.96)	−0.003 (−0.55)	−0.002 (−0.43)	0.939*** (2.85)
LOANS	−0.166 (−1.27)	−0.139 (−1.07)	−0.242 (−1.48)	−0.223 (−1.38)	0.079 (0.74)
PC	0.993*** (2.65)	1.167*** (3.13)	1.119** (2.54)	1.118** (2.55)	1.064*** (3.51)
ROA	0.441 (1.17)	0.595 (1.59)	0.236 (0.43)	0.279 (0.52)	1.050*** (3.00)
ORG	1.353*** (9.22)	1.327*** (9.11)	1.003*** (5.85)	0.995*** (5.83)	1.036*** (7.96)
DEB	1.882*** (13.50)	1.729*** (12.38)	1.918*** (10.83)	1.967*** (11.16)	1.264*** (10.88)
ANALYST	0.029*** (10.60)	0.028*** (10.25)	0.027*** (7.92)	0.027*** (7.85)	0.014*** (6.37)
DUAL	−0.353*** (−6.49)	−0.312*** (−5.75)	−0.302*** (−4.59)	−0.308*** (−4.70)	−0.312*** (−6.84)
MAJOR	0.011 (0.22)	0.027 (0.54)	0.039 (0.64)	0.029 (0.47)	−0.018 (−0.45)
INDE	1.134 (2.87)	1.367 (93.47)	−0.055 (−0.11)	−0.011 (−0.02)	1.070*** (3.31)
IND	0.648*** (8.34)	0.634*** (8.21)	0.602*** (7.14)	0.628*** (7.49)	0.443*** (7.18)
YEAR			Control		
Constant	−0.657*** (−3.74)	−0.050 (−0.26)	0.867*** (2.79)	0.141 (0.41)	−1.590*** (−8.60)
Number of obs.	4,620	4,620	3,309	3,309	4,620
Adjusted-R^2	0.1365	0.1487	0.1198	0.1301	

***$p<0.01$, **$p<0.05$, and *$p<0.1$.

TABLE 9 | Regression results of further analysis.

Variable	State-owned		Non-state-owned	
	Model 1	Model 2	Model 1	Model 2
PITI	0.032*** (7.53)		0.000 (0.06)	
OC		−1.811*** (−4.42)		−0.962*** (−5.27)
INS	−2.945*** (−3.17)	−2.855*** (−3.04)	0.354 (0.94)	0.332 (0.89)
LOANS	−0.230 (−0.80)	−0.332 (−1.14)	0.170 (1.35)	0.162 (1.29)
PC	3.407*** (4.08)	3.607*** (4.26)	−0.041 (−0.12)	0.032 (0.09)
ROA	−1.925 (−1.48)	−1.787 (−1.36)	0.594* (1.87)	0.706** (2.23)
ORG	1.428*** (5.56)	1.533*** (5.91)	0.885*** (5.39)	0.859*** (5.25)
DEB	1.645*** (5.16)	1.363*** (4.18)	1.006*** (7.13)	0.970*** (6.90)
ANALYST	0.046*** (7.82)	0.045*** (7.50)	0.023*** (8.48)	0.022*** (8.18)
DUAL	−0.448** (−2.50)	−0.395** (−2.18)	−0.081* (−1.66)	−0.060 (−1.25)
MAJOR	0.062 (0.60)	0.056 (0.53)	−0.026 (−0.55)	−0.013 (−0.28)
INDE	1.423* (1.90)	1.584** (2.09)	0.249 (0.60)	0.604 (1.44)
IND	0.679*** (4.67)	0.589*** (4.01)	0.416*** (4.92)	0.421*** (5.00)
YEAR		control		
Constant	−1.849*** (−4.47)	0.778* (1.96)	−0.278 (−1.27)	0.031 (0.16)
Number of obs.	1,598	1,598	3,022	3,022
Adjusted-R^2	0.1430	0.1231	0.0841	0.0924

***$p<0.01$, **$p<0.05$, and *$p<0.1$.

Second, the government should strengthen the regulation on firms' environmental issue, increase penalties for firms' environmental damage, and implement related laws and policies to promote the carbon emission reduction of firms. Meanwhile, the psychology of executive overconfidence should be paid enough attention. Executive overconfidence should be alleviated in order to mitigate the negative impact of executive overconfidence on government regulation.

Third, the firms should improve the corporate governance by establishing an environmental committee or a dedicated environment division, separating the CEO and chairman of the board, and increasing the proportion of independent directors to reduce the cost of environmental information acquisition and management to promote the quality of carbon information disclosure.

Fourth, before the mandatory carbon information disclosure policy has been implemented for all firms in China, the policy

should be implemented first from state-owned firms. The state-owned firms are more sensitive to government policies, they can play a leading and exemplary role in carbon information disclosure.

Limitations

The results of this study are subject to some limitations. The scope of our study is limited to the A-share listed firms in the low-carbon pilot provinces and cities in China. Future research can extend this study by replicating it in other economic areas, such as north America, European Union, Australia, and other developing countries. Another limitation is related to the measurement of executive overconfidence, which may not measure the psychological characteristics of executive overconfidence accurately. Additionally, with the important environmental policies issued by Chinese central government and local governments in the future, other methods can be used to explore the impact of government regulation on firms' carbon information disclosure, such as a quasi-natural experiment.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

RH and QY designed the studies and made a significant revision to the earlier version of the manuscript. YC and MZ assisted in research and data collection and wrote the manuscript. MZ and JL revised the manuscript. All authors contributed to the article and approved the submitted version.

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Synergistic Effect Between Online Broadcast Media and Interactive Media on Purchase Intention

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It is becoming increasingly important for marketers to use online broadcast media and interactive media simultaneously. In this paper, three studies were conducted to explain the mechanism inherent in a synergistic effect. We ran Study 1 to test the synergistic effect of online broadcast media and interactive media on purchase behavior. We conducted Study 2 (synergistic vs. non-synergistic groups) to test the differences between the groups. Study 2 was a 2 (interference vs. no interference terms) × 2 (synergistic vs. non-synergistic groups) experiment to test whether the interaction between online broadcast media and interactive media is a necessary condition for the synergistic effect. Finally, Study 3 was conducted to test the difference in the level of information processing between online broadcast media and interactive media as a necessary condition for the synergistic effect. We designed a 2 (questioning vs. not questioning) × 2 (synergistic vs. non-synergistic groups) experiment to examine the difference between the groups. The results show that online broadcast media and interactive media have a synergistic effect on consumer purchase intention and memory. Study 1 shows that participants in the synergistic group had a higher purchase intention than participants in the non-synergistic group. Study 2 revealed a significant cognition interaction effect on product memory between online broadcast media and interactive media. Finally, in Study 3, the difference in the information processing level between broadcast media and interactive media had a significant synergistic effect on product memory.

Keywords: media synergy, online broadcast media, online interactive media, product memory, online purchase intention

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INTRODUCTION

In the last 20 years, online marketing has rapidly become a favored method for conveying corporate advertising, promotions, public relations, and other communications (Stephen and Galak, 2012). The introduction of deploying online broadcast media and interactive media simultaneously has presented both opportunities and challenges for marketing managers. On one hand, it is important to select the right combination of online media as certain media may be incompatible and may result in "1 + 1 < 2" (Naik and Raman, 2003). On the other hand, based on numerous direct experiments, marketing managers have found that including interactive media is essential to getting the results that exceed expectations when devoting a large budget to broadcast advertising

(Culnan et al., 2010; Dong et al., 2018). For example, Ford obtained good results when promoting the new Ford Focus model through Facebook, Twitter, and other interactive media (Levin, 2011). Only a few studies have focused on online multimedia marketing issues (Schultz et al., 2012). However, we still know little about the online multimedia synergistic effect. It is important for marketers to understand how online broadcast media interact with interactive media and how the interaction affects consumer variables.

Synergistic effect is the basis of synergy research. Previous studies have found that media with different sensory patterns, origins, and information load can produce a synergistic effect (Maheswaran and Chaiken, 1991; Dijkstra et al., 2005; Chatterjee, 2012). Differences in the form of media can lead to a synergistic effect because of the sensory model, the origin of information, or the different information load. Therefore, based on the consideration of the form to determine content, we hypothesize that a synergistic effect will occur between interactive media and online broadcast media as these two types of media differs greatly in form from the original.

This study analyzes the synergistic effect between online broadcast media and interactive media and shows that media collaboration has an impact on purchase intention through product memory.

THEORETICAL BACKGROUND

Online Media Synergistic Effect and Purchase Intention

Media synergy refers to multimedia cohesions that exceed the sum of the influence of use alone (Naik and Raman, 2003; Naik and Peters, 2009). In this research, we define the multimedia synergistic effect as the media cohesion that exceeds the sum of the effect of use alone, and synergy as the combination of multimedia.

Research on the influence of media synergy on consumer behavior has focused primarily on three avenues of inquiry. First, research on traditional offline multimedia has found that synergy has a positive effect on purchase intention. For example, the combination of TV and broadcast advertising can increase audiences' purchase intention (Edell and Keller, 1989). Synergy between TV, print advertising, and other print media can also improve consumers' brand awareness and purchase intention (Dijkstra et al., 2005).

Second, research on the synergistic effect between traditional offline media and online media on purchase intention has yielded different conclusions. In Chang and Thorson (2004) research, the coordination of TV and web advertising led to higher perceived information trust and more aggressive product ideas for the consumer. However, other studies point out that the combination of TV, print media, and online banners has no effect on purchase intention (Dijkstra et al., 2005).

Third, research on the role of online multimedia synergy on purchase intention is limited. Abraham (2008) found that online display advertising and online search advertising can increase online and offline sales. Other studies have found that acquired social media (such as online communities) have a role in promoting acquired traditional media (Stephen and Galak, 2012).

The research hypothesis is stated as follows:

> ***H1***: The combination of online broadcast media and interactive media has a synergistic effect on purchase intention.

Different Media Produce Synergy Through Interaction

Integrated marketing theory points out that there is a complex interaction between the marketing communication tools (Smith et al., 2006). However, we do not know what this "complex interaction" is. Cognitive information processing theory provides a theoretical explanation for the sequential stimulation of different media synergies. After the first advertisement stimulation, the consumer forms memory traces. After the second stimulation, three kinds of cognitive processing activities occur. First, the memory traces of the first advertisement stimulation are retrieved and the second advertisement information provides an "introduction" and a "bait" for memory retrieval. Second, the encoding of current advertisement stimulation information includes two cognitive activities, namely, deepening comprehension and refinement, and thus forms the second memory structure. Third, a new memory structure is formed by way of schematic representation of the first memory traces and the second memory structure (Edell and Keller, 1989). In this information processing, interaction determines the recoverability of the memory traces, thus affecting the processing of the follow-up stimulus. Therefore, we assume Hypothesis H2a as follows:

> ***H2a***: Online broadcast media and interactive media can only produce a synergistic effect on product memory through an interaction.

Different Media Produce Synergy Through Form Differences

The collaboration of different media creates higher brand awareness, higher purchase intention, and other marketing results, leading to the effect that overall surplus part. The current research literature focuses on the following three aspects of media form differences.

First, different media produce synergy through different perceptual modes. The greater the number of different sensory modalities, the better the communication and learning effects (Jacoby et al., 1983; Kisielius and Sternthal, 1984). For example, video media and auto media, video media and print media, and video media and web display all can produce synergy, thus resulting in higher advertising memory (Edell and Keller, 1989; Dijkstra et al., 2005; Voorveld et al., 2011). Consumers can even produce higher brand ratings and better advertising memory using the two sensory cues—smells and images (Lwin and Morrin, 2012). In short, media with different sensory modalities provide more coding channels and form multi-tiered cognitive structures (Becker-Olsen, 2003).

Second, different media create synergy through different information loads. Different media forms, such as paper media and email, carry different amounts of information. Different information loads can lead to different levels of mental activation and produce different product evaluations (Keller and Staelin, 1987). Previous research has focused on the collaboration of three kinds of media, namely, network banner, paper media, and email. Although these three media have the same sensory model, their combination can produce higher brand recall and brand attitude due to their different information loads (Chatterjee, 2012).

Third, different media produce synergy through different information sources (media attribution sources). Consumers process information and react differently to different media sources. For example, consumers take different cognitive approaches to media launched by businesses and third parties. Differences in the source of media attribution lead to cognitive differences (Cameron, 1994). Audiences allocate more cognitive ability to understand information, and produce stronger product attitude and new integration evaluation when media with different information sources release coordinated stimulation (Maheswaran and Chaiken, 1991). For example, the two different media sources, advertising and publicity, enhance information inference and purchase intention when deployed together (Wang and Nelson, 2006).

In the abovementioned studies, different media produce synergy because of their form differences, such as different sensory modalities, different information loads, and different information sources. The memory structure stimulated by different media forms is larger than the one produced by an individual media form. That is, the media form difference produces a synergistic effect. Based on these studies, we hypothesize that there is a form difference between online broadcast media and online interactive media that leads to synergy because audiences will produce different levels of information processing.

Different Information Processing Levels and Product Memory

Online broadcast media, which include the enterprise's website, network banners, network text, etc., have a remarkable unidirectional characteristic of information communication (Andzulis and Panagopoulos, 2012). After receiving this kind of media stimulation, consumers often choose to ignore information and have no obvious consciousness or thought to participate in information processing. Online interactive media, which include microblogs, network communities, and forums, have a bidirectional characteristic of information communication, problem-solving, and other activities (Haythorthwaite, 2005; Kim and Ko, 2012). The difference between online broadcast media and online interactive media is essential as to whether consumers have significant consciousness and thought to participate in the process of media information processing.

In the process of forming information, the individual has a higher level of information processing under conscious participation compared to unconscious participation. When an individual was aware they are processing information, the brain performs a higher level of information processing (Hulstijn, 1992). Different levels of information processing form different memory structures. The higher the processing level, the more complex and abstract the semantic analysis. The latter is conducive to information retention in long-term memory (Kapur et al., 1994). Therefore, we believe that online broadcast media lead to a low level of consumer information processing, while online interactive media lead to high levels of information processing. The form difference (interactive vs. not interactive) leads to the difference in the information processing level, and a different information processing level can form a strengthened cognitive structure.

Through the difference of information processing level, the collaborative stimulation of online broadcast media and interactive media can push consumers to form a strengthened product memory that exceeds the product memory achieved by either online broadcast media or interactive media individually. In this study, we employed product recall and product identification as the two dimensions of product memory. That is, there is synergy between online broadcast media and interactive media. We assume the following:

> ***H2b:*** Online broadcast media and online interactive media can only produce a synergistic effect on product memory through different information processing levels.

clearly describe the relationship between variables, a conceptual model is presented in **Supplementary Figure A1**.

Next, we present the three studies designed to test these hypotheses. In Study 1, we provide evidence for the synergistic effect of online broadcast media and online interactive media on consumer purchase intention. We propose the two conditions (interaction and different processing levels of stimuli) of the synergistic effect between online broadcast media and interactive media. We provide evidence of the theoretical mechanism for the online multimedia synergistic effect in Studies 2 and 3. In Study 2, the first condition interaction is verified by illustrating that the interaction between online broadcast media and interactive media creates a synergistic effect. In Study 3, we demonstrate the second condition that different processing levels of stimuli (online broadcast media and interactive media) can produce a synergistic effect. We close with a discussion of the implications of these findings.

STUDY 1

In Study 1, the objective was to provide evidence for H1 by validating the existence of the media synergistic effect.

Method, Stimuli, and Procedure

One hundred and twenty-eight undergraduate students from Huazhong University of Science and Technology participated in this study for course credit. In this study, a 2 (synergistic and non-synergistic) between-group design was employed. We randomly assigned participants to four groups: Broadcast-Interactive (B-I), Broadcast-Broadcast (B-B), Interactive-Broadcast (I-B), and

Interactive-Interactive (I-I), so that the participants of each group were exposed to two media stimulations. We constructed the synergistic group with B-I and I-B and the non-synergistic group with B-B and I-I. We manipulated online media (broadcast media and interactive media) by two websites displaying advertisements (virtual product network home page and virtual product network forum) that a pretest showed, which were significantly different in product attitude (1 = "strongly disagree" and 7 = "strongly agree"; $M_{homepage}$ = 2.15, M_{forum} = 3.17; t = 7.599, p = 0.010). Within the groups, participants were randomly assigned to one of the two online media stimulus conditions. In the online broadcast media stimulus condition, subjects were exposed to an online advertisement embedded in the virtual product network home page. In the online interactive media stimulus condition, subjects were exposed to an advertisement embedded in the virtual product network forum.

For this study and the following studies, we created advertisements using images and advertisement propositions from Baidu. For Study 1, we chose six advertisement images of a mobile phone brand as an experimental material. We used these images to design a virtual phone brand labeled "Dis-80." Then, to reduce the impact of former brand knowledge and experience, we change the logo of the pictures. Some product advertisement propositions were written by other 28 students participating in the production of experimental product advertisements. All the product propositions were evaluated by the group members, including 1 title and 16 product advertisement propositions. The participants could conduct a series of interactive behaviors, such as inputting comments and answering questions. Finally, advertising portfolios were produced. We combined the two types of pages (virtual mobile phone home page and virtual mobile phone network forum) in pairs through the website linkage and created the four advertising portfolios that represented B-I, I-B, B-B, and I-I, respectively. We set a fixed browsing time for each with an automatic linkage. Taking the advertising portfolio B-I as an example, the browsing time for each web page's advertisement was 120 s. After a 120-s display of the virtual mobile home page, the virtual mobile phone network forum was opened automatically through a web linkage. The advertising portfolio closed automatically after 120 s of continuous display.

As a cover story, fifty-six subjects were told that they would be pretesting stimuli for a business study on media advertising in a school–enterprise cooperation project and that they could earn school credit through the test. Before beginning, all external networks were removed and subjects were asked general information questions, including gender, age, height, weight, general online media usage habits, and a current product attitude measured on a seven-point scale anchored by 1 ("strongly disagree") and 7 ("strongly agree"). Next, participants were told that they would be evaluating a mobile phone advertisement. The advertising portfolio on the computer were then shown to participants, and participants were asked to state their purchase intention for Dis-80 on an eleven-point scale anchored by 1 ("1% likelihood of making a purchase") and 11 ("99% likelihood of making a purchase"). Finally, we included a manipulation check for online media and responded to participants' questions about the study.

Results and Discussion

Online Media Manipulation

To test the effectiveness of two kinds of media manipulation, a one-way ANCOVA with online media type as a between-subject factor and product attitude as a dependent variable revealed the expected significant effect of online media type such that participants perceived more positive product attitude in the online mobile phone forum (M_{forum} = 3.17) than in the online mobile phone home page ($M_{homepage}$ = 2.15; t = 7.599, p = 0.010).

Purchase Intention Analysis

First, we compared synergistic and non-synergistic groups. Using purchase intention as a dependent variable, we conducted a one-way ANCOVA with synergy type (synergy and non-synergy) as a between-group factor. The results revealed a significant effect for synergy type ($M_{synergy}$ = 2.270, $M_{non-synergy}$ = 1.400; t = 8.659, p = 0.004), indicating that the synergy between the Dis-80 advertisement in the home page and the Dis-80 advertisement in the mobile phone forum potentially create a higher purchase intention than the non-synergy case (see **Table 1**).

Next, using purchase intention as a dependent variable, we conducted a one-way ANCOVA with synergy type (synergy and separate stimulation) as the between-group factor. Specifically, in accordance with H1, participants exposed to synergy media were more willing to buy the Dis-80 phone ($M_{synergy}$ = 2.487; t = 8.024, p = 0.007) than participants exposed to separate stimulation ($M_{separateB-B}$ = 1.278). Similarly, participants exposed to synergy media were more willing to buy the Dis-80 phone ($M_{synergy}$ = 2.487; t = 5.260, p = 0.026) than participants exposed to separate stimulation ($M_{separate\ I-I}$ = 1.529) (see **Table 2**).

These results support H1. Study 1 verified the synergistic effect between online broadcast media and online interactive media at the behavioral willingness level (purchase intention). Because of differences in media type, audiences are more likely to recognize a product brand. As a result, audiences produce higher product identification and higher purchase intentions for targeted products. This conclusion is consistent with other scholars' findings that the combination of TV advertising and broadcast advertising can increase willingness to buy (Edell and Keller, 1989). Other studies have focused on other variables in the consumer's behavioral dimension. For example, Jagpal (1981) found that the combination of a commercial bank's radio and newspaper advertising could increase media consumption. Similarly, Dijkstra et al. (2005) found that TV media and online media could enhance sales of products, store visits, advertising clicks, etc.

However, a small number of studies reached different conclusions in comparison to our study. For example, one study found that there was no synergistic effect for the combination of TV media, print media, and online banner, and that the combination had nothing to do with consumers' purchase intention (Havlena et al., 2007). Even so, based on previous studies of the effects of synergy on certain psychological variables

TABLE 1 | Comparison of synergistic stimulation and non-synergistic stimulation.

Variable	Media exposure		*t*	Significance
	Non-synergy (B-B and I-I)	Synergy (B-I and I-B)		
Purchase Intention	1.400	2.270	8.659	0.004

TABLE 2 | Comparison of separate stimulation and synergistic stimulation.

Variable	Media exposure			*t*	Significance
	Separate stimulation (B-B)	Separate stimulation (I-I)	Synergy (B-I and I-B)		
Purchase Intention	1.278	_	2.487	8.024	0.007
	_	1.529	2.487	5.260	0.026

(Chang and Thorson, 2004; Dong et al., 2018), this study argues that media synergy plays a role in willingness behavior through certain psychological variables.

STUDY 2

We believed that the interaction of the two different stimulations (broadcast and interactive) can only produce synergistic effects. A synergistic effect would occur from the two media stimulations in the case of interaction, and *vice versa*. In Study 2, we explored the effects of "interaction" on product memory to verify hypothesis H2a.

Pretest

We manipulated the interaction between the two media stimulations by adding an interference item in the middle of the media stimulations. For the interference condition, a web page with nonsense text was inserted into the middle of the virtual online product home page and the network forum. For the non-interference condition, we used a blank web page without text. Seventy-eight undergraduate students completed the pretest in this study.

To examine the effectiveness of the interaction between the two stimuli using product memory as a dependent variable, we conducted a one-way ANCOVA with the interference type (interference and non-interference) as the between-group factor. The results show that participants exposed to the blank page had a higher level of recall of product information ($M_{non-interference}$ = 5.050; t = 23.614, p = 0.000) than participants exposed to the web page with nonsense text ($M_{interference}$ = 3.211). Likewise, the treatments resulted in significant differences in product identification ($M_{interference}$ = 9.790, $M_{non-interference}$ = 11.075; t = 9.520, p = 0.003). The results indicate that the web page with nonsense text interferes with memory retrieval, hindering the formation of a memory structure. In contrast, the blank page did not produce any interference effect, resulting in higher product memory.

Method, Stimuli, and Procedure

One hundred and eighty-eight undergraduate students participated in this study for course credit. The study employed a 2 (interference group and non-interference group) × 2 (synergistic group and non-synergistic group) between-group design. In this study, we made *d* to represent a web page with nonsense text, and *b* to represent a blank web page. Finally, we randomly assigned participants to eight groups (B-d-I, I-d-B, I-d-I, B-d-B; B-b-I, I-b-B, I-b-I, and B-b-B) each group being exposed to three media stimulations. For the interference condition, we constructed the synergistic group with B-d-I and I-d-B and the non-synergistic group with I-d-I and B-d-B. For the non-interference condition, we constructed the synergistic group with B-b-I and I-b-B and the non-synergistic group with I-b-I and B-b-B.

The experimental stimuli were eight advertising portfolios similar to the ones in Study 1. We similarly combined the four types of pages (a virtual mobile phone home page, a virtual mobile phone network forum, a blank web page, and a web page with nonsense text) in pairs through the web site linkage.

Participants were told that they would be evaluating the use of advertisements that a mobile phone company was considering for a new brand. The advertising portfolio on the computer were then shown to participants, and participants were asked to fill out a product recall scale (the number of recalled words mentioned in the previous advertisement) and a product identification scale (the number of correct true or false statements).

Results and Discussion

Product Memory Analysis

In the non-interference condition, we conducted a one-way ANCOVA with synergy type (non-synergy and synergy) as a between-group factor and product memory as a dependent variable. In Study 2, product recall and product recognition were employed as the two dimensions of product memory. The results (see **Table 3**) reveal that participants exposed to the synergistic stimulation produced higher levels of product recall ($M_{synergy}$ = 6.708; t = 23.475, p = 0.000) than participants exposed to the non-synergistic stimulation ($M_{non-synergy}$ = 5.050), and produced higher levels of product identification ($M_{synergy}$ = 12.042; t = 11.476, p = 0.001) than participants exposed to the non-synergistic stimulation ($M_{non-synergy}$ = 10.700).

In the interference condition, we conducted a one-way ANCOVA with the synergy type (non-synergy and synergy) as

TABLE 3 | Comparison of non-synergistic stimulation and synergistic stimulation in the non-interference condition.

Variable	Media exposure		*t*	Significance
	Non-synergy (B-b-B and I-b-I)	Synergy (B-b-I and I-b-B)		
Product Recall	5.050	6.708	23.475	0.000
Product Identification	10.700	12.042	11.476	0.001

a between-group factor and product memory as a dependent variable. The results (see **Table 4**) reveal that product recall did not differ significantly between the non-synergistic group ($M_{non-synergy}$ = 3.211) and the synergistic group ($M_{synergy}$ = 3.813); product identification yielded similar results ($M_{synergy}$ = 9.813, $M_{non-synergy}$ = 9.790; t = 0.03, p = 0.957).

In this study, we verified that the labeling of two media stimuli with "interaction" is a necessary condition to generate a synergistic effect. In the non-interference group, the inserted blank page did not interfere with the memory structure of the tested product. After the second stimulus, the second stimulus information is integrated with the original memory. Thus, the synergistic stimulation produced a higher product memory than the non-synergistic stimulation. In the interference group, the inserted nonsense text interfered with the participants' memory of the tested mobile phone as participants could not recall the mobile phone brand. In contrast, participants, instead of remembering the phone brand itself, were more likely to remember the fact there was nonsense text in the home page or the mobile phone forum. This conclusion is consistent with the findings of Harkins and Petty (1981), in which multi-source information can affect the persuasiveness of information and destroy it by obstructing the thought-generating process. The irrelevant material interferes with the retrieval process of the semantic classification table in memory, which leads to an inability to proceed normally (Marsh et al., 2014). Thus, H2a is validated.

STUDY 3

We believed that only two different advertising stimulations (broadcast and interactive), that is, media with different information processing levels, could produce synergistic effects. Therefore, Study 3 explored the impacts of two media with different levels of information processing on product memory to verify H2b.

Pretest

We manipulated the different levels of information processing between the two media stimulations by adding a series of questions to the web pages. For the questioning condition, participants were asked to complete the pop-up questions *via* a link button in the product web forum. For the non-questioning condition, no questions would pop up automatically in the product web forum, even if participants clicked the link button. Forty-two undergraduate students participated in the pretest.

To examine the difference in the effectiveness of information processing between the two media stimulations, we conducted a one-way ANCOVA with questioning type (questioning and non-questioning) as the between-group factor and product memory as a dependent variable. The results show that participants exposed to B-I with automatic pop-up questions had a higher level of recall of product information ($M_{questioning}$ = 5.050; t = 8.719, p = 0.005) than participants exposed to B-I without questions ($M_{non-questioning}$ = 3.211). Likewise, participants had significant differences in product identification ($M_{questioning}$ = 10.458, $M_{non-questioning}$ = 9.375; t = 3.406, p = 0.073). The results indicate that the two types of web forum (questioning and non-questioning) are different in terms of information processing. Because of this, a higher product memory was present in the questioning condition than in the non-questioning condition.

Method, Stimuli, and Procedure

One hundred and eighty-eight undergraduate students participated in this study for course credit. The study employed a 2 (questioning group and non-questioning group) × 2 (synergistic group and non-synergistic group) between-group design. We randomly assigned participants to eight groups, each group exposed to two media stimulations. For the questioning condition, we constructed the synergistic group with B-I and I-B and the non-synergistic group with I-I and B-B. For the non-questioning condition, we constructed similar groups. Other experimental operations were the same like in Study 1.

The experimental stimuli were eight laptop advertising portfolios. We similarly combined the three types of pages (virtual laptop home page, virtual laptop network forum with pop-up questions, and virtual laptop network forum without automatic pop-up questions) in pairs through the web site linkage, and created eight advertising portfolios.

Participants were told that they would be evaluating the use of advertisements that a laptop company was considering for its new brand. The laptop advertising portfolio on the computer were then shown to participants, and they were asked to fill out a product recall scale (the number of recalled words mentioned in a previous advertisement) and a product identification scale (the number of correct true or false statements).

Results and Discussion

Product Memory Analysis

In the questioning condition, we conducted a one-way ANCOVA with synergy type (non-synergy and synergy) as a between-group factor and product memory as a dependent variable. In Study 3, product recall and product recognition were employed as the two dimensions of product memory. The results (see **Table 5**) reveal that participants exposed to the synergistic stimulation of laptop advertisement produced higher levels

TABLE 4 | Comparison of non-synergistic stimulation and synergistic stimulation in the interference condition.

Variable	Media exposure		*t*	Significance
	Non-synergy (B-b-B and I-b-I)	Synergy (B-b-I and I-b-B)		
Product Recall	3.211	3.813	3.075	0.084
Product Identification	9.790	9.813	0.003	0.957

TABLE 5 | Comparison of non-synergistic stimulation and synergistic stimulation in the questioning condition.

Variable	Media exposure		*t*	Significance
	Non-synergy (B-B and I-I)	Synergy (B-I and I-B)		
Product Recall	4.550	5.833	7.378	0.010
Product Identification	9.450	10.458	4.527	0.039

TABLE 6 | Comparison of non-synergistic stimulation and synergistic stimulation in the non-questioning condition.

Variable	Media exposure		*t*	Significance
	Non-synergy (B-B and I′-I′)	Synergy (B-I′ and I′-B)		
Product Recall	4.316	4.313	0.000	0.996
Product Identification	9.158	9.375	0.096	0.758

of product recall ($M_{synergy}$ = 5.833; t = 7.378, p = 0.010) than participants exposed to the non-synergistic stimulation ($M_{non-synergy}$ = 4.550), and higher levels of product identification ($M_{synergy}$ = 10.458; t = 4.527, p = 0.039) than participants exposed to the non-synergistic stimulation ($M_{non-synergy}$ = 9.450). In the non-questioning condition, we conducted a one-way ANCOVA with synergy type (non-synergy and synergy) as a between-group factor and product memory as a dependent variable. The results (see **Table 6**) reveal that product recall between the non-synergistic group ($M_{non-synergy}$ = 4.316; t = 0.000, p = 0.996) and the synergistic group ($M_{synergy}$ = 4.313) did not significantly differ, and product identification between non-synergistic and synergistic groups ($M_{synergy}$ = 9.375, $M_{non-synergy}$ = 9.158; t = 0.096, p = 0.758) also did not differ.

In this study, we verified that the two media with different information processing levels could produce synergistic effects, so H2b is validated. In the non-questioning condition, even though the laptop home page and the laptop forum were different in their form, there was no difference in the level of information processing because of the button in the forum page without automatic pop-up questions. In the questioning condition, the difference between the laptop home page and the laptop web forum came from the difference in the communication method (one-way broadcast and two-way interactive).

This study concludes that the difference between the two stimulations will produce a synergistic effect, which is consistent with previous studies. Previous studies focused on the impact of different media forms on marketing communication. For example, perceived pattern differences between broadcast media and dynamic video media can produce a synergistic effect (Edell and Keller, 1989). The difference in the perceived pattern has the advantage of providing multiple coding channels (Voorveld et al., 2011). Some studies have focused on the differences in information load and information origin (Wang and Nelson, 2006; Chatterjee, 2012) from which the synergistic effect might come. In short, inter-media differences in the cognitive coding process lead to a richer memory structure. In this study, the difference of information processing level between broadcast and interactive media resulted in a synergistic effect in product memory that is consistent with our proposed theory.

GENERAL DISCUSSION

In the present research, we provide strong support across three studies for the thesis that the combination of online broadcast media and interactive media increases the effect of marketing communication on purchase intention and product memory because of the synergistic effect. In Study 1, the joint stimulation of online broadcast media and interactive media led to a synergistic effect on consumer purchase intention (H1). In Study 2, we empirically verified our proposed theory that a synergistic effect occurs only when the interaction between online broadcast media and interactive media actually works (H2a). In Study 3, we demonstrate that, when the information processing level is different, a synergistic effect of online broadcast media and interactive media occurs (H2b).

Theoretical Implications

This research contributes to the literature streams on marketing synergy, media planning, and integrated marketing communication. First, we extend research on marketing synergy by introducing a new marketing media classification.

Second, we extend research on media planning in communications to reveal that a media portfolio is effective only when the two media interact with each other and a difference in media information processing level between the two media is present. The sequential stimulation from two or more distinct media reinforces the marketing message, leading to a stronger cognitive structure. There is no synergistic effect if there is no interaction and no difference between online broadcast media and interactive media.

Third, previous research on integrated marketing communication has focused on the outcome variables that can measure the effect of integrated marketing communication (Schultz et al., 2012). The present research, however, demonstrates that these outcome variables are affected by product or brand memory.

Managerial Implications

This research also has an important managerial implication for marketers. First, it has been found that online media synergy between different media can lead to a more positive purchase intention and product memory than repeated media advertisement. In the internet environment, marketers need to integrate different media to bring out communication breadth. Therefore, how to classify media to form a media portfolio becomes an important issue. Based on an online broadcast and interactive classification framework, marketers can build a media portfolio to achieve their marketing goals.

Furthermore, marketers should adapt the multimedia interaction to the characteristics of the marketing media portfolio. In the practice of real marketing, if the time interval between the two media stimulations is too long or the theme difference of the two media stimulations is too great, then the two-media synergistic effect does not work due to the absence of a searching prompt.

Finally, marketers should create an online media portfolio with different information processing levels. In practice, if there is no significant difference in interactive dimensions between the media, such as multiple product web pages, there will be the result of no synergistic effect occurrence and of the multimedia portfolio degenerated into a repetition of web pages.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

YG conceived and designed the study. Both authors performed the experiments, wrote the manuscript, reviewed and edited the manuscript, and read and approved the manuscript.

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SUPPLEMENTARY MATERIAL

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Measuring Internet Slang Style in the Marketing Context: Scale Development and Validation

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As an emerging language variant, practitioners have extensively used Internet slang in advertising and other communication activities. However, its unique characteristics that differ from standard language have yet to be explored. Drawing upon interdisciplinary theories on schema and communication styles, this research makes the first attempt to conceptualize and measure these characteristics by introducing a new multi-dimensional construct, "Internet slang style," in the marketing context. It develops and validates a new scale to measure Internet slang style along the dimensions of amiability, overtness, candor, and harshness through a series of in-depth interviews, two surveys, and one experiment with consumers. In addition, this research investigates the impact of Internet slang styles on brand personality and brand attitude. The results indicate that different Internet slang style dimensions positively correspond to different brand personality dimensions but exert no influence on brand attitude. Practically, the scale provides an easy-to-use instrument to evaluate Internet slang styles from a consumer perspective to help companies appropriately employ Internet slang in marketing communication activities.

Keywords: internet slang style, scale development, brand personality, marketing context, communication

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INTRODUCTION

The extensive usage of the Internet and social media leads to the integration of virtual and real-life (Kilicer et al., 2017). As a result, Internet slang that emerges and develops online has become part of our everyday language, and even unconsciously influences people's psychological states and behaviors in areas such as communication and consumption (Crystal, 2006; Liu et al., 2019). For example, expressions such as "rona" or "vid" have been popular among young people to replace the formal designation "COVID-19" and to inject a sense of humor as a relief when facing the problematic current pandemic situation. Meanwhile, marketing practitioners have begun to notice the advantages of introducing Internet slang in advertisements. An example of this is Coca-Cola's "Share a Coke" summer campaign in China, in which many popular online nicknames were selected and printed on the coke bottles [e.g., "北鼻 (Bei Bi)," a transliteration of "baby"] to generate senses of proximity and cuteness among young consumers.

Internet slang can create distinct associations in consumers' perceptions as a unique language variant of the standard language (Crystal, 2006). These associations can be understood within the framework of language schemata, which refers to an individual's prototypical knowledge about the language, including its underlying social and cultural meanings, typical users, contexts, and appropriate topics, as well as individuals' beliefs about the language (Luna and Peracchio, 2005).

Such understanding would help both academics and practitioners clarify the merits and demerits of Internet slang and establish criteria for selecting appropriate slang in marketing activities. For example, recent empirical research shows that Internet slang with innovative and novel characteristics can attract audience attention (Liu et al., 2019). However, no study yet has systematically investigated consumers' perceptions about Internet slang as a whole.

Our study introduces the "Internet slang style" to address this gap, defined as consumers' schematic perception of the characteristics conveyed by the Internet slang expressions adopted in marketing-related contexts. Drawing upon relevant theories from psychology, communication, and marketing, we aim to contribute theoretically by: (1) establishing valid conceptualization of its definition and dimensions; (2) developing an adequate scale to measure it as a multi-dimensional construct; (3) exploring its possible marketing-relevant outcomes from a consumer perspective. To do so, we first derive the definition of Internet slang style and its dimensions based on an extensive literature review. A pilot study that involves consumer interviews validates these conceptualizations. Then, following scale-development procedures, four studies are conducted to develop the scale (Studies 1–2), examine its validity and reliability (Study 3), differentiate it from the brand personality scale (Aaker, 1997), and reveal its influence on brand personality dimensions (Study 4). As far as we know, this is a very initial attempt to systematically conceptualize and empirically examine the characteristics of Internet slang, especially in the marketing domain. We also aim to contribute to practitioners by providing an easy-to-use instrument to evaluate Internet slang style.

CONCEPTUALIZING INTERNET SLANG STYLE

Theoretical Foundation: Schema Theory

Internet slang, consisting of distinct pronunciation, word, morphology, and syntax derived from online context, is a variant of the standard language (Liu et al., 2019). The emergence of Internet slang depends on two factors: its users and the context. On the one hand, netizens, active online for a long time, create and speak Internet slang instead of the standard language to express their unique identity. On the other, compared to real communication context, online communication is more accessible, random, and secretive, constructing a different environment for the continuous evolution of Internet slang as an independent variety.

As such, we draw from schema theory to clarify the conceptual nature of Internet slang style. Schema theory describes how people recognize and understand the world by using cognitive structures to organize prior knowledge (Fiske, 1982). In this vein, schemata refer to the knowledge unit in the human mind, and an intermediary between objects and language. People organize schemata as a psychological structure network that represents shared meaning among many individuals. In the marketing context, this network allows individuals to form mental representations of ads, brands, or products, process, retrieve, and categorize information related to them, and finally facilitate decision-making (Sujan and Bettman, 1989; Halkias, 2015).

Similarly, people with direct or indirect experiences with online communication will develop a cognitive representation of Internet slang. In other words, they establish prototypical knowledge and consensual meaning of this particular language variety, forming the "style" perception of Internet slang (Jeffries and McIntyre, 2010, p. 127). As people see similarities between events or experiences during processing, and weave them into different schema categories (Schank, 1982), the "style" of Internet slang can also be further understood and measured based on the "types" of thematic meaning delivered.

Definition of Internet Slang Style in the Marketing Context

To the best of our knowledge, the literature contains no conceptually useful definition of Internet slang style and its dimensions that can be further extended to a scale and used in business practices. Therefore, the definition of Internet slang style should be first established before scale development. To achieve this purpose, we searched extensively to identify articles on "linguistic style," "language style," "communication style," and "advertising style" published in leading journals that encompass communication or linguistic topics. By carefully understanding these articles, we tried to establish an appropriate framework to introduce the conceptualization of the Internet slang style.

Recent general conceptualizations in prior literature seem to coalesce around two streams of frameworks. On the one hand, the construct "communication style" emphasizes how people communicate with others. In this vein, communication style can be "conceived to mean the way one verbally and paraverbally interacts to signal how literal meaning should be taken, interpreted, filtered, or understood (Norton, 1978, p.99)." Prior research often uses this conceptualization to evaluate different ways that service providers use to interact with customers (e.g., Webster and Sundaram, 2009; Hwang and Park, 2018). On the other hand, "linguistic style," or "language style," reflects the linguistic nature of a word within a sentence structure, . . . and the meaning of a word provided by the semantics of the word and the rest of the sentence (Hung and Guan, 2020, p. 597). Operationalization of linguistic style usually relies on LIWC, a coding dictionary that categorizes nearly 6,400 words into 89 themes (Pennebaker et al., 2015; Kovacs and Kleinbaum, 2020). Eighteen out of these 89 themes directly capture linguistic style, and can be used to predict intentions or personality traits (e.g., Lee et al., 2019; Koh et al., 2020).

General conceptualizations outlined in this section underlie divergent theoretical natures. Although linguistic styles are indeed psychologically-derived, their operationalization is based on specific linguistic features. For example, a social linguistic style is associated with the number of social intercourse-related words, such as family, employee, neighbor, and personal pronouns (Lee et al., 2019). Therefore, the linguistic style framework cannot directly describe consumers' perceptions of Internet slang as

a unique language variety. Internet slang may contain very distinct elements or rules from the standard language and generate different consumer mindsets perceptions. By contrast, the framework of "communication styles" seems more in line with the essence of our intended definition of Internet slang style (i.e., the schema theory), as it emphasizes more on people's schematic perceptions.

Responding to the argument that language features should be examined with consideration of social meanings embedded in the applied context (Coupland, 2007; Moore, 2012), we aim to provide a conceptualization that encompasses the essence of Internet slang style specific to the marketing domain while still offering consistency with prior communication style literature. Therefore, in our research, we formally define Internet slang style as consumers' schematic perception of the characteristics conveyed by the Internet slang expressions adopted in marketing-related contexts (e.g., in an advertisement, on the product package).

Dimensions of Internet Slang Style in the Marketing Context

As communication style plays as the conceptual basis for Internet slang style, we reviewed all the extracted articles again, focusing on possible dimensions of this scale. Generally, communication style consists of nine dimensions: dominant, dramatic, contentious, animated, impression-leaving, relaxed, attentive, open, and friendly (Norton, 1978). However, in line with our aim of developing a parsimonious scale specific to the marketing domain, we determined whether some dimensions needed to be summarized or eliminated and whether additional components should be considered. Embedding Internet slang in the marketing context is not the same as communicating with others in everyday interactions. We, therefore, examined the unique features of Internet slang (especially those in the marketing context) to decide on possible dimensions for the conceptualization of Internet slang style.

Amiability

The anti-conventional nature of Internet slang determines its originality (Collot and Belmore, 1996; Liu et al., 2019). According to social information processing theory, netizens creatively employ verbal cues (e.g., foreign words, dialects, digital elements, and icons) and interaction strategies (e.g., paraphrasing, homonyms, thumbnails, reduplication, and unconventional syntax) to express and interpret social and emotional messages in online contexts (Kundi et al., 2014; Valkenburg et al., 2016). In this way, Internet slang keeps gaining novelty and freshness. It allows its users, who are young and full of entertainment spirits, to generate more favorable and attractive impressions to similar others in computer-mediated communication (Gao, 2006; Valkenburg and Peter, 2009). As a result, Internet slang may lead its users to cultivate psychological belongingness and familiarity.

These features of Internet slang correspond to both friendly and attentive communication styles proposed by Norton (1978). The friendly communication style connotes being unhostile to deep intimacy. Meanwhile, the attentive communication style reflects the extent to which a person expresses empathy and attention during interactions with other individuals (Norton, 1978). With defining characteristics such as creativity and attractiveness, Internet slang in the marketing context may lead consumers to categorize themselves and the brands as members of the online community. Consequently, consumers develop interpersonal intimacy with these brands (Postmes et al., 2000). In sum, the amiability dimension captures overall attributes that can interpret why and how consumers feel closed and attracted by Internet slang.

Overtness

Computer-mediated communication has been typically taken place in anonymous contexts between unacquainted partners (Valkenburg et al., 2016). Therefore, anonymity ensures that the online communication environment is relatively independent and secretive, leading people to communicate more freely and casually online than in real contexts (Turkle, 1995; Crystal, 2006). In addition, the text-based settings allow people to develop non-verbal cues (e.g., emoji, emoticons), verbal strategies (e.g., abbreviation, interjection), and rhetoric instruments (e.g., exaggeration, metaphors) to express themselves more directly (Collot and Belmore, 1996; Liebrecht et al., 2021). For example, comparing an online chat corpus and a daily interaction corpus identifies more exclamations in the first corpus (Wong et al., 2006). People tend to express more intense emotions when using Internet slang.

Such properties of Internet slang enable people to communicate because it is "self-generated in content and self-directed in emission (Castells, 2007, p.248)." These properties integrate what Norton (1978) illustrates about open, dramatic, animated, or relaxed communication styles. Specifically, an open style, in line with the self-focus of Internet slang, indicates interacting with others in a frank, sociable, unreserved, and non-secretive manner and sharing personal emotions during the communication. In addition, a relaxed style that evaluates whether the communicator feels comfortable or at ease also reflects the free and casual natures of online contexts (Norton, 1978). Meanwhile, dramatic or animated styles emphasize more on stylistic devices (e.g., exaggerations, fantasies, stories, metaphors) or non-verbal cues (e.g., eye contact, facial expressions, and gestures) that help transmit emotive expressions or highlight/understate message content (Kang and Hyun, 2012), both, therefore, can be regarded as concrete linguistic approaches that facilitate people's self-expression online. Collectively, the overtness dimension reflects how Internet slang can be used to express oneself and show autonomy, with signature features such as freedom, vitality, and passion.

Candor

Computer-mediated communication is associated with physical features such as time and space constraints and text-based (Valkenburg et al., 2016). Therefore, many informal expressions emerge and result in a popular and funny way of communication that mimics spoken language (Liu et al., 2019; Liebrecht et al., 2021). For example, audible elements can be employed as paralinguistic approaches in computer-mediated communication using repeated punctuation ("*!!!*," "*??!!*") and sound mimicking

("*soooo*"), while informal verbal cues include contractions ("*LOL*," "*OMG*") and interjections ("*wow*," "*haha*") (Tagliamonte, 2016; Liebrecht et al., 2021). Overall, these newly-developed unique vocabulary and phrases deliver intense meaning in a relatively shortened and straight forward manner (Wong et al., 2006; Tagliamonte, 2016), fostering another dimension of Internet slang style—condor, which refers to the conciseness, simplicity, and efficiency manifested in the usage of Internet slang during communication to others (Collot and Belmore, 1996; Crystal, 2006).

However, after careful examination, no specific communication style proposed by Norton (1978) is identical to such a candor dimension, except for the impression-leaving style. It reflects the extent to which a communicator is strongly memorable (Kang and Hyun, 2012), partially supporting what is suggested in the candor dimension. To establish a lasting impression, communicators should use unique appearance, visual stimuli, or special comments to create a meaningful memory for consumers (Hwang and Park, 2018), just as unique expressions are dynamically generated to communicate efficiently in the online context.

Harshness

The anonymity associated with the Internet can also lead to inhibited behaviors in online communication, such as flaming (Valkenburg et al., 2016). For example, empirical research shows that people may have the disposition to behave in an uninhibited and non-conforming manner and ignore status differences in computer-mediated communication due to the decreased social context cues of the Internet environment (Sproull and Kiesler, 1986).

Two remaining communication styles proposed by Norton (1978) correspond to these characteristics: a dominant style refers to taking charge of social interactions, while a contentious style emerges as a covariate of dominant style and denotes an argumentative and disputable way of interaction (Norton, 1978; Kang and Hyun, 2012). Remarkably, the contentious style sometimes entails negative components (Norton, 1978). Extending to our research settings, Internet slang may consist of ironic and sarcastic expressions that possess a dominant or contentious style in people's perception. We merge these two specific styles into the harshness dimension.

The four resulting dimensions of Internet slang style are amiability, overtness, candor, and harshness. We refer to them as "ISS dimensions" in the following discussion. We propose that these four dimensions are the most prominent perceptions that Internet slang leaves to consumers. We conducted a pilot study to examine whether consumers also conceive of Internet slang style along these theoretically-driven dimensions. Six consumers were interviewed (aged 20–30 years with balanced demographics and Internet engagement, see **Appendix 1** for demographic information). We asked them to indicate their opinions toward Internet slang in daily consumption (both online and offline). The interview started open-ended, but questions regarding Internet slang characteristics were also introduced later on. All interviews were recorded and then transcribed. Then, we analyzed the interviews and found considerable overlap between consumers' responses regarding their perceptions of Internet slang and our four dimensions. **Table 1** gives examples of quotations.

METHODS AND RESULTS

Four studies were conducted to measure, validate, and establish the ISS construct and its predictivity. Study 1 focuses on item generation and purification. In Study 2, we develop and validate the ISS scale. Study 3 further validates the ISS scale and its dimensionality, while Study 4 examines ISS's predictive power for brand personality dimensions.

Study 1: Item Generation and Purification

The item generation procedure followed Churchill's (1979) scale development. To generate the initial pool of 156 statements, three sources were used: (1) the literature on linguistic style, geographical dialects, and accent characteristics (Cheyne, 1970; Edwards and Jacobsen, 1987; Tsalikis et al., 1992), including Chinese classics; (2) in-depth interviews with consumers to elicit descriptions regarding ISS; and (3) additional search for online resources and Chinese dictionaries.

To eliminate redundancy, five marketing or economics graduate students were recruited to judge the statements after presenting the ISS concept and example. The appropriateness in the marketing context was explicitly listed as a critical evaluative standard. This process reduced the initial 156 statements to

TABLE 1 | Consumer quotations for the four ISS dimensions.

Dimension	Consumer quotations
Amiability dimension	• "I think Internet slang's original and fashionable associations will transfer to my products." • "Probably the slang I used is relatively euphemistic and mild, containing emotional feelings such as fun." • "Usage of Internet slang makes people in the conversation feel warm." • "I feel intimate, familiar, and adorable about Internet slang."
Overtness dimension	• "Slangs represent characteristics of young people, such as coolness, confidence and without upper-limit." • "Internet slangs generally possess characteristics like humor and popularity." • "Internet slang can make communications livelier."
Candor dimension	• "Internet slang is more comprehensible, more concise, and easier to remember." • "Internet slang can precisely express our intended meanings. " • "The meanings of these words and phrases are clear." • "Internet slang helps us communicate as much information as possible in a short time." • "By using Internet slang, only a few words will express the meaning clearly. However, using common language requires many words to type in."
Harshness dimension	• "Some Internet slang expressions are cynical." • "(Some Internet slangs) involve derogation, irony, and arrogation." • "It's informal and non-deferential features flaw internet slangs. Thus, we should be cautious about using Internet slang." • "(Internet slang) engages sarcasm and irony toward real life."

The interviews were conducted in Chinese and were translated.

only 55 items. Afterward, the authors invited three marketing professors and one linguistic professor to omit to ensure the authority and rationality of the results and further reduced the statements to a manageable set of 35 items.

Study 2: Initial Identification of Dimensionality

To identify a comprehensive and representative set of Internet slang, the authors used the "Network Buzzwords" database, a Chinese official website[1] collecting Internet slang sentences voted on for popularity by Internet users. The collection period was from January 12, 2014, to December 24, 2014. The authors gathered 1,241 sentences, to which 280 additional sentences were supplemented after thoroughly reviewing a professional Chinese language journal ["*Yao Wen Jiao Zi* (咬文嚼字)"] and exploring rankings published by a Chinese online search engine ("Baidu").

A set of 350 Internet slang sentences was randomly selected from the sentence pool, which was constructed according to the definitive standards in the pilot study and Study 1. Then, these sentences were distributed into 44 groups[2], and 44 versions of the questionnaire were designed to limit fatigue and boredom. Specifically, each participant was randomly assigned to one version of the questionnaire and indicated their agreement with how each Internet slang sentence reflected the original 35 items generated from Study 1. All 35 items were rated on a five-point Likert scale anchored by 1 (*Strongly disagree*) and 5 (*Strongly agree*).

Participants were approached at airports, railway stations, or a university in a major city in southern China. A final set of 443 complete questionnaires was returned and reserved (valid rate = 76.3%, 47% male, 528 adults participated). Of the valid responses, 50.8% of participants were aged between 18 and 22 years, and 54.6% spent 2–4 h online daily.

Because our objective was to identify the dimensionality of ISS from consumers' perspective and not individual variations in evaluations of each sentence, the average scores of each sentence for each item were computed across participants (each sentence evaluated by an average of 10 participants). The resulting data consisted of 350 cases, each reflecting an Internet slang sentence with average scores on 35 different items.

Iterated-principal-component exploratory factor analyses (EFAs) with direct-oblimin-rotation were conducted. First, item-to-total correlations less than 0.4 were eliminated (resulting in one item being deleted). Then, 22 items were removed individually based on the rotated component matrix and the expected interpretable meanings brought to the structure, as their loading coefficients exceeded 0.4 in more than one factor. The remaining items entered the final factor analysis, presenting a four-factor solution. The Kaiser–Meyer–Olkin value of 0.81 (Bartlett's test of sphericity: $\chi^2 = 1789.55$, $p < 0.001$) and the eigenvalues greater than one both indicated that the analysis was appropriate for the data. The final set of 15 items accounted for 62.37% of the variance, and the Cronbach's α was 0.89, within the guidelines for scale development (Nunnally, 1978). The scree plot showed a significant dip, confirming the rationality of this four-factor solution. The four factors were labeled amiability (five items, α = 0.84), overtness (five items, α = 0.78), candor (three items, α = 0.63), and harshness (two items, α = 0.66). A summary of the factor analysis is shown in **Table 2**.

[1] Source: https://www.wllxy.net/

[2] One group contained only six different sentences; the other 43 groups had eight.

TABLE 3 | Study 3 model comparison.

Model	χ2	df	χ2/df	CFI	GFI	IFI	RMSEA
(a) Null	1,749.60	105	NA	NA	NA	NA	NA
(b) 1-Factor	781.49	89	8.78	0.58	0.73	0.58	0.15
(c) 2-Factor correlated	753.92	88	8.57	0.61	0.73	0.61	0.15
(d) 4-Factor uncorrelated	1,243.72	97	12.82	0.64	0.66	0.64	0.18
(e) 4-Factor correlated	243.20	83	2.93	0.90	0.92	0.90	0.07
(f) 4-Factor second-order	244.10	85	2.87	0.90	0.92	0.90	0.07

df, degrees of freedom; CFI, comparative fit index; GFI, goodness of fit index; IFI, incremental fit index; RMSEA, root mean square error of approximation.
NA suggests that the corresponding estimates do not exist.

Study 3: Dimensionality Confirmation

To confirm whether the four-dimension solution was the general structure for ISS, additional research was conducted to collect data from a second independent sample of subjects to examine the structure *via* a series of confirmatory factor analyses. Similar to the procedure from Study 2, a total of 415 questionnaires were sent to participants with a similar demographic profile.

Finally, 350 useable responses (a response rate of 84.3%) formed the basis for the iterated confirmatory factor analysis models (**Table 3**): (a) the null model; (b) a one-factor model (all items were loaded on a single factor); (c) a two-factor correlated model (amiability and overtness items were loaded on the same factor, while the remaining items loaded on the other; (d) a four-factor uncorrelated model with items loaded on their respective hypothesized factors; (e) a four-factor correlated model with the same structure as model (d); and (f) a four-factor model with one second-order factor.

Table 3 shows that, compared with the fit results of models (a)–(d), models (e) and (f) presented superior fit results (Kelloway, 1998). Model (e) was constructed as a correlated

TABLE 2 | Four dimensions of ISS.

Name	Dimensions	Variance explained	Eigenvalue	Statement with highest item-to-total correlations
Amiability	1	30.22%	4.53	Fresh, beautiful, euphemistic, adorable, original
Overtness	2	13.64%	2.05	Lively, pure, passionate, free, popular
Candor	3	10.37%	1.56	Concise, self-mocking, forthright
Harshness	4	8.14%	1.22	Sharp, rough

four-factor model (χ^2/df = 2.93, CFI = 0.90, GFI = 0.92, IFI = 0.90, RMSEA = 0.07). Model (f) was to confirm these four factors constituted the higher-order construct ISS (χ^2/df = 2.87, CFI = 0.90, GFI = 0.92, IFI = 0.90, RMSEA = 0.07). Closer examination revealed identical results from these two models. First, nearly every indicator's t value was statistically significant ($p < 0.01$), and almost all the coefficients exceeded 0.50 (**Table 4**). Furthermore, the estimates of Cronbach's α for the ISS four factors based on the second independent sample were similar to those of Study 2: amiability α = 0.83, overtness α = 0.78, candor α = 0.64, and harshness α = 0.74. Finally, composite reliability and AVE indices were computed to justify the scale's convergent and discriminant validity (Fornell and Larcker, 1981; **Table 5**). Composite reliability was higher than 0.60, and AVE did not fall below the corresponding pairwise squared correlation coefficients. In general, results supported the stability of the four-factor structure for the scale and suggested good psychometric properties.

Study 4: Predictive Validity Assessment

Study 4 was an experiment to test how different ISS dimensions induced by slogans help build corresponding brand personality dimensions in advertisements with the same product. Besides, we also wanted to provide further evidence to differentiate it from brand personality in this study.

ISS theoretically differs from brand personality, whose formal definition is "the set of human characteristics associated with a brand" (Aaker, 1997). Brand personality reflects consumers' generalizable impressions of the brands (Aaker et al., 2004) and is helpful for companies to establish deeper consumer-brand relationships and favorable brand attitudes (Fournier, 1998). Prior research reveals that even subtle marketing cues can influence consumers' brand personality perception, including visual symmetry (Bajaj and Bond, 2018), haptic product attributes (Ranaweera et al., 2021), and disclosure of the brand's corporate social responsibility activities (Tarabashkina et al., 2020). More importantly, extending prior findings of linguistic reflexes of personality (Mairesse and Walker, 2011; Kovacs and Kleinbaum, 2020), we propose that brand personality can also be shaped by the specific language features adopted in the advertising. For example, using metaphors in marketing communications leads consumers to perceive the products as more innovative and less socially responsible (Luffarelli et al., 2021).

To examine the effectiveness of ISS, we adopted brand personality as the key criterion variable. For operationalization, we used the brand personality scale developed by Aaker (1997), broadly validated and generalized cross-culturally and widely applied to academic and practical settings, despite slight changes in some countries (Aaker et al., 2001). Precisely, the scale consists of five trait dimensions: sincerity, competence, excitement, ruggedness, and sophistication. Our theoretical model highlighted the trait dimensions of sincerity and competence, which constantly emerge as parts of brand personality in both eastern and western cultures (Aaker et al., 2001). Accordingly, to further understand how brand personality would dictate the kind of language used in advertisements, two ISS dimensions with relatively orthogonal meanings, amiability, and harshness, were selected in advance.

The trait of sincerity captures the extent to which consumers characterize a brand with adjectives such as "warmth," "cheerful," and "genuineness," while the competence dimension is composed of efficient, successful, and confident impressions (Aaker, 1997; Aaker et al., 2001). On the one hand, consumers often form the perception of brand sincerity when a proximal psychological distance is elicited (Hu and Shi, 2020) or when a sense of social belongingness is boosted (Chang et al., 2019). In this vein, an amiable Internet slang slogan generates an atmosphere with original, pleasing, and adorable properties, allowing consumers to feel psychologically close to the brand to establish a sincere brand perception. On the other hand, a harsh slogan would convey a sense of straightforwardness and roughness, which easily leads consumers to induce associations of confidence and capability from the brand to embed in the advertisement, thereby building perceptions of brand competence (Chen, 2021). Therefore, we formally hypothesized that:

H_1: Styles of Internet slang sentences significantly affect brand personality dimensions.

H_{1a}: An amiable (vs. harsh) statement as a slogan causes consumers to perceive a sincere (vs. competent) brand personality.

H_{1b}: A harsh (vs. amiable) statement as a slogan causes consumers to perceive a competent (vs. sincere) brand personality.

TABLE 4 | Coefficients of the first- and second- order four-factor CFA models in study 3.

Paths	First order CFA result		Second order CFA result	
	Estimates	*t*-values	Estimates	*t*-values
Amiability → Euphemistic	0.67	NA	0.67	NA
Amiability → Beautiful	0.71	10.82	0.71	10.81
Amiability → Fresh	0.60	9.38	0.60	9.38
Amiability → Adorable	0.77	11.43	0.76	11.43
Amiability → Original	0.72	10.95	0.72	10.95
Overtness → Free	0.58	NA	0.58	NA
Overtness → Lively	0.81	10.37	0.81	10.37
Overtness → Pure	0.79	10.25	0.79	10.26
Overtness → Passionate	0.71	9.64	0.71	9.65
Overtness → Popular	0.36	5.80	0.36	5.80
Candor → Self-mocking	0.61	NA	NA	NA
Candor → Concise	0.55	6.74	0.55	6.71
Candor → Forthright	0.64	7.04	0.65	7.03
Harshness → Sharp	0.68	NA	0.68	NA
Harshness → Rough	0.86	6.74	0.86	6.74
Overall → Amiability	NA	NA	0.72	Fixed
Overall → Overtness	NA	NA	0.49	4.76
Overall → Candor	NA	NA	0.68	5.04
Overall → Harshness	NA	NA	0.57	4.65

Overall refers to the second-order construct Internet slang style. NA suggests that the corresponding estimates do not exist.

Design, Procedure, and Sample

In a pretest (n = 39, 85.3% female), participants evaluated dimensions of ISS on several network buzzwords. Among them, *Mo Mo Da* (么么哒, slogan A) scored significantly higher on the amiability dimension than did "Even today you are standoffish and indifferent to me, I will be the one out of your league sooner or later" (今天你对我爱理不理, 明天我让你高攀不起, slogan B) [M_A = 4.31, SD = 1.19; M_B = 3.15, SD = 1.04; $t(76) = 4.56$, $p < 0.001$], whereas slogan B scored significantly higher on the harshness dimension than did slogan A [M_A = 2.30, SD = 1.21; M_B = 4.53, SD = 1.44; $t(76) = 7.42$, $p < 0.001$]. Slogans A and B were not significantly different on the dimensions of overtness and candor [overtness: M_A = 4.07, SD = 1.18; M_B = 4.06, SD = 0.97; $t(76) = 0.04$, *n.s.*; candor: M_A = 4.10, SD = 1.06; M_B = 3.98, SD = 1.045; $t(76) = 0.50$, *n.s.*]. The results demonstrated that these two slogans were ideal stimuli in the follow-up experiment.

A single-factor between-group design (ISS: amiable vs. harsh) was adopted. Specifically, the experiment was administered online, and 101 Internet users (76.4% female, M_{age} = 24.3 years, 93.1% spent more than 2 h online every day) were randomly assigned to one condition. In the beginning, participants watched a randomly assigned advertisement for the wallet produced by a fictional brand AROX. The slogan used in the advertisements was either the amiable phrase or the harsh phrase identified in our pretest and adjusted to ensure equivalent sentence length. Except for the slogan, the two advertisements (including product pictures and layout) were the same. Then, participants were instructed to indicate their perceptions toward the wallet itself by using two items (i.e., adorable, upscale). Afterward, participants rated the slogan on two dimensions of the ISS scale (amiability α = 0.77, and harshness α = 0.77) and assessed brand personality ("What personality do you think Brand AROX possesses?" Specifically, sincerity (α = 0.74; "wholesome," "cheerful," "warm") and competence (α = 0.82; "successful," "efficient," "determination") were each measured by three items. Four items also measured participants' attitudes toward the brand AROX (α = 0.85; "I like the brand," "I'd like to buy the brand," "It is more possible for me to buy the brand," and "I think the brand's quality is good"). All items were measured on a seven-point scale (1 = *Strongly disagree*, 7 = *Strongly agree*). Finally, participants answered several demographic questions and were then debriefed.

Results

Consistent with our pretest, participants who watched advertisements that contained slogan A rated the advertisement as more amiable and less harsh than did those who watched advertisements with slogan B [amiability: M_A = 4.43, SD = 1.00; M_B = 3.24, SD = 1.24; $t(99) = 5.33$, $p < 0.001$; harshness: M_A = 2.22, SD = 1.18; M_B = 4.57, SD = 1.28; $t(99) = -9.58$, $p < 0.001$]. Results confirmed that different dimensions of ISS were successfully manipulated. Groups exhibited no statistical difference in the perception of the product as adorable [M_A = 3.52, SD = 1.63; M_B = 3.51, SD = 1.63; $t(99) = 0.03$, *n.s.*] and upscale [M_A = 4.24, SD = 1.32; M_B = 4.31, SD = 1.61; $t(99) = -0.25$, *n.s.*] before watching the advertisements; this indicated that participants in different groups had similar perceptions of the wallet itself.

According to our hypothesis, different styles of slogan embedded in advertisements would exert different types of brands. The independent sample t test (ISS dimension: amiable vs. harsh) on sincerity revealed the predicted pattern [$t(99) = 2.36$, $p < 0.05$]. Specifically, the amiable slogan made participants feel the brand was more sincere than the harsh one did (M_A = 4.40, SD = 1.23; M_B = 3.82, SD = 1.25). By contrast, the harsh slogan made participants feel the brand was more competent than the amiable one did [M_A = 3.47, SD = 1.21; M_B = 4.29, SD = 1.30; $t(99) = -3.31$, $p < 0.001$]. Additionally, neither condition elicited distinctively favorable evaluations toward the brand [M_A = 3.52, SD = 1.21; M_B = 3.67, SD = 1.20; $t(99) = -0.63$, n.s.].

To summarize, the results from Study 4 verified the predictive validity of the ISS scale by showing that online slogans adopted in advertising slogans would change consumers' perceptions of brand image (i.e., brand personality). Meanwhile, consumers' brand evaluation was not influenced.

DISCUSSION

Theoretical Contribution

Although Internet slang is recognized as a novel approach for corporations to conduct marketing practices, some gaps still exist in understanding its characteristics distinct from those of the standard language. In closing these gaps, this research attempts to link three literature streams–the communication literature,

TABLE 5 | Tests for convergence and discriminant validity in study 3.

Dimensions	First-level CFA results				Second-level CFA results				
	Amiability	Overtness	Condor	Harshness	Amiability	Overtness	Condor	Harshness	Overall
Amiability	0.48 (0.82)	0.09	0.09	0.10	0.48 (0.82)	0.09	0.09	0.10	NA
Overtness	0.31	0.45 (0.79)	0.07	0.07	0.31	0.45 (0.79)	0.07	0.07	NA
Condor	0.30	0.27	0.36 (0.63)	0.09	0.30	0.27	0.36 (0.63)	0.09	NA
Harshness	0.32	0.26	0.30	0.61 (0.75)	0.32	0.26	0.30	0.61 (0.75)	NA
Overall	0.76	0.74	0.61	0.57	0.76	0.74	0.61	0.57	0.39 (0.71)

The first number of the diagonal elements represents AVE; the number in parentheses refers to composite reliability.
The below-diagonal elements refer to correlations between dimensions; the off-diagonal elements are corresponding squared correlation.
NA suggests that the corresponding estimates do not exist.

psychology literature, and marketing literature–by introducing a new construct that evaluates the unique characteristic associated with Internet slang as an emerging language variant. In this vein, we make three significant theoretical contributions.

First, some previous studies on Internet slang have focused only on one particular feature (e.g., humor or novelty) (e.g., Liu et al., 2019). We develop a theoretically well-grounded and comprehensive conceptualization of the Internet slang style as a multi-dimensional construct based on the schema theory and the communication style literature. Specifically, Internet slang style comprises the four dimensions of amiability, overtness, candor, and harshness. Accordingly, a scale of Internet slang style is constructed to provide researchers with an instrument for contextualized Internet slang research in the marketing domain. Investigators can select particular dimensions or comprehensively use our scale in their study. As such, the understanding of Internet slang and its influence in the marketing context can be deepened, and the results can be comparable.

Second, in addition to empirical results that consistently show high convergent and discriminant validity of the ISS scale (studies 1–3), we demonstrate that our scale differs from brand personality and brand attitudes under experimental conditions (Study 4). Specifically, we empirically show that Internet slang style dimensions impact consumers' perception of brand personalities, but exert no influence on their brand attitudes. These results provide support for recent conceptual propositions that brand personality can be constructed through the linguistic identity of a brand (Carnevale et al., 2017) and extend the classic concept of "linguistic styles as the individual difference (Pennebaker and King, 1999)" to a marketing context. Meanwhile, these empirical findings also respond to the call of emphasis on exploring whether social media context (i.e., Internet slang) would infuse a collectively-derived meaning into brands (i.e., brand personality) (Carnevale et al., 2017).

Third, this research explores an interdisciplinary topic by examining Internet slang and its influence on marketing communications. In such a field that bridges linguistics and marketing theories, most research focuses on the code-switching effect (e.g., Lin and Wang, 2016; Ahn et al., 2017), or impacts of concrete linguistic elements (e.g., pronouns, phonetics, rhyme) (e.g., Hung and Guan, 2020; Liebrecht et al., 2021). Few studies have examined Internet slang individually as an essential phenomenon. This paper extends this research field by establishing a typology of the prominent perceptual characteristics manifested in Internet slang as a unique language variety.

Managerial Implication

Marketing practitioners already acknowledge the importance of Internet slang by extensively integrating popular slags into their advertisements. Therefore, our research helps managers to gain insights into applying Internet slang in four ways. First, a refined definition of Internet slang style provides practitioners an objective recognition and shared understanding of the unique but common perceptual characteristics that Internet slang would generate among consumers. This would help establish an essential foundation for managers who consider employing Internet slang in marketing communications, and avoid possible risks of subjective judgment of Internet slang.

Second, we conceptualize and operationalize ISS as comprising four dimensions (i.e., amiability, overtness, candor, and harshness). This expanded conceptualization of the Internet slang style shows that solely associating Internet slang with separated features such as novelty, youth, or interestingness is inadequate to marketing practitioners (e.g., Crystal, 2006; Liu et al., 2019). Study 2 reveals that although amiability contributed to the highest variance, overtness, candor, and harshness each accounted for approximately 10% of the variance in the EFA. Therefore, companies should consider all four dimensions and their possible influences in their decisions to use Internet slang in their marketing communications. For instance, when adopting concise or efficient Internet slang in an advertising context, companies should realize that the slang statement might convey sharpness and even imply non-deference.

Third, we provide an easy-to-apply scale that consists of only 15 clear items for companies to measure Internet slang styles. As such, this instrument enables practitioners to predict consumers' conception of particular Internet slang statements before launching an advertisement or promotional activity. In addition, with a large body of Internet slang available for marketing use, practitioners can establish a corpus in which all the Internet slang phrases or sentences are categorized by specific ISS dimensions that are evaluated and determined in large-scale consumer surveys beforehand. Such a corpus would allow companies to choose appropriate slang embedded in the advertisements to activate particular associations among consumers.

Finally, we find evidence that different Internet slang style dimensions correspond to differential brand personalities (Study 4). As such, Internet slang could serve as a means for building a particular brand personality. Therefore, companies should align their use of Internet slang statements with branding decisions. Strategic promotional activities that include Internet slang should not violate the brand's predetermined personality. In turn, when launching a new brand or new product in the market, marketing managers can also take advantage of the readily available associations of certain popular Internet slang statements to construct a particular brand personality in a much easier manner.

Limitations and Future Research

This research still contains some limitations, which also suggest avenues for future research. First, the external validity of the ISS scale and related findings might be limited because all the studies were conducted in China. Although our conceptualization encompasses general theories of psychology, communication, and marketing that involve no country-specific factors, replication studies in other countries are required in the future. Second, Internet slang is context-specific (which is ignored in the current paper). Therefore, it would be helpful to account for the interactional roles of product categories, launching platforms, and target audiences when examining the downstream effect of ISS. Third, the relationships between ISS dimensions and brand personality dimensions require more theoretical development and clarification. For example,

what would the impact of overtness and candor be on brand personality dimensions? Would amiability and harshness still influence consumers' perception of the other two brand personality dimensions? Finally, the nomological validity of the ISS scale should be further tested. This research only identifies brand personality as a possible outcome, but finds no relationship between ISS and brand attitude. Future research should reveal relationships between ISS dimensions and other consequential variables (e.g., word-of-mouth intentions) and try to identify possible antecedents that help build different ISS dimensions.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

SL and YW conceived of the presented idea and developed the theory and research model. SL and WG collected data and performed the analysis. YW wrote the manuscript. All authors contributed to the article and approved the submitted version.

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APPENDIX

Table A1 | Demographic statistics of pilot study participants.

No.	Gender	Age	Education level	Occupation	Daily online duration
P1	Male	20–25	Master	Student	5–8 h
P2	Male	20–25	Master	Student	3–5 h
P3	Female	25–30	Undergraduate	Company employee	8–10 h
P4	Male	25–30	Undergraduate	Self-owned electronic business	More than 12 h
P5	Female	20–25	Junior College	Company employee	8–10 h
P6	Female	25–30	Doctoral	Student	5–8 h

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How Does Social Support Affect the Retention Willingness of Cross-Border E-Commerce Sellers?

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E-commerce research usually focuses more on how to protect consumers' rights and increase their purchase intention from the perspective of consumers. However, we still lack understanding of e-commerce sellers, especially cross-border e-commerce sellers. Based on the stimulus-body-response theory, this paper built a moderated mediation model to test the relationships among social support, perceived benefits, perceived usefulness and sellers' willingness to retain. The results show that social support has a positive impact on perceived benefits and sellers' willingness to retain; perceived benefits play a partial intermediary role between social support and sellers' willingness to retain; and perceived usefulness moderates these mediating effects. The research results further expand the perspective of e-commerce research and reveal the mechanism and boundary conditions of the influence of social support on the retention willingness of cross-border e-commerce sellers.

Keywords: cross-border e-commerce, social support, perceived benefits, perceived usefulness, sellers' willingness to retain, S-O-R theory

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INTRODUCTION

Online shopping has important economic potential and its popularity is gradually increasing. While online shopping brings convenience to buyers, it also brings benefits to sellers. However, the complexity of online shopping, especially cross-border shopping, has led to opportunistic behavior of buyers and sellers to a certain extent. It is worth noting that, by reviewing the previous literature, we found that most of the previous studies were from the perspective of consumers. They assume that consumers are the weaker party in online shopping, discuss how to protect consumers' rights (Wang et al., 2021) and increase consumers' willingness to buy (Escandon-Barbosa and Rialp-Criado, 2019; Liu et al., 2020; Guitart and Stremersch, 2021). They believe that opportunistic behavior of sellers seems particularly common in these computer-mediated trading environments (Hong, 2015; Kim and Koo, 2016). For instance, buyers in e-commerce usually conduct transactions with most unknown sellers. These sellers can easily create and change their identities and are basically unable to meet with buyers (Meents and Verhagen, 2018). As a result, some sellers deliberately provide false advertisements, sell unreliable products and other deceptive behaviors (Román, 2010), which will cause consumers not being able to obtain the authenticity information of the products.

However, considering the problem of widespread buyer opportunistic behavior such as chargeback fraud that is common in cross-border e-commerce transactions, this assumption is not always valid (Guo et al., 2018). Refund fraud refers to the behavior of buyers requesting the seller to refund the purchase price through some excuses, such as "unauthorized transaction," and when the seller has returned the purchase price without returning the purchased goods to the seller,

in order to obtain "free" goods (Khan, 2015). Besides, many third-party trading platforms have introduced policies that buyers can return goods when they are dissatisfied with goods within 180 days, which further strengthens refund fraud (Clemons, 2007), harms the seller's interests and survival. Cross border transactions and delivery face greater complexity and high risks than traditional offline markets or domestic electronic markets. Compared with domestic transactions, the unique high transportation costs of cross-border transactions, the asymmetry of information between buyers and sellers, and the differences in laws, languages and cultures of various countries all determine that multinational e-commerce has a high degree of uncertainty (Gessner and Snodgrass, 2015). Guo et al. (2018) found through a study of 443 cross-border e-commerce sellers that in cross-border e-commerce transactions, sellers are full of uncertain about the success of the transaction like buyers, and once it happens in transaction disputes, sellers suffer far more losses than buyers. In addition, because some regulations of the third-party trading platform are too partial to consumers, placing sellers in a disadvantageous position, which affects sellers' benefits and transaction willingness to some extent (Guo et al., 2018). This has also made many small and medium-sized enterprises "failed" after getting involved in cross-border e-commerce. According to statistics, in 2017, 391905 new sellers settled on Amazon's US site, less than 30% of them sold goods, and the retention proportion of sellers was less than 10% (Li, 2018). Besides, the recent Sino US trade friction and the continuous spread of covid-19 have led to the rise of international logistics costs, which have brought great challenges to cross-border e-commerce sellers. In addition, since May 2021, the Amazon platform has closed more than 50,000 Chinese cross-border e-commerce sellers, which has caused an estimated industry loss of more than 100 billion yuan (Ma, 2021). All of these shows that China's cross-border e-commerce is facing challenges from many aspects. Thus, sellers' "difficulty to retention" has become a major problem restricting the development of cross-border e-commerce.

From the perspective of sellers, there are relatively few papers study on factors affecting sellers' retention intentions. Most of existing research focuses on the study of consumer behavioral intentions, emphasizing how to protect consumers from sellers' opportunistic behavior (Wang et al., 2021) and increase consumers' willingness to buy (Escandon-Barbosa and Rialp-Criado, 2019; Liu et al., 2020; Guitart and Stremersch, 2021). Although previous research has enriched our understanding of cross-border e-commerce buyers and provided useful suggestions for improving consumers' purchasing intentions. But as the other side of the transaction, cross-border e-commerce sellers play an important role in cross-border e-commerce transactions (Guo et al., 2018) and make a huge contribution to China's foreign trade exports. It is critical for the development of China's foreign trade to solve the problem of "difficulty to retention" of cross-border e-commerce sellers. Therefore, this research aims to meet the above-mentioned research gap by focusing on the retention willingness of sellers in the context of cross-border e-commerce. Based on stimulus-body-response (S-O-R) theory, we proposed a conceptual model. This model divides the social support obtained by cross-border e-commerce sellers into two dimensions: information support and emotional support. We use perceived benefits as an intermediary variable, and sellers' perceived usefulness of third-party trading platforms as a moderating variable to test the influence mechanism and boundary conditions between social support and sellers' willingness to retain.

This article has contributed to the literature related to cross-border e-commerce in the following aspects. Firstly, different from the existing literature that focuses on the protection of buyers' rights (Wang et al., 2021) and the promotion of purchase intentions (Escandon-Barbosa and Rialp-Criado, 2019; Liu et al., 2020; Guitart and Stremersch, 2021). This article reveals the mechanism that can enhance sellers' willingness to retain from the perspective of sellers. It has played a certain role in promoting the research of seller behavior in the cross-border e-commerce environment. The findings of this study are an important supplement to the existing literature on improving buyers' purchase intentions. It not only enriches the research content of the existing cross-border e-commerce literature, but also expands the perspective of cross-border e-commerce research. Secondly, this paper found that social support and perceived benefits have significant influence on sellers' retention intention, which challenges the dominant assumptions of the existing literature. The success of cross-border transactions mainly depends on buyers' purchase intention, because buyers are affected by sellers' opportunistic behavior. As an alternative, this research shows that sellers are also vulnerable to buyer fraud, trade frictions and other external factors. The social support and perceived benefits they receive influence the seller's willingness to retain. Finally, this study provides strong evidence that third-party trading platforms need to strengthen the protection of sellers' rights in the context of cross-border e-commerce. Specifically, as the main place for cross-border transactions, third-party online transaction platforms are critical to the development of cross-border e-commerce. However, existing research focuses on the protection of consumers' rights (Wang et al., 2021) and the enhancement of consumers' willingness to buy (Escandon-Barbosa and Rialp-Criado, 2019; Liu et al., 2020; Guitart and Stremersch, 2021). This article explores the moderating effect of the platform's perceived usefulness on the relationship between the seller's perceived benefits and retention intention, and provides a new perspective for the research on the platform's perceived usefulness. Together, these studies provide a more complete portrait of how third-party trading platforms can play an important role in the sustainable development of cross-border e-commerce.

THEORETICAL BASIS AND RESEARCH MODEL

Theoretical Basis

The S-O-R theory originated from environmental psychology (Mehrabian and Russell, 1974). It points out that when an individual is stimulated, its internal state will change, which eventually leads to a certain behavior. With the development of e-commerce, many scholars use the S-O-R theory to explain

user behavior. In existing studies, stimulus factors mainly include social factors (Huang, 2016), technical factors (Zhang et al., 2014), etc.; organic factors mainly include attitude (Chang et al., 2015) and trust (Tuncer, 2021), etc.; reactive factors mainly include willingness to share (Chang et al., 2015) and purchase intention (Liu et al., 2016) etc. It can be seen that the S-O-R theory has a certain explanatory power for people's decision-making behavior. Thus, this research is based on the S-O-R theory to construct a theoretical model that affects the retention willingness of cross-border e-commerce sellers. According to S-O-R theory, social support is the stimulus element, the perceived benefit is the organic element, and the seller's willingness to retain is the response element.

Specifically, in terms of stimulus factors, the research on social support involves multiple fields, and there is no unified definition in each field. However, it is a consensus that social support is a multi-dimensional concept. Schaefer et al. (1981) proposed that social support can be divided into information support, emotional support and tangible support in traditional social relations. More specifically, tangible support includes providing loans or material assistance. Information support refers to providing information, suggestions and timely feedback that can help solve problems. Emotional support refers to providing empathy, understanding or caring and other emotional support. With the development of information technology, traditional offline social relationships have been changed. People's interactions are more online, which is virtual in nature. Therefore, compared with information and emotional support, there is little tangible support. Based on the above discussion, this study adopts the classification of social support by Liang et al. (2011) and Hajli (2014a), dividing social support into two dimensions: emotional support and information support. In terms of organic elements, the definition of perceived benefits is proposed to adopt the research of Molla and Heeks (2007) on the analysis of e-commerce advantage factors. It means that sellers feel the benefits of engaging in e-commerce, which mainly include reducing costs, increasing revenue and improving company competitiveness. In addition, we combine the definitions of Guo et al. (2018) on seller's intention to trade and Liang et al. (2011) on continuance intention, and define seller's retention intention as the seller's willingness to persist in cross-border e-commerce when they have the opportunity to choose in the future. In addition, from the perspective of sellers, one of the main reasons for sellers to choose cross-border transactions is to attract foreign consumers, expand product markets and improve sales performance. This needs to rely on the "referral traffic" function of third-party platforms to achieve. Considering that the success of cross-border e-commerce requires the guarantee of third-party trading platforms, we incorporate sellers' perception of the usefulness of third-party platforms into our research framework, and the research model of the entire research is shown in **Figure 1**.

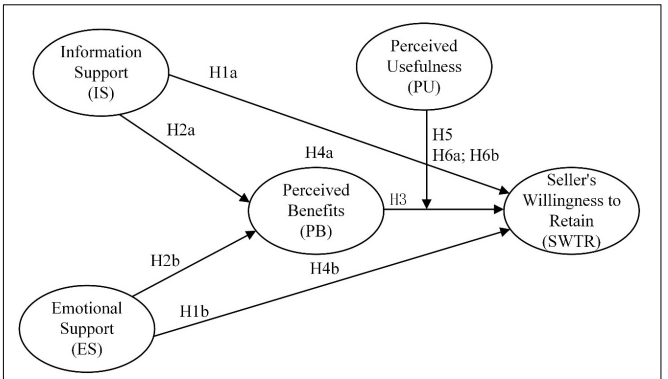


FIGURE 1 | Research model. H4a-Indirect influence of IS on SWTR; H4b-Indirect influence of ES on SWTR; H6a-the conditional indirect relationship of IS with SWTR (through PB); H6b-the conditional indirect relationship of ES with SETR (through PB).

Research Model

In view of the importance of cross-border e-commerce to economic development and the complexity of cross-border transactions, many scholars have explored how to promote the development of cross-border e-commerce. However, most of the previous studies have focused on cross-border e-commerce buyers and neglected to sellers. As shown in the review of previous relevant literature in **Table 1**, previous research focuses on improving the benefits and (continuous) purchase intentions of cross-border e-commerce buyers. While these studies have greatly increased our understanding of cross-border e-commerce. However, considering the importance of sellers, the difficulty to retention and the risks of engaging in cross-border transactions. It is crucial to explore how to improve sellers' interests and willingness to retain, in order to promote the healthy and sustainable development of cross-border e-commerce. Thus, we explore the impact of social support on the willingness to retain from seller's perspective, drawing on online shopping-related research and SOR theory.

In a virtual environment, feeling social support from other users will encourage people to be more open to business strategies (Yahia et al., 2018). In a situation with high-level social support, trust can be easily formed and is related to positive results. While a low level of social support can lead to despair and emotional problems (Shah et al., 2019). Past research has revealed that the social support consumers receive from friends, social media and other channels positively affects their satisfaction (Zhu et al., 2016), participation (Wang et al., 2020), citizenship behavior (Zhu et al., 2016), and purchase intention (Lin et al., 2018) in social commerce. Sellers, as another main body of the e-commerce market, also feel the social support from other practitioners. According to the S-O-R theory, when the seller perceives the stimulation of social support, the psychological perception will change and then take action. Because social support helps to increase the individual's perceived benefits and reduce the individual's perceived risk (Shah et al., 2019). Social support is considered a key indicator of participation and positive behavior (Hu et al., 2019). Therefore, the perceived social support of sellers can help increase their perceived benefits of engaging in cross-border e-commerce, which is consistent with the S-O path of the SOR theory. At the same time, social support will

TABLE 1 | Previous studies related to our research.

Author	Theme	Research object	Variable	Findings
Lin et al., 2018	Social support and consumer engagement in social commerce	Consumer	Social support; Social shopping intention; Social sharing intention	The social support influence user behaviors on their social shopping intention and social sharing intention.
Zhu et al., 2016	Social support on customer satisfaction and citizenship behavior in online brand communities	Consumer	Social support; Consumer satisfaction; Consumer citizenship behavior	Social support significantly affects the customer citizenship behavior through customer satisfaction in online brand communities.
Wang et al., 2020	Social support promotes consumers' engagement in the social commerce community	Consumer	Social support; consumer engagement	Social supportive significantly affects the consumers' engagement in the community through consumer involvement.
Shah et al., 2019	Perceived social support and perceived benefit	SNSs users	Perceived social support; Perceived benefit	Perceived social support is positive significantly associated with perceived benefits.
Park et al., 2019	Perceived benefit and consumers' M-payment service adoption	Consumer	Perceived benefit; Intention to use	The perception of benefits in using the m-payment positively affects consumers' intention to use M-payment.
Zhao et al., 2020	Consumers' perceived benefit and their purchase intention.	Consumer	Perceived benefit; Purchase intention	Consumers' perceived benefit is positively related to their purchase intention.
Payakkapong et al., 2017	Perceived benefit and sellers' behavior in e-commerce	Sellers in E-commerce	Perceived benefit; Intention to use e-commerce	Perceived benefits had direct effects on the intention to use e-commerce.
Sun, 2010	Sellers' trust and continued use of online marketplaces	Online Sellers	Sellers' trust; Sellers' retention of online marketplaces	A seller's perceived usefulness of using an online marketplace for selling positively influences his/her retention of that marketplace.
Lee et al., 2019	Perceived usefulness and platform-based mobile payment service	Consumer	Perceived usefulness; Intention to use	Perceived usefulness positively affects user attitudes toward mobile payment services.
Abbes et al., 2020	Perceived usefulness and online collaborative redistribution platforms	Consumer	Perceived usefulness; platform behavioral intentions	Perceived usefulness of the platform has a direct positive influence on platform behavioral intentions.
Kwak et al., 2020	Perceived usefulness and green logistics platforms	Consumer	Perceived usefulness; Intention to use	The perceived usefulness for users increases the intention to use the green logistics platform.

directly affect individual behavioral decisions (Lin et al., 2018; Hu et al., 2019). Therefore, the social support perceived can also help increase sellers' willingness to engage in cross-border e-commerce.

In addition, many studies have shown that perception affects individual behavior (Dijksterhuis and van Knippenberg, 1998). For instance, when consumers perceive the benefits from mobile payment and online shopping, their use of mobile payment and purchase willingness will increase (Park et al., 2019; Zhao et al., 2020). Similarly, when sellers perceive the benefits of using e-commerce, their intention to use e-commerce will increase (Payakkapong et al., 2017), which is consistent with the 0-R path of SOR theory.

What's more, from the perspective of sellers, they need to obtain adequate protection from third-party trading platforms for continued operation. Existing studies have extensively referenced the technology acceptance model to study user acceptance of e-commerce. But most of them studied the acceptance of mobile payment platforms (Lee et al., 2019), collaborative redistribution platform (Abbes et al., 2020), green logistics platforms (Kwak et al., 2020), and other e-commerce platforms from the perspective of consumers. Some scholars explained that sellers' perceived usefulness of the e-commerce market can also significantly increase their retention rate (Sun, 2010). Cross-border e-commerce sellers often choose to stay on a third-party platform if they can perceive that using that platform will provide sufficient protection for their legal rights. The higher the perceived usefulness of the platform, the more cross-border e-commerce sellers believe that they can turn the perceived benefits into real benefits, thereby further enhancing the relationship between perceived benefits and sellers' willingness to retain. And the higher level of perceived usefulness will also affect the indirect effect of social support on sellers' willingness to retain through perceived benefits. This is because at a higher level of perceived usefulness, sellers are more convinced that information from social support is reliable and valuable, thereby increasing their perception of benefits and increasing their willingness to retain. Based on the above analysis, the conceptual model of this research is shown in **Figure 1**.

RESEARCH HYPOTHESIS

Social Support and Sellers' Willingness to Retain

Social support will have a positive impact on sellers' willingness to retain. Social support is the experience of an individual being cared for and helped in a group (Cobb, 1976). It arises from the interaction between individuals in the group and represents the available social resources that a person perceives. These social resources make a person think that he is loved, respected and cared for. Existing literature has confirmed that social support will affect consumers' purchase intention (Li, 2019), and even stimulate consumers' impulse consumption (Hu et al., 2019). Similarly, this study believes that the amount of social support will affect the willingness of cross-border e-commerce sellers to retain. First, when there is more information support in a group, group members will naturally share business information and suggestions as an extension of their sharing of other support information (Liang and Turban, 2011). Second, if group members believe that other members have been providing helpful information, then obtaining or sharing valuable information with others will be considered a mandatory behavior (Crocker and Canevello, 2008). Finally, when individuals receive support from others, people often believe that they are obligated to give others similar support in return (Cheshire, 2007), and frequent sharing of useful information can enhance the trust and friendship between members (Liang and Turban, 2011). The frequent exchange of information among members of the seller group puts sellers in a mutually helpful situation. This mutually help process will generate information related to product marketing or sales. The existence of friendship and trust makes people feel that information is trustworthy and valuable for conducting cross-border transactions. Valuable information can help sellers reduce the uncertainty of transactions, avoid some speculative behaviors similar to refund fraud by buyer, and increase the probability of successful transactions. Besides, past successful transaction experience will enhance sellers' confidence in cross-border transactions, thereby enhancing the willingness of sellers to continue cross-border business activities. Similarly, when a person gets more emotional support, it shows that he gets more care, trust, respect and understanding from others, which will make him feel that he is important, concerned and valuable (Chiang and Huang, 2015). This will provide sellers with a sense of belonging, thereby enhancing the willingness of sellers to retain. Thus, we put forward the following hypothesis.

H1a: Information support is positively associated with sellers' willingness to retain.
H1b: Emotional support is positively associated with sellers' willingness to retain.

Social Support and Perceived Benefits

Perceived benefits are relative to perceived risks. It is an individual's perceptual utility to provide things, which is generated based on the comprehensive judgment of the individual after weighing the benefits and costs (Woodruff, 1997). For the cross-border e-commerce seller in this study, the perceived benefit refers to the benefits that sellers feel that cross-border e-commerce brings to the enterprise. It should include the reduction of transaction costs, the improvement of company performance, and the improvement of competitiveness. However, in developing countries, due to the backwardness of technology and facilities, the cost for enterprises to obtain information is higher than the global average. The benefits of e-commerce are generally limited to the improvement of inter-organizational communication. Most enterprises have not obtained the market expansion standards or cost savings benefits (Molla and Heeks, 2007). Especially for small and medium-sized enterprises, the complexity of cross-border transactions and the lack of their own resources determine that it is difficult to obtain the benefits of cross-border trade (Patterson and Wilson, 2000). In addition, the increase in transaction uncertainty caused by the lack of information further weakens the perceived benefits of cross-border e-commerce sellers.

We argue that social support positively affects the perceived benefits of cross-border e-commerce sellers. First of all, valuable information provided by group members, especially members similar to the sellers themselves, can reduce the cost of searching information (Xiao et al., 2015). Second, more social support means more sources of information. The more information the seller contacts, the more the seller will understand the latest developments in the product market, and thus more accurately grasp the needs of consumers. This helps increase the company's sales performance. Finally, while cross-border transactions bring benefits to sellers, they are also accompanied by transaction risks, especially for cross-border e-commerce. The existence of risks will inhibit people's perceived benefits (Chaudhuri, 1998). Thus, a large amount of relevant information can effectively weaken people's perception of the risks of transactions (Zhang et al., 2015), which will promote sellers' perceived benefits. Compared with information support, the existence of emotional support mainly indirectly helps people overcome difficulties with a positive attitude. This positive attitude will inhibit individuals' perception of risks, thereby increasing their perceived benefits. Therefore, we put forward the following hypothesis.

H2a: Information support is positively associated with perceived benefits.
H2b: Emotional support is positively associated with perceived benefits.

The Mediating Role of Perceived Benefits

Zhang et al. (2015) pointed out that the perceived benefits will mediate the relationship between the knowledge that consumers have and their purchase intention. A large amount of relevant knowledge can help consumers obtain more useful information. As a result, the perceived risk to consumers will be reduced and the perceived benefits will increase accordingly, which will increase consumers' willingness to buy (Zhang et al., 2015). Based on this, this study believes that perceived benefit is an important intermediary variable between the seller's perceived social support and the willingness to retain. The foundation of a business is profitability. When sellers feel that cross-border e-commerce is profitable, they will have a stronger willingness

to retain. Sellers are more aware of the benefits of cross-border e-commerce. One of the reasons sellers are able to perceive more benefits of cross-border e-commerce is that the valuable information provided by others can weaken the perception of risk, and some advisory information can directly help sellers overcome difficulties and make some decision correctly (Liang and Turban, 2011). In addition, emotional support from others, such as care, understanding and respect, allows sellers to actively seek solutions when facing difficulties, indirectly helping them to solve the problems they encounter (Pfeil and Zaphiris, 2009). Finally, in the cross-border e-commerce industry, when sellers gain the understanding and care from people who have similar painful experiences, it will make them release and anchor their emotions and feel comfortable and belonging, which will further motivate them to overcome difficulties and retain. Therefore, the following hypotheses are proposed in this paper.

H3: Perceived benefits is positively correlated with sellers' willingness to retain.
H4a: Perceived benefits mediates the relationship between information support and sellers' willingness to retain.
H4b: Perceived benefits mediate the relationship between emotional support and sellers' willingness to retain.

Moderating Effect of Perceived Usefulness

The concept of perceived usefulness comes from the technology acceptance model, which refers to an individual's subjective perception of whether the use of new technology can help improve work efficiency. Specifically, it refers to the user's belief or expectation that the use of a system/IT will improve his efficiency or results in accomplishing a task (Venkatesh et al., 2003). For the sellers in this study, the perceived usefulness refers to the evaluation of whether the use of third-party platforms can improve efficiency and operating performance of cross-border transaction. Some studies have pointed out that perceived usefulness will affect consumers' purchase intention. For example, Moslehpour et al. (2018) propose that perceived usefulness is related to consumers' purchase intention. Yoon and Steege (2013), Hajli (2014b), and Bonn et al. (2016) also confirmed this point. Different from previous studies, our research object is the perceived usefulness of third-party platforms of cross-border e-commerce sellers. Through small-scale interviews, we believe that sellers' perceived usefulness of the platform will influence the relationship between perceived benefits and willingness to retain. Because the completion of the seller's cross-border transaction needs to rely on the support of the platform, different people have different perceptions of the usefulness of the platform. In other words, people will have different perceived usefulness to the same platform. For example, in the case study of Charpin et al. (2021), restaurants have significantly different evaluations of the usefulness of mobile procurement platforms. The usefulness of the platform is critical to the availability of sellers to turn the perceived benefits into real benefits. Therefore, we believe that the level of perceived usefulness will have an interacting effect with the perceived benefits upon the sellers' willingness to retain. Specifically, when an individual perceives a higher platform usefulness, he believes that the platform he relies on can turn the perceived benefits into the actual benefits of the enterprise and increase his confidence in cross-border e-commerce transactions. This will further strengthen the relationship between perceived benefits and sellers' willingness to retain. Conversely, the impact of perceived revenue on sellers' willingness to retain will be weakened.

In addition, this study believes that perceived usefulness not only moderates the relationship between perceived benefits and sellers' willingness to retain, but also moderates the conditional indirect relationship between social support and sellers' willingness to retain (transmitted by perceived benefits). As mentioned earlier, the perceived benefit act as the mediating variables between information support and emotional support on sellers' willingness to retain. And in the case of high perceived usefulness, the seller's retention will be further enhanced by the impact of perceived benefits. Based on this, this study argues that in the case of high perceived usefulness, information support and emotional support have a stronger indirect effect on sellers' retention intentions through perceived benefits. Therefore, the following hypothesis is proposed.

H5: Perceived usefulness moderates the influence of perceived benefits on sellers' willingness to retain, such that the effect is stronger with the high perceived usefulness.
H6a: Perceived usefulness moderates the indirect effect of information support on sellers' willingness to retain, such that the effect is stronger with the high perceived usefulness.
H6b: Perceived usefulness moderates the indirect effect of emotional support on sellers' willingness to retain, such that the effect is stronger with the high perceived usefulness.

RESEARCH DESIGN

Scale Description

In order to obtain a sample that meets the requirements, the first part of the questionnaire sets up three selection translations: (1) The province where the individual is located. When the respondent chooses "Fujian," the survey will continue, otherwise the survey will end; (2) The personal residential address, when the respondent chooses "Quanzhou," the survey will continue, otherwise the survey will end; (3) Individuals are engaged in the industry. The investigation will continue when the subject chooses the "cross-border e-commerce industry," otherwise the investigation will end. In order to improve the effectiveness of data sources, each person participating in the survey will be paid. The second part of the questionnaire is a survey on retention expectations of cross-border e-commerce sellers. The factors that affect the willingness of cross-border e-commerce sellers to retain include social support, perceived benefits, and perceived platform usefulness. Each variable has 3–10 questions, and there are 22 questions in total. In order to prevent demographic variables from affecting the research conclusions, gender, age, and education are set as control variables, and other variables are measured using the Likert five-point scale. The questions of the questionnaire were all selected from the maturity scales

in the existing literature, followed by small-scale interviews and discussions. According to the interviewer's suggestion, the questionnaire was revised to make it more suitable for the survey situation of this study. Finally, the measurement items of each variable are shown in **Table 2**.

Data Collection and Samples

This article mainly investigates the sellers of cross-border e-commerce. Quanzhou is the origin of the "Maritime Silk Road," and cross-border transactions have deep historical and cultural heritage here. In the "Report on the Development Trends of China's Export E-commerce Cities with Amazon Global Store Opening" released in 2018, Quanzhou was ranked among the "Top 20 Chinese Export E-commerce Cities Development with Amazon Global Stores." According to incomplete statistics, there are currently more than 4,000 cross-border e-commerce sellers in Quanzhou, of which about 1,000 are export cross-border e-commerce B2C companies. Therefore, this article selects some cross-border e-commerce sellers in Quanzhou as the survey objects, which is representative.

The descriptive statistical results of the sample are as follows: Among the cross-border e-commerce sellers surveyed, in terms of gender, men accounted for 70.44% and women accounted for 29.56%; in terms of age, those aged 25 and below accounted for 10.34%, those aged 26–35 accounted for 67.00%, those aged 36–45 accounted for 19.21%, and those aged 46 and above accounted

TABLE 2 | Scales of the constructs.

Construct	Items		Resources
Social support	Information support	When I encounter difficulties, some of the cross-border e-commerce practitioners who interact with me can provide me with some information and help me solve the difficulties.	Liang et al., 2011; Hajli, 2014a
		When I need help, some of the cross-border e-commerce practitioners who interact with me can give me advice.	
		When I face difficulties, some of the cross-border e-commerce practitioners who interact with me can help me find the cause of the problem and provide suggestions.	
	Emotional support	When I faced difficulties, some of the cross-border e-commerce practitioners who interacted with me are on my side with me.	
		When I face difficulties, some of the cross-border e-commerce practitioners who interact with me will comfort and encourage me.	
		When I face difficulties, some of the cross-border e-commerce practitioners who interact with me will expressed interest and concern in my well-being.	
Perceived benefits	Interaction with other cross-border e-commerce practitioners can help me reduce operation costs (personnel, rent, order, and payment processing).		Molla and Heeks, 2007
	Interaction with other cross-border e-commerce practitioners can help me reduce market costs (communications, interaction, customer information management, bypassing intermediaries).		
	Interaction with other cross-border e-commerce practitioners can help me reduce the cost of maintaining up-to-date company information.		
	Interaction with other cross-border e-commerce practitioners can help me reduce the company's transaction costs (purchasing, sales).		
	Interaction with other cross-border e-commerce practitioners can help me extending firm's reach (market).		
	Interaction with other cross-border e-commerce practitioners can help me improve the differentiation of products and services.		
	Interaction with other cross-border e-commerce practitioners can help me improve competitive position.		
	Interaction with other cross-border e-commerce practitioners can help me to promote communication between companies.		
	Interaction with other cross-border e-commerce practitioners can help me increase revenue.		
	Interaction with other cross-border e-commerce practitioners can help me improve the company's image.		
Perceived usefulness	This platform can improve my performance in product search and product sales.		Davis, 1989
	This platform allows me to be more efficient in product search and product sales.		
	This platform can enhance my effectiveness in product search and product sales.		
Seller's willingness to retain	Given the chance, I predict that I would consider continuing to engage in cross-border e-commerce transactions in the future.		Liang et al., 2011; Guo et al., 2018
	It is likely that I will continue to work in cross-border e-commerce in the future.		
	Given the opportunity, I intend to sell products to cross-border consumers.		

for 3.45%; in terms of education level, junior high school and below accounted for 7.39%, high school accounted for 10.84%, technical secondary school accounted for 14.78%, and junior college accounted for 27.09%, bachelor degree accounted for 36.45%, master degree and above accounted for 3.45%.

RESULTS

Measurement Model

The reliability and validity of the variables and the research model of this study were analyzed using SmartPLS 3. PLS, a PLS structural equation modeling tool. This tool has notable advantages, such as minimal demands on sample size, sample distribution and measurement scales. It also excels at the simultaneous analysis in which the conceptual model is quite complex (Hair et al., 2014).

Table 3 shows the Cronbach's α, composite reliability (CR), and average variance extracted (AVE) values of each variable. It can be seen from the table that, the values of Cronbach's α of each variable are greater than the threshold 0.7. This shows that the questions of the scale have high credibility. The values of CR are greater than 0.7, indicating that the scale has good combination reliability. The values of AVE for all constructs are greater than 0.5, indicating that the scale has good convergent validity. Thus, the measurement items appear reliable and converged on the latent constructs.

To test the discriminant validity, we followed the guidelines of Fornell and Larcker (1981) and Chin (1998). As shown in **Table 4**, the correlation coefficient between the variables is less than 0.8, and the square roots of the AVEs are greater than the correlation coefficient between all variables, so the discrimination validity is passed (Fornell and Larcker, 1981). As shown in **Table 5**, the factor loadings of all items on their respective construct are range from 0.7 to 0.95 ($P < 0.0001$); and more strongly on their respective construct than on any other. Thus, the discrimination validity of the constructs in our research model is supported.

TABLE 3 | Reliability and convergent validity.

Construct	Cronbach's α	CR	AVE
Emotional support	0.770	0.866	0.684
Information support	0.722	0.844	0.645
Perceived benefits	0.928	0.940	0.609
Perceived usefulness	0.805	0.884	0.719
Seller's willingness to retain	0.848	0.908	0.767

CR, composite reliability; AVE, average variance extracted.

TABLE 4 | Analysis of discriminative validity.

	ES	IS	PB	PU	SWTR	Age	Education	Gender
ES	**0.827**							
IS	0.575	**0.803**						
PB	0.772	0.599	**0.781**					
PU	0.757	0.502	0.742	**0.848**				
SWTR	0.608	0.588	0.688	0.675	**0.876**			
Age	0.022	0.258	0.108	0.065	0.108	**NA**		
Education	−0.326	0.013	−0.197	−0.311	−0.199	0.369	**NA**	
Gender	−0.078	−0.008	−0.076	−0.047	−0.016	−0.008	0.231	**NA**

The bold font on the diagonal are the square roots of the AVEs and the lower triangle is the Pearson correlation coefficient.

Hypothesis Testing

Figure 2 shows the results of empirical test of the structural model, all hypotheses received strong support. It can be seen from **Figure 2** that information support had a positively influence on sellers' willingness to retain (β = 0.377, $t = 4.735$, $P < 0.001$), and emotional had a positively influence on sellers' willingness

TABLE 5 | Factor loadings (bolded) and cross-loadings.

	ES	IS	PB	PU	SWTR
ES1	**0.818**	0.590	0.580	0.607	0.503
ES2	**0.785**	0.411	0.550	0.601	0.432
ES3	**0.876**	0.436	0.759	0.667	0.560
IS1	0.350	**0.705**	0.400	0.300	0.385
IS2	0.477	**0.875**	0.528	0.443	0.533
IS3	0.543	**0.819**	0.504	0.450	0.485
PB1	0.689	0.376	**0.773**	0.611	0.532
PB2	0.646	0.645	**0.809**	0.612	0.600
PB3	0.619	0.514	**0.863**	0.594	0.669
PB4	0.624	0.619	**0.830**	0.586	0.604
PB5	0.503	0.526	**0.719**	0.508	0.498
PB6	0.564	0.387	**0.737**	0.515	0.375
PB7	0.672	0.374	**0.764**	0.630	0.464
PB8	0.641	0.312	**0.714**	0.596	0.461
PB9	0.579	0.418	**0.817**	0.594	0.520
PB10	0.479	0.452	**0.767**	0.538	0.590
PU1	0.650	0.238	0.520	**0.831**	0.449
PU2	0.640	0.494	0.674	**0.798**	0.546
PU3	0.646	0.500	0.673	**0.910**	0.682
SWTR1	0.620	0.505	0.622	0.676	**0.901**
SWTR2	0.438	0.476	0.559	0.519	**0.851**
SWTR3	0.527	0.561	0.622	0.569	**0.875**

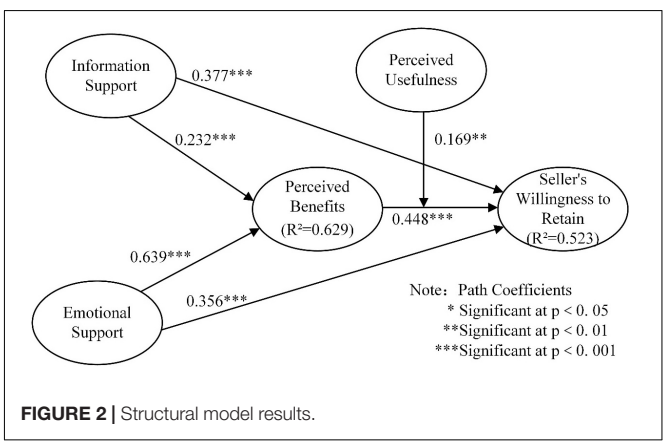


FIGURE 2 | Structural model results.

to retain (β = 0.0.356, t = 3.984, $P < 0.001$), H1a and H1b are supported. Information support had a positive impact on perceived benefits (β = 0.232, t = 3.542, $P < 0.001$), emotional support had a positive impact on perceived benefits (β = 0.639, t = 12.135, $P < 0.001$), H2a and H2b have been verified. Perceived benefits had a positively influence on seller's willingness to retain (β = 0.448, t = 4.144, $P < 0.001$), H3 is supported.

In order to test the mediation effect suggested in H4a and H4b in **Figure 1**, we computed t-statistics and path significance levels for each of the hypothesized relationships using the bootstrapping method. The test results are shown in **Table 6**, and the results confirm that the perceived benefits mediate the influence of information support (β = 0.104, t = 2.439, $P < 0.050$) and emotional support (β = 0.286, t = 3.995, $P < 0.001$) on sellers' willingness to retain. Thus, H4a and H4b are supported.

To test the interaction effects, we formulated the interaction term by multiplying the corresponding indicators of the predictor and moderator constructs. As shown in **Figure 2**, statistically significant beta path coefficient was indicated, perceived usefulness had a positive interacting effect with perceived benefits on sellers' willingness to retain (β = 0.169, t = 2.685, $P < 0.010$). Thus, H5 is supported.

In order to test the moderated mediation effect suggested in H6a and H6b in **Figure 1**, consistent with the guidelines of Preacher et al. (2007), we used the bootstrap procedures (Hayes PROCESS, select Model 14) implemented in Preacher et al.'s application in these analyses. Model 14 includes formal significance tests of the indirect effect between the independent and the dependent variable, as transmitted by the mediating variable, at different values of the moderator (Menges et al., 2011). In other words, we evaluated the statistical significance of the conditional indirect relationship between our measures of social support and seller's willingness to retain, as transmitted by perceived benefits, at the mean value of perceived usefulness and at one standard deviation below and above the mean.

The results of the moderated mediation analyses are shown in **Table 7**. The conditional indirect relationship between information support and emotional support and sellers' willingness to retain (transmitted by perceived benefits) are moderated by perceived usefulness. Specifically, the conditional indirect relationship of information support with seller's willingness to retain (through perceived benefits) does not reach the statistical significance at the mean value (boot indirect effect = 0.011; ns) or at one standard deviation below the mean of perceived usefulness (boot indirect effect = 0.054; ns). However, the conditional indirect relation is positive and statistically significant, at one standard deviation above the mean value of perceived usefulness (boot indirect effect = 0.097; sig), it means that the conditional indirect relation is positive and statistically significant, H6a is supported. Similarly, the conditional indirect relationship of emotional support with seller's willingness to retain (transmitted by perceived benefits) does not reach the statistical significance at the mean value (boot indirect effect = 0.033; ns) or at one standard deviation below the mean of perceived usefulness (boot indirect effect = 0.116; ns). When the value of perceived usefulness is higher than the mean value by one standard deviation (boot indirect effect = 0.200; sig), meaning the conditional indirect relation is positive and statistically significant, H6b is supported.

DISCUSSION

Conclusion

This paper takes cross-border e-commerce sellers as the research object and proposes a structural model that affects cross-border e-commerce sellers' retention willingness based on the S-O-R theory. The findings of our study are as follows: firstly, both information support and emotional support have positive influence on sellers' willingness to retain. This corresponds

TABLE 6 | Summary of the tests of mediating effects.

Dependent variable Seller's willingness to retain	Results			Bootstrap results			
				Point estimate	*p*-value	Boot LL97.5%CI	Boot UL97.5%CI
Independent variable	Mediating variable	*t*-value	Mediation				
Emotional support	Perceived benefits	3.995	Yes	0.286	0.000	0.147	0.429
Information support	Perceived benefits	2.439	Yes	0.104	0.015	0.037	0.204

TABLE 7 | Moderated mediation model test.

Perceived benefits	Emotional support				Information support			
	Boot indirect effect	Boot SE	Boot LL 95%CI	Boot UL 95%CI	Boot indirect effect	Boot SE	Boot LL 95%CI	Boot UL 95%CI
–1 SDMean+1 SD	0.033	0.074	–0.107	0.178	0.011	0.042	–0.074	0.093
	0.116	0.068	–0.017	0.255	0.054	0.042	–0.014	0.151
	0.200	0.081	0.048	0.371	0.097	0.054	0.018	0.236

to previous research showing that the social support had an influence on consumers' behavioral intentions (Zhu et al., 2016; Lin et al., 2018; Wang et al., 2020). Compared with domestic transactions, cross-border transactions not only bring a larger market for sellers, but also greater transaction risks and uncertainties. One of the reasons is the asymmetry of information between buyers and sellers. Through communication and information sharing between sellers, it will increase the understanding of consumers and increase the probability of successful transactions. In addition, mutual encouragement and support among sellers will bring a strong sense of belonging. All in all, both the benefits of a successful transaction and the support from others when faced with difficulties will increase sellers' willingness to continue to engage in cross-border e-commerce.

Secondly, perceived benefits of sellers had a positive influence on sellers' willingness to retain. Specifically, perceived benefits are feelings in the mind of sellers, reflecting in the sellers' awareness of the benefits of engaging in cross-border transactions. Such awareness reflects the seller's attitude toward cross-border transaction activities. When a seller feels that cross-border transactions can bring greater benefits, he is more likely to continue to participate in cross-border transactions. Conversely, sellers are more likely to choose domestic transactions, which are less risky.

Thirdly, perceived benefits act as a mediating variable between the two antecedents (information support, emotional support) and sellers' willingness to retain. A large amount of valuable information can help sellers reduce the uncertainty of transactions, so that the seller's perceived risks will be reduced and the perceived benefits will increase accordingly. The pursuit of profit is fundamental to the businessman. Only when the seller believes that cross-border transactions are profitable can he continue to engage in cross-border e-commerce transactions instead of turning to other industries.

Finally, perceived usefulness had an interacting effect with perceived benefits on seller's retention intention. The conditional indirect relationship between information support and emotional support and sellers' willingness to retain (transmitted by perceived benefits) are moderated by perceived usefulness. Perceived benefit is a kind of seller's cognition, and whether this cognitive benefit can be turned into real benefit requires the help of a third-party platform. When the seller thinks that the third-party platform can't help them translate perceived benefits into real benefits, the seller's perception of benefits is only at the cognitive level and cannot be put into practice. Therefore, the impact of perceived benefits on willingness to retain will be reduced. Only when sellers perceive that the use of third-party platforms can bring positive feedback to cross-border e-commerce business, the perceived benefits brought by social support can be worked. In addition, we believe that perceived usefulness plays a crucial role in influencing the relationship between social support, perceived benefits, and willingness to retain. Only if sellers perceive the higher usefulness of third-party platforms, social support will indirectly affect the retention willingness of cross-border e-commerce sellers through perceived benefits. Because in the case of low perceived usefulness of the platform, sellers may doubt the value of the information they receive or the authenticity of the information, thereby reducing the seller's perceived benefits and further reducing the willingness to retain. Conversely, when the perceived usefulness of the platform is high, sellers will be more convinced of the reliability and value of social support, thereby increasing their perceived benefits and increasing their willingness to retain.

Theoretical Contributions

In the context of cross-border e-commerce, sellers play an equally important role like buyers. Without buyers, sellers will not be able to sell their products. Similarly, without sellers, it will be difficult for buyers to buy their favorite products. Therefore, cross-border e-commerce sellers and buyers are two important roles in cross-border e-commerce transactions. However, most of previous literature about cross-border e-commerce focused on the benefits of buyers and discusses how to improve buyers' willingness to buy. They assume that the buyer is the weaker party in cross-border transactions (Hong, 2015; Kim and Koo, 2016) and only consider the impact of the seller's opportunistic behavior on the buyer. Different from previous research, this paper calls attention to increasing sellers' willingness to retain based on the complex facts of cross-border e-commerce, such as chargeback fraud, e-commerce platforms' preference for buyers' rights, sellers' "difficulty to retention" and so on. Specifically, based on the S-O-R theory, this paper develops a conceptual model to examine the antecedents of sellers' perceived benefits and their influence on sellers' willingness to retain. In addition, considering the important role played by third-party platforms in cross-border e-commerce transactions, this paper also examines the impact of perceived benefits and its antecedents on sellers' willingness to retain under different levels of platform perceived usefulness. In so doing, this paper has the following three main contributions.

Firstly, this study extends the existing literature on the determinants and consequences of perceived benefits from the perspective of the seller. Most of the previous studies focused on the antecedents and consequences of buyers' perceived benefits from the perspective of consumers (Chae et al., 2020; Li et al., 2020; Lin et al., 2020; Sinha and Verma, 2020). Although these studies have increased our understanding of cross-border e-commerce buyers, the success of e-commerce requires not only buyers, but also sellers (Sun, 2010). From a new perspective of cross-border e-commerce sellers, based on this, this paper proposed and tested the influence of different dimensions of social support on the sellers' willingness to retain through their perceived benefits. We have found that information support and emotional support can help increase sellers' perceived benefits, because a large amount of information support can help sellers obtain more valuable information, reduce transaction uncertainty, and increase the probability of transaction success. Different from information support, more emotional support can help sellers face the possible risks of cross-border trading centers with a positive attitude and increase their perceived benefits. To sum up, all of these are important factors affecting sellers' willingness to retain. Therefore, the findings of this paper enrich the related research on the antecedents and consequences of

perceived benefits. For example, existing research focused on the antecedents and consequences that affect perceived benefits of consumers (Chae et al., 2020; Li et al., 2020; Lin et al., 2020; Sinha and Verma, 2020). However, this paper explores the antecedents and consequences of perceived benefits of cross-border e-commerce sellers.

Secondly, the findings of this paper show that information support and emotional support obtained by the sellers will affect the seller's willingness to retain through their perceived benefits. This finding emphasizes the importance of paying attention to the seller's rights and interests, which is in sharp contrast to the mainstream view that only paying attention to the buyer's rights and interests in the existing research. Specifically, the existing research believes that the development of cross-border e-commerce mainly depends on the buyer's willingness to buy continuously, and it is assumed that buyers are more easily influenced by the harmful effects of sellers' opportunistic behavior (Guo et al., 2018). Therefore, most of the existing studies only start from the buyer's perspective, discussing how to protect consumers' rights (Wang et al., 2021) and increase consumers' purchase intentions (Escandon-Barbosa and Rialp-Criado, 2019; Liu et al., 2020; Guitart and Stremersch, 2021). This research shows that, due to the complexity of cross-border e-commerce transactions and the impact of information asymmetry, sellers are also vulnerable to opportunistic behaviors by buyers, such as chargeback fraud. This will seriously damage the benefits of sellers and their willingness to continue to engage in cross-border e-commerce. Therefore, in the situation of cross-border e-commerce, exploring to improve the seller's willingness to retain is just as important as paying attention to the interests of buyers. This paper meets the lack of attention paid to sellers' rights gap by shifting the focus to the seller's perceived benefits and retention willingness. This paper is a natural extension of related research in e-commerce research on improving buyers' purchasing intention (Wei et al., 2018; Lin et al., 2019; Chen and Yang, 2021; Kowalczuk et al., 2021). By exploring how to improve sellers' willingness to retain, in this sense, this paper contributes to the promotion of research on sellers' behavior in the cross-border e-commerce and enriches the existing cross-border e-commerce research.

Finally, this paper considers the perceived usefulness of cross-border e-commerce sellers to the third-party trading platform they rely on and finds that the perceived usefulness of sellers to the platform influences the relationship between sellers' perceived benefits and retention intention. This finding emphasizes the importance of third-party trading platforms to provide rights and interests protection for sellers in cross-border transactions. Specifically, cross-border transactions are mostly conducted on third-party trading platform. The research shows that the perceived usefulness of third-party trading platforms plays an important role in e-commerce transactions (Lee et al., 2019; Abbes et al., 2020; Kwak et al., 2020). However, existing studies mainly focus on the impact of platform perceived usefulness on buyers' continuous use of the website and purchase intention, with few studies explore the impact of perceived usefulness on sellers' willingness to retain. In addition, the excessive protection of consumers' rights and interests by third-party platforms, such as some online platforms that do not allow sellers to leave negative comments on buyers (Sun, 2010), which encourages buyers' opportunistic behavior and increases the risk of damage to sellers' interests. This paper finds that the higher the perceived usefulness of seller to the trading platform, the stronger the sellers believes that the platform protects their interests. It means that the platform they rely on is more likely to translate the perceived benefits into the actual income of the enterprise, thereby enhance the impact of the seller's perceived benefits on the seller's retention intention. In general, these findings emphasize the importance of sellers' social support and perceived benefits, and the necessity of third-party platforms to protect sellers' legitimate interests when designing cross-border online transaction mechanisms. In this sense, through the research on how to protect the interests of sellers and improve sellers' retention intention, this paper not only provides an important supplement to the mainstream view on the necessity of protecting buyers from sellers' opportunistic behavior in the existing literature (Kim and Koo, 2016; Meents and Verhagen, 2018), but also provides a new idea for the future research related to the impact of perceived usefulness.

Practical Contributions

This study provided new insights and solutions for promoting the sustainable development of cross-border e-commerce. Firstly, our findings affirm the crucial role of social support in promoting sellers' willingness to retain. Thus, for cross-border e-commerce sellers themselves, we suggest they must manage their own social relationships in the industry, manage the relationship of competition and cooperation with other sellers, and expand sources of information and emotional support, because social support can help them reduce the risks and costs in cross-border transactions.

Secondly, we found that sellers' perceived usefulness of third-party platforms is also an important factor affecting sellers' willingness to retain. As mentioned earlier, the development of cross-border e-commerce depends not only on buyers, but also on sellers. Therefore, in order to improve sellers' willingness to retain, the third-party trading platforms must understand that sellers and buyers are equally important to the platform. And we advise the third-party trading platform should improve the transaction mechanism to avoid unnecessary losses for the seller's legitimate interests, only in this way can the third-party platform itself and the entire cross-border e-commerce industry develop well.

Finally, to create a mutually beneficial and healthy industry atmosphere, the policy makers of cross-border e-commerce industry associations in various regions should actively encourage sellers to exchange their experience, help each other, exchange what they have and learn from each other, which will help sellers get more benefits from cross-border transactions.

Limitations and Future Research

Finally, this study also has some limitations. First, self-questionnaire survey is used in data collection, and there may

be some methodological bias. Second, the questionnaire survey is conducted through the Internet, although the respondents are given some reward, it is still unable to guarantee that all the answers are true and objective. Finally, the respondents are cross-border e-commerce sellers in Quanzhou, and the research results may not be applicable to other regions. In future research, researchers can consider expanding the source of respondents, and at the same time, we can use online and offline data collection to test the universality and effectiveness of the model.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

HS and XZ contributed to conception and design of the study. JY and HZ organized the database. JY and JG performed the statistical analysis. HS wrote the first draft of the manuscript. XZ wrote sections of the manuscript. All the authors contributed to manuscript revision, read, and approved the submitted version.

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Reviewers' Identity Cues in Online Product Reviews and Consumers' Purchase Intention

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This research performs three experiments to investigate the influence mechanisms of identity cues in product reviews on consumers' purchase intention, and to examine the effects of reference groups. The results indicate that: (1) identity cues in positive reviews have a significant positive impact on consumers' purchase intention, while identity cues in negative reviews have a significant negative impact on consumers' purchase intention; in addition, identity cues play a greater role in amplifying the impact of negative reviews on purchase intention; (2) emotional social support has a mediating role in the relationship between reviewers' identity cues and purchase intention, while informational social support and review credibility only play significant mediating roles under all positive reviews scenario; and (3) identity cues of dissociative groups have a negative impact on purchase intention, whereas identity cues of in-groups or aspirational groups have a positive impact on the purchase intention. These findings complement existing research on online reviews and offer insights into the management and strategic oversight of product reviews for e-commerce platforms and merchants.

Keywords: online product reviews, identity cues, social support, review credibility, purchase intention

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INTRODUCTION

The product reviews are one of the important information sources for consumers to make their purchasing decision (Lee and Shin, 2014). Previous study has shown that the disclosure of review providers' characteristics, such as personal identity, expertise, and reputation, can increase the perceived usefulness of online product reviews (Liu and Park, 2015). Reviewer disclosure of identity-descriptive information used by consumers to supplement or replace product information, is an important factor of consumers' judgment on review helpfulness. Analyzing the secondhand data of Amazon book community, Forman et al. (2008) found that reviewer disclosure of identity information is one of the positive factors in subsequent sales prediction. In practice, enterprises generally assume that online reviewers with ambiguous identities will reduce consumers' trust in the reviews they produce, negatively affecting the persuasive quality of product reviews. However, reviews with ambiguous identity information are not always less persuasive than those with clear identity information. Based on the concept of egocentric anchoring, Naylor et al. (2011) found that when consumers lack relevant information, they will automatically "filling in" ambiguous reviewers' identities information blanks with their own information, which leads to consumers being more persuaded by reviews written by ambiguous reviewers than by those from dissimilar reviewers.

The disclosure of identity information in the above research is all straightforward and specific. Reviewers naturally are reluctant to provide their identity information for the privacy concerns. Except for the direct presentation of identity information, there are also such kind of words or

phrases that does not directly indicate, but from which a reviewer's identity can be indirectly inferred in reviews, making the reviewers' image more vivid. For example, one online shopping review of chocolate says, "sweetness is moderate, my daughter likes to eat." This is not just a simple introduction to product taste. Through the statement "my daughter," this reviewer's identity can be inferred; that is, the reviewer is a mother or father. We define such words as identity cues in product reviews.

Unlike identity information, these cues include subjective inferences regarding identities that are inferred from reviews. In fact, it is more common for reviewers to voluntarily disclose personal information by identity cues when reviewing personal experiences with products or services, which provides a more realistic reading experience for consumers. A total of 65,740 reviews on 36 products, including food, fitness, electronic products, books, accessories, daily necessities, and other categories, were obtained using an online crawler from the JD.COM website (a top online retailer in China). Among them, 15,122 reviews shared identity cues (mainly occupation and family information, such as being a father), accounting for about 23% of the total. The actual data indicate that consumers will express their identity cues (which can be used to infer reviewers' age, occupation, family, and other personal information) in online product reviews.

When making online purchase decisions, consumers will intentionally refer to previous buyers' product reviews. Consumers also tend to seek opinions from different types of people when buying different products. For example, when buying computers, consumers are more likely to consider the purchase choice of similar people (such as with a similar consumption level and similar personality). When buying necklaces, consumers are more likely to refer to the choices of those at a higher level (Li and Li, 2020). Furthermore, for the long-distance communication in virtual space, the recognition of identity cues may become an important basis for consumers' establishment and maintenance of social connections, which makes people feel like communicating with "real" people. Therefore, we infer that the identity cues in reviews have similar influence on consumers' purchase intentions as the reviewer disclosure of identity information.

This is what we will explore in the present research. Specifically, we will examine the effect of identity cues in product reviews on purchase intention, how it happens, and whether they have different influence regarding for different reference groups. It complements existing research on online reviews and offer valuable insights into the management and strategic oversight of product reviews for e-commerce platforms and merchants to increase sales.

RESEARCH HYPOTHESES

Reviewers' Identity Cues and Purchase Intention

Product reviews include both buyers' feedback and suggestions for potential consumers. Consumers share their thoughts and review other interactions in the comment area, thus being considered a form of online social community. Reviews provide consumers with product information. In addition to sharing a review regarding opinions and products or services experiences, reviewers' identity cues convey information about the person who is transmitting the review (Brown et al., 2007). The previous research review shows that the direct disclosure of personal information has a positive impact on consumers' purchase intention. Identity cues are another form of information disclosure, so it is reasonable to speculate that the impact of identity cues on consumers' purchase intention is similar to that of direct disclosure.

In online shopping, all positive reviews and partial negative reviews (both positive and negative comments in the comment area) are the two most common situations. In circumstances in which reviews convey two types of valences (positive vs. negative), people pay more attention to negative ones. Previous literature has shown that negative reviews are more salient than positive reviews (Chen et al., 2011) and have a greater impact on consumers than positive ones (Skowronski and Carlston, 1989; Chevalier and Mayzlin, 2006; Chakravarty et al., 2010; Lee and Koo, 2012). Consumers believe that the expression of negative emotions in reviews is more persuasive (Li et al., 2011), and the description of product conditions is more accurate, which can more effectively help them reduce purchase risks in online shopping (Ahluwalia et al., 2000).

Based on the above, we infer that identity cues in positive reviews will increase the positive effect of reviews on consumers' purchase intention. In contrast, identity cues in negative reviews can amplify the negative impact of the reviews on purchase intention. Further, the promoting effect of identity cues in positive reviews is weaker than that of negative reviews considering the dissymmetry influence of them. So we propose this hypothesis.

> H1: Identity cues amplify the impact of product reviews on consumers' purchase intention. In particular, compared with no identity cue, identity cues in positive reviews increase consumers' purchase intention, whereas identity cues in negative reviews decrease purchase intention.

Mediating Role of Review Credibility

Review credibility is an influential aspect of reviews' influence. Reviewers' identity information, authority, and trustworthiness affect online review credibility (Park and Nicolau, 2015). Identity cues in reviews can result in consumers associating reviewers' image and make the reviews perceived as credible information sources. This study assumes that personal reviews within identity cues help readers gain a more authentic experience of communication, and improve reviews credibility. Product reviews with high credibility are more persuasive (Song and Zhao, 2015) and promote consumers' purchase intention. So we propose this hypothesis.

> H2: Review credibility has a mediating role in the relationship between identity cues and purchase intention.

Mediating Role of Social Support

Social support is usually defined as help offered by someone with whom the recipient has an interpersonal relationship, including family members, friends, colleagues, and significant others (Zimet et al., 1988). These relationships are based on social interactions and can be virtual, implied, imagined, real, momentary, or ongoing (Luo and Chen, 2018). Social support also exists in the online virtual environment (Liang and Wei, 2008), and online channels have become an increasingly important means for people to receive and deliver social support (Qian et al., 2020). Social support has three dimensions, including tangible, informational, and emotional support (Schaefer et al., 1981). Among them, informational support refers to information shared to help solve problems, often in the form of suggestions, recommendations, and other forms of useful advice. Emotional support is the provision of emotional care, such as encouragement. Due to the virtuality of cyberspace, online social support is rarely presented in the form of tangible support, but more informational and emotional support (Coulson, 2005). Social support obtained through the internet can reduce loneliness, depression, stress, and other adverse psychological reactions (Valkenburg and Peter, 2007; Yao et al., 2018), and promote physical and mental health. Social support can relieve life pressure and improve personal happiness. The experience of positive emotions can positively influence consumers' purchase intention (Yan and Wang, 2017).

Identity cue is the premise of shaping the sense of social connection and perceiving social support in the virtual environment. It makes people feel like communicating with "real people" in virtual online shopping, and plays a role in enhancing perception. On the one hand, identity cues help consumers obtain emotional positive support from reviewers by reading reviews. On the other hand, the existence of identity cues shortens the subjective distance between consumers and reviews, so that consumers are more likely to recognize and perceive the reviewers' informational support about the product itself and problem-solving methods. Therefore, we assume that the sense of social support gained by reading such reviews will increase purchase intention. In this study, social support (emotional and informational support) is assumed to play a mediating role between reviewers' identity cues and consumers' purchase intention.

H3: Social support (emotional and informational support) has a mediating role in the relationship between identity cues and purchase intention.

Influence of Reference Groups

Reference group refers to individuals or groups that are considered for reference and comparison when individuals make purchase decisions (Jiang et al., 2009). According to the degree of social identification, reference groups can be divided into in-groups and out-groups, while out-groups include aspirational reference groups and dissociative reference groups (Liu et al., 2017). Previous studies have found that consumers' choice of products and brands is influenced by these reference groups. Consumers prefer products that are endorsed by an aspirational group (Whittler and Spira, 2002). When brand image is consistent with an in-group, consumers' self-brand connection can be enhanced (Escalas and Bettman, 2003). In contrast, consumers will show negative evaluation and decision-making behavior toward products endorsed by dissociative groups (Berger and Heath, 2008).

The influence of reference groups' value evaluation refers to consumers' desire to establish a psychological connection with a positively perceived reference group. Identities form a basis for social classification (Aquino and Reed, 2002). When shopping online, the identity cues can allow consumers to identify the reviewer' social information, so as to enrich the image of reviewers and infer their group. Through this process, consumers can connect emotionally and psychologically with aspirational groups to improve their self-image (Alvarez and Fournier, 2016), establish connections with in-groups to enhance the sense of group attachment (Escalas and Bettman, 2003), and exclude dissociative groups to avert their purchasing choices (Berger and Heath, 2008). The following hypotheses are therefore proposed.

H4a: Reviews containing identity cues from in-groups and aspirational groups positively affect purchase intention.

H4b: Reviews containing identity cues from dissociative groups negatively affect purchase intention.

MATERIALS AND METHODS

Three studies were conducted to test these hypotheses. Study 1 examined the impact of identity cues in reviews on purchase intention, and the mediating roles of social support and review credibility. Study 2 further examined the difference of identity cues' amplification between positive and negative reviews on purchase intention. Study 3 examined the difference in the impact on purchase intention of reviews containing identity cues from in-groups, aspirational groups and dissociative groups.

Methods

The experiments are designed as a shopping task for the participants, in which they will read some product reviews and then indicate their purchase intention. Before the experiments, it is necessary to determine the total number of reviews presented to the participants and the number of negative reviews among them. So we conducted the following two pilots.

Pilot 1

We did a 50-person test that 88% of the participants (48% male, averagely aged 27.7, SD = 6.8, 28% students, 50% staff, 8% farmer and factory-hands) would consult product reviews after browsing product information. By further observing the online shopping process recorded by participants[1], we found that 68% of consumers who shopped on the computer interface were likely to read 30 reviews (comment interface is page turning, and per page has 10 reviews), and consumers who shopped on

[1]Participants were asked to record the process of browsing products on computers and mobile phones, and upload them.

the mobile interface read 21.2 reviews (comment interface is sliding) averagely. Because our experiments are carried out on the computer, so we decided to use 30 reviews in the experiment.

Pilot 2

In order to determine the number of negative reviews, we conducted a 30-min experiment with 50 college students (50% male, averagely aged 19.8, SD = 0.90) in the university. Participants were asked to search the designated five products (notebook, folder, chocolate, umbrella, book bag) on the computer, and are promised that they would be able to buy one of their favorite products among the five products at the expense of this experiment funds. Their search process was recorded by computer screen. Among the total 235 searches, 233 searches opened the product review interface for browsing and page turning (averagely page turning times 3.5, SD = 1.82). We manually coded the participants' review browsing behavior. In 19.3% of the search behavior, when the participants saw 1 negative review, they ended the comment reading, and then exited the product page. 19.7% of the search behavior, when participants see 2 negative reviews, they exit this product page. 30.9% of the search behavior, when participants see 3 negative reviews, they exit the product page. In 12.4% of the search behavior, when participants see 4 or more negative reviews, they exit the product page. 17.6% of the search behavior did not have negative reviews. According to the results, we decide that 3 negative reviews are enough under partial negative reviews scenario.

Materials

To avoid the impact of the particularity of product's target group on the type of identity cues (such as the applicability of clothing products to men or women, or the matching degree of health care products to age) and the preference of different groups for product selection, all the products selected in the experiments are very common and applicable to a wide range of individuals (e.g., electric toothbrush, Chinese wolfberry, portable juicer, albumen powder, water cup, neck massager, backpack, chocolate, toothpaste, coffee)[2]. The products of each experiment are randomly selected from this product collection. As the research object is online shopping reviews, this study selects the real products' reviews on JD.COM as the experimental material source. Using the portable juicer as an example, **Table 1** presents the specific reviews[3].

STUDY 1

Participants and Procedure

Study 1 examined the impact of identity cues in reviews on purchase intention, and the mediating roles of social support and review credibility. 416 Participants (52.2% male, averagely aged 27.6, SD = 9.0, 16.6% student, 55.5% staff, 12.0% factory-hands) in China participated in this experiment from website, using Credamo survey platform. Participants were randomly assigned to one condition in a 2 (scenarios: all positive reviews, partial negative reviews) × 2 (identity cues: with, without) between-subjects design. We selected Chinese wolfberry and water cup as the products by randomly selecting from the public product collection.

Each participant was randomly matched with a situation (e.g., Chinese wolfberry, and identity cues under partial negative reviews scenario). The experiment was carried out with the following three steps. First, participants read the product information (including product picture, name, price, function description), then conducted a purchase intention survey and asked them if they are willing to read the follow-up product reviews. If participant is unwilling to read product reviews, the experiment will be ended. 97% of the participants chose to read product reviews. The 30 product reviews were presented in the form of turning pages (each page has 10 reviews). After reading reviews, participants were asked to answer questions that are not related to the product reviews, such as "do you remember the product's color?" "how many products are presented in the picture?" and so on. Finally, after answering these irrelevant questions, participants were measured on their product purchase intention (7-point Likert scale, 1 = "strongly disagree" and 7 = "strongly agree"), social support and review credibility.

Measures

Regarding the measurement of online social support, this study divided online social support into two categories of emotional and informational social support by comprehensively referring to the relevant studies of Rosenbaum (2006) and Zhu et al. (2016), with corresponding modifications according to the characteristics of online reviews. To measure review credibility, a scale designed by Cheung et al. (2009), including three items, was adopted. All measurements used a 5-level Likert scale, as shown in **Table 2**.

As indicated in **Table 3**, Cronbach's alpha of all variables is greater than 0.8, indicating that the scale exhibited high internal consistency and strong reliability.

To further verify the validity of measurements, we performed the confirmatory factor analysis. The goodness of fit measurement model's index included a ratio of chi-square to freedom of $3.001 < 5$; root mean square of approximate error of $0.062 < 0.08$; goodness of fit index of $0.936 > 0.90$; comparison fitting index of $0.976 > 0.90$; norm fitting index of $0.952 > 0.90$; saving norm fitting index (PNFI) of $0.797 > 0.50$; and saving goodness of fit index (PGFI) of $0.665 > 0.50$. All of the above fitting indexes meet the requirements of the fitting standards, indicating a good fitting effect of the measurement model. Average variance extraction (AVE) and combined reliability (CR) were calculated by measuring the standardized factor loads of each observation index in the model, obtaining an emotional support AVE of 0.732 and CR of 0.897; informational support AVE of 0.623 and CR of 0.829; and review credibility AVE of 0.749 and CR of 0.947. As the average extraction variation of each latent variable is greater than 0.5, and the CR is greater than 0.7, this further indicates that the scale has good internal consistency and good structural validity.

[2] By viewing the product introduction and applicable groups description.

[3] See **Supplementary Appendix** for more reviews.

TABLE 1 | Review presentation.

Review type	Presence of identity cues	Review on the content
Positive reviews	Yes	158013qhi 2021-2-26 09:05 Too convenient. I had two cups of milk (pitaya, and orange). I can take it **on business** in the afternoon.
		Melon 2020-12-30 16:59 I really like it. It's better than expected, and also convenient for **my children** to live in **school**.
Negative reviews	Yes	290333qhi 2021-4-26 01:05 I was going to buy it for use **in school**. Today I tried it, but it was bad! It can't be repaired at all!
		Ha*** love watermelon 2021-2-30 11:20 Don't buy it. If you buy it, you'll be fooled. It's useless. I'm preparing to return it downstairs. **My boss** said that fortunately she didn't buy it.
Positive reviews	No	182kue***2 2021-02-11 12:31 It's very small and cute. Do not take up space. Beautiful, suitable for summer.
		156437vil 2020-12-16 09:54 Very good, and very convenient! Successfully replace the heavy juice machine! It's easy to clean.
Negative reviews	No	l****VE 2021-1-26 09:12 I bought it to make a milkshake. It broke after one use. And it's really too small to use.
		15y22e 2021-01-13 16:34 There is a smell of plastic. I dare not use it. I washed it with hot water several times, but it still smells.

The bold terms mean cue words reflecting identity information.

TABLE 2 | Measurement variables.

Measurement variables	Item
Emotional social support	In the reviews, I felt supported. In the reviews, I felt comforted and encouraged. In the reviews, I could get a sense of belonging.
Informational social support	In the reviews, someone gave me advice on buying products. In the reviews, someone gave me information about buying products. In the reviews, someone helped me find the product problems, and put forward relevant suggestions.
Review credibility	I believe the reviewers are honest. I believe the reviewers are true. I believe the review information is reliable.

Results and Discussion

The results of variance analysis include three findings. First, before reading the reviews, the samples in the four groups show no significant difference in purchase intention [$M_{all\ positive\ reviews\ \ with\ identity\ cues}$ = 5.57, SD = 1.26; $M_{all\ positive\ reviews\ \ without\ \ identity\ cues}$ = 5.63, SD = 1.03; $M_{partial\ negative\ reviews\ \ \ with\ identity\ cues}$ = 5.63, SD = 1.02; $M_{partial\ negative\ reviews\ \ without\ identity\ cues}$ = 5.56, SD = 1.04; F (3, 412) = 0.131, P = 0.951]. Second, when all reviews are positive, purchase intention with identity cues in reviews is higher than those without identity cues [$M_{with\ identity\ cues}$ = 5.94, SD = 1.04; $M_{without\ identity\ cues}$ = 5.66, SD = 0.85; F (1, 206) = 4.457, $P < 0.05$], indicating that the main effect of identity cues on purchase intention is significant. Third, purchase intention with identity cues in reviews is lower than those without identity cues under partial negative reviews scenario [$M_{with\ identity\ cues}$ = 5.33, SD = 1.22; $M_{without\ identity\ cues}$ = 5.65, SD = 1.12; F (1, 206) = 15.421, $P < 0.05$] (see **Figure 1**). Although there are only three negative reviews per product (total reviews' number is 30), this result shows that identity cues seriously amplify the negative impact of negative reviews on purchase intention. Therefore, we inferred that the effect of positive and negative reviews on purchase intention amplified by identity cues is different. This research specifically explores this phenomenon in Study 2.

The results of the bootstrap mediating effect test (sample size 5,000, 95% confidence interval) under all positive reviews scenario demonstrate that a significant direct effect of identity cues on purchase intention (LLCI = 0.0069, ULCI = 0.4579, t = 2.032, $P < 0.05$). The mediating effects (see **Table 4**) of emotional social support (LLCI = 0.0524, ULCI = 0.4475), informational social support (LLCI = 0.0481, ULCI = 0.3432), and review credibility (LLCI = 0.0795, ULCI = 0.4487) are significant. In addition, the regression results show that the identity cues in reviews have a positive impact on emotional social support (β = 0.6250, P = 0.0276), information social support (β = 0.7154, P = 0.0071) and review credibility (β = 0.8269, P = 0.0028), while emotional support (β = 0.3581, $P < 0.001$), informational support (β = 0.2732, $P < 0.001$) and review credibility (β = 0.3699, $P < 0.001$) positively affect purchase intention. In sum, the indirect effect consists of two pathways: identity cues → social support → purchase intention, and identity cues → review credibility → purchase intention.

We test the mediation mechanism under partial negative reviews scenario (sample size 5,000, 95% confidence interval). The results (see **Table 5**) show that the mediating effect of emotional social support (LLCI = −0.4182, ULCI = −0.0197) is significant. The mediating effects of informational social support (LLCI = −0.0509, ULCI = 0.1237) and review credibility (LLCI = −0.1043, ULCI = 0.0610) are not significant. The regression results show that the identity cues in negative reviews (β = −0.6859, P = 0.0348) have a negative impact on emotional social support, while emotional support (β = 0.3737, $P < 0.001$) positively affects purchase intention. The impact of identity cues and informational social support is not significant (β = 0.1057, P = 0.53), but informational support (β = 0.2562, $P < 0.001$)

TABLE 3 | Reliability analysis results.

Variable	Item number	Cronbach's alpha (α)
Emotional social support	3	0.818
Informational social support	3	0.832
Review credibility	3	0.907

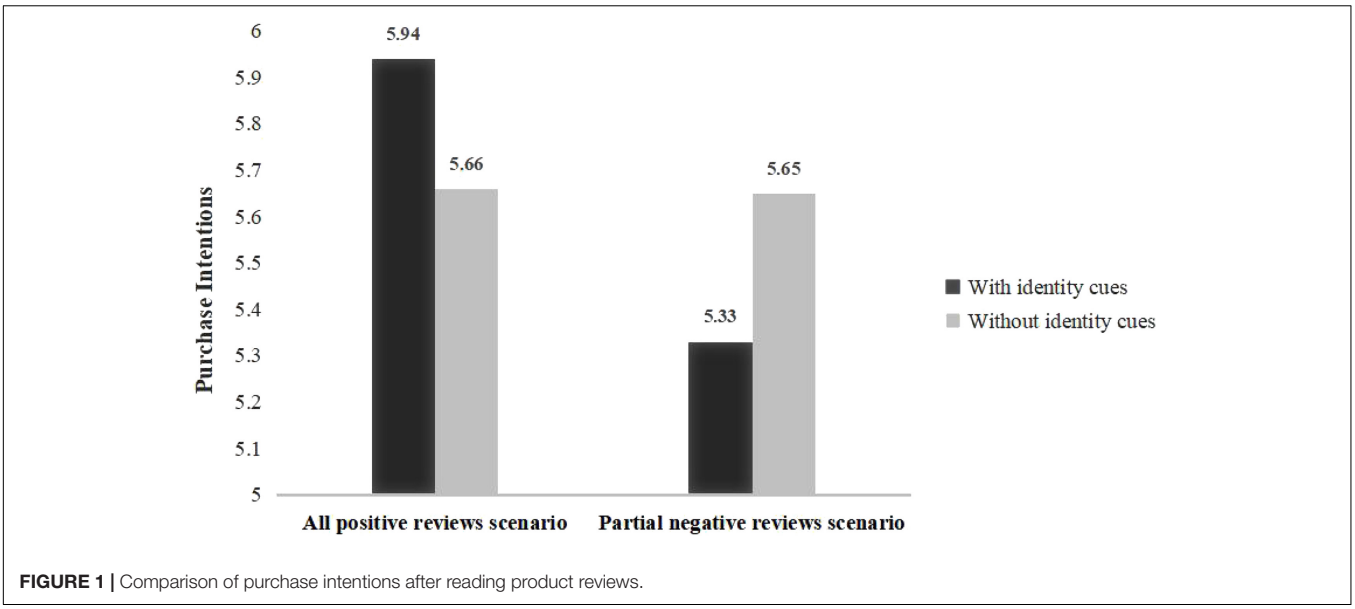


FIGURE 1 | Comparison of purchase intentions after reading product reviews.

TABLE 4 | Mediating effects between identity cues and purchase intention under all positive reviews scenario.

Mediation path	Effect value	LLCI	ULCI	SE
Identity cues → Emotional social support → Purchase intention	0.24	0.0524	0.4475	0.101*
Identity cues → Informational social support → Purchase intention	0.17	0.0481	0.3432	0.074*
Identity cues → Review credibility → Purchase intention	0.22	0.0795	0.4487	0.094*

*$p < 0.05$.

TABLE 5 | Mediating effects between identity cues and purchase intention under partial negative reviews scenario.

Mediation path	Effect value	LLCI	ULCI	SE
Identity cues → Emotional social support → Purchase intention	−0.22	−0.4128	−0.0197	0.102**
Identity cues → Informational social support → Purchase intention	0.03	−0.0509	0.1237	0.044
Identity cues → Review credibility → Purchase intention	−0.02	−0.1043	0.0610	0.041

*$p < 0.05$ and **$p < 0.01$.

positively affects purchase intention. Identity cue (β = 0.9782, $P < 0.001$) has a positive impact on review credibility, but the impact of review credibility and purchase intention is not significant (β = −0.0383, $p = 0.361$).

Compared with no identity cues, consumers' purchase intention is significantly decreased after browsing reviews with identity cues under partial negative reviews scenario. In this process, consumers are attracted by negative reviews. The existence of identity cues makes them feel like "having a real person" make complaints about this product, which lead to the decrease of emotional social support. So emotional social support plays a negative mediating role in the relationship between identity cues and purchase intention. At the same time, negative reviews are more about bad product experience but not how to solve the problems. Therefore, identity cues in negative reviews have no influence on informational social support. Although identity cues increase the credibility of negative reviews, we think this promoting effect may not be enough to affect the purchase intention because consumers are more likely to trust negative reviews no matter with or without identity cues.

The results of Study 1 demonstrate that identity cues significantly amplify the impact of product reviews on consumers' purchase intention, confirming Hypotheses 1. Hypothesis 2 and 3 are verified that social support and review credibility implying a significant mediating effect on this relationship under all positive review scenario. In the situation of partial negative reviews, only emotional social support plays a significant mediating role.

STUDY 2

Participants and Procedure

Study 2 was designed to further examine the difference of identity cues' amplification between positive and negative reviews on purchase intention under partial negative reviews scenario. 292 Participants (52.1% male, averagely aged 29.1, SD = 8.8, 21.6% student, 51.7% staff, 12.3% factory-hands) in China participated

in this experiment from website, using Credamo survey platform. The study examined four experimental groups (identity cues which appeared only in positive reviews vs. appeared only in negative reviews vs. no identity cue vs. both positive and negative reviews have identity cues). We selected juicer and toothpaste as the products, and performed the same procedure as study 1.

Results and Discussion

A variance analysis of purchase intention before and after reading the reviews was conducted. First, before reading the reviews, the samples in the four scenarios have no significant differences [$M_{positive\ reviews\ with\ identity\ cues}$ = 5.55, SD = 0.88; $M_{identity\ cues\ in\ negative\ reviews}$ = 5.60, SD = 0.80; $M_{no\ identity\ cue}$ = 5.51, SD = 0.73; $M_{positive\ and\ negative\ reviews\ with\ identity\ cues}$ = 5.61, SD = 1.03; F (3, 288) = 0.204, P = 0.893] in purchase intention. Second, samples in the group which identity cues only appeared in positive or negative reviews have significant differences in purchase intentions after reading reviews (see **Figure 2**). Compared with no identity cue in product reviews, (1) consumers' purchase intention is higher when identity cues only appeared in positive reviews [$M_{no\ \ identity\ cue}$ = 5.65, SD = 0.89; $M_{identity\ cues\ in\ \ positivereviews}$ = 5.89, SD = 0.79; F (1,144) = 3.025, $P < 0.1$]. (2) Consumers' purchase intention is lower when identity cues only appeared in negative reviews [$M_{noidentity\ cue}$ = 5.65, SD = 0.89; $M_{identity\ cues\ in\ negative\ reviews}$ = 5.19, SD = 1.10; F (1,150) = 7.999, $P < 0.01$]. Third, compared with no identity cues in product reviews, when identity cues appear in both positive and negative reviews, the purchase intention is lower [$M_{noidentity\ cue}$ = 5.65, SD = 0.89; $M_{positive\ \ and\ \ negative\ \ reviews\ with\ identity\ cues}$ = 5.39, SD = 0.96; F (1,152) = 2.998, $P < 0.1$].

The results of Study 2 demonstrate that reviewers' identity cues have a significant impact on consumers' purchase intention. Specifically, identity cues in positive reviews positively influence consumers' purchase intention, and identity cues in negative reviews have a negative impact on purchase intention, confirming Hypotheses 1 again. In addition, the results of purchase intention after reading positive reviews (or negative reviews) with identity cues and reviews without identity cues show that, compared with positive reviews, identity cues play a greater role in amplifying the impact of negative reviews on purchase intention. This conclusion is also proven by the difference of purchase intention between the two groups of "no identity cues in reviews" and "identity cues in both positive and negative reviews," from the side.

STUDY 3

Participants and Procedure

Study 3 examined the influence of reviewers' identity cues from in-groups, aspirational groups, and dissociative groups on consumers' purchase intention. The experiment was conducted using (reference groups: in-groups, aspirational groups, and dissociative groups vs. no identity cue) a single factor design. Neck massage machine, coffee, and neutral perfume are selected as experiment products randomly. All of 30 reviews for each product were positive.

Because the participants are undergraduates, in-group's identity cues include dormitories, roommates, libraries and classrooms. Aspirational group's identity cues include white-collar workers, clubs, mental work occupations, high-income and high-end communities. Dissociative groups cues include elderly people, low-income, poor living environment, etc.[4] 495 college students (43.6% male, averagely aged 20.0, SD = 1.55) in China participated in this experiment. Each participant was randomly matched with a situation (e.g., coffee, reviewers' identity cues from in-groups), and the experimental procedure was the same as that of study 2.

Results and Discussion

Before reading reviews, there is no significant [F (3, 491) = 1.071, P = 0.361] difference in purchase intention between the samples in the four scenarios of reading reviews containing identity cues from in-groups, aspirational groups, dissociative groups and the reviews without identity cues. After reading reviews, the samples with or without reviewers' identity cues in the reviews reveal a significant difference in consumers' purchase intention [F (3, 491) = 10.186, $P < 0.001$]. Specific analysis results show that compared with no identity cue in product reviews, (1) consumers' purchase intention is higher when reviews contained in-group and aspirational group identity cues [$M_{reviews\ containing\ in-group\ identity\ cues}$ = 5.78, SD = 1.07; $M_{reviews\ without\ identity\ cues}$ = 5.44, SD = 0.95; F (1, 242) = 0.6653, $P < 0.05$; $M_{reviews\ containing\ \ aspirational\ group\ identity\ cues}$ = 5.73, SD = 0.99; $M_{reviews\ without\ identity\ cues}$ = 5.44, SD = 0.95; F (1, 243) = 5.133, $P < 0.05$]. (2) Purchase intention is lower when reviews contain identity cues from dissociative groups [$M_{reviews\ containing\ \ dissociative\ group\ identity\ cues}$ = 5.09, SD = 1.37; $M_{reviews\ without\ identity\ cues}$ = 5.44, SD = 0.95; F (1, 238) = 5.403, $P < 0.05$] (see **Figure 3**). The results indicate that reviews containing identity cues from in-groups and aspirational groups have a positive impact on purchase intention, and those containing identity cues from dissociative groups will negatively affect purchase intention. In addition, the ANOVA analysis for in-groups and aspirational groups indicates that identity cues from in-groups and aspirational groups have no significant difference on purchase intention [$M_{reviews\ containing\ in-group\ identity\ cues}$ = 5.78, SD = 1.07; $M_{reviews\ containing\ \ aspirational\ group\ identity\ cues}$ = 5.73, SD = 0.99; F (1, 253) = 0.168, P = 0.682].

Experimental results indicate that the influence of identity cues on consumers' purchase intention was moderated by reference group. Compared with reading reviews without identity cues, the reviews containing identity cues from dissociative groups will negatively influence purchase intention, identity cues

[4]We recruited 20 senior students (50% male, averagely aged 19.7, SD = 0.75) in the university to select reviews on the identity cues of reference groups (in-group, aspirational groups, and dissociative groups). The participants were randomly divided into three groups to classify and select the reviews at the same time. Each participant selected out the reviews with identity cues of different reference groups from 2,000 reviews on this three specified product. Finally, reviews with the same classification constitute the database of study 3. In the experiment, reviews will be randomly extracted from this database according to the previous reference group code.

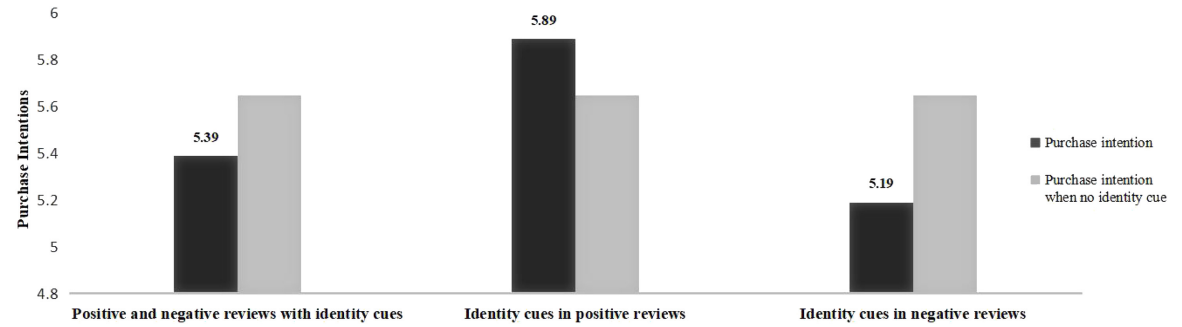


FIGURE 2 | Comparison of purchase intentions after reading product reviews.

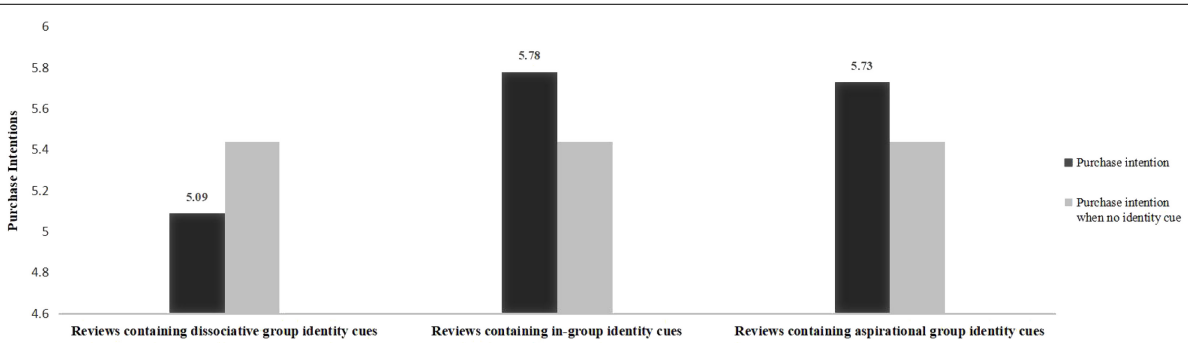


FIGURE 3 | Comparison of purchase intentions after reading product reviews.

from in-groups and aspirational groups have a positive impact on consumers' purchase intention, confirming Hypotheses 4.

DISCUSSION AND CONCLUSION

This study verifies that reviewers' identity cues amplify the impact of product reviews on consumers' purchase intention, and the extent to which voluntary identity cues have a role in positive and negative reviews. The influence of the amplification of negative reviews by identity cues on purchase intention is greater than that of positive reviews, resulting in insignificant, or even negative influence of identity cues on purchase intention under partial negative reviews scenario. This study examines the mediating roles of emotional social support and review credibility. For consumers who have read the product information itself, they hope to confirm their purchase or non-purchase decision through "real person" reviews (credible) and get a sense of support. Reviews containing reviewers' identity cues (vs. those without identity cues) can increase readers' perceptions of social support and review credibility, influencing their purchase intention. This study also verify the influence of reference group. As for identity cues from different reference groups in the reviews, significant differences of influence on consumers' purchase intention were found. In comparison to reviews without identity cues, those containing identity cues from dissociative groups have a negative impact on purchase intention, whereas identity cues from in-groups and aspirational groups have a positive impact on purchase intention.

Research and Managerial Implications

This research makes several theoretical and practical contributions. Theoretically, we increase the identity information disclosure literature of product reviews in online shopping. We expand the form of information disclosure in product reviews and examine how identity cues (voluntary and indirect) in product online reviews affect consumers' purchase intention, rather than direct identity information display. Specifically, previous studies have confirmed that reviewers' direct identity information disclosure will significantly affect review credibility, and has been applied in the marketing. However, few existing studies further distinguish the different forms of identity disclosure. Identity cue is an indirect and vague form of identity information disclosure, and is more common in real online shopping reviews. This study verifies the impact of voluntary implicit identity cues on consumers' purchase intention, and discusses the multiple boundary conditions of the main effect. This study provides an interesting perspective for the field of online reviews. In addition, we also enrich the literature on social support in the Internet and the impact of reference groups on consumers' purchase intention.

The conclusions offer important marketing implications for successfully leveraging the influence of product reviews

on consumers' purchase intentions in online shopping environments. First, e-commerce platforms and registered merchants should actively promote communication between the reviewers, potential consumers, and others. They should take measures to increase reviews and replies to improve the cohesion of the existing virtual community. Even by providing review templates, platforms can guide buyers to express themselves at a deeper level. Second, merchants should improve the ability to manage negative reviews and expediently address negative reviews. To avoid the magnifying effect of identity cues on negative reviews, reviews containing identity cues should be prioritized in cases of limited oversight resources. In addition, merchants can consider using labels to manage product reviews so that consumers are able to navigate to relevant reviews that are produced by in-groups and aspirational groups, and by pass product reviews of dissociative groups through ranking and appropriate placement.

Limitations and Directions for Future Research

This study has some notable limitations suggesting further research. First, although we tried to minimize the demanding effect in the process of experiment, some participants may still have chance to get the purpose of the experiment since we measured the purchase intention twice before and after they read the product reviews. In order to make the results more valid, the experiment design could be improved in the future.

Second, individuals' personality characteristics and cognitive process will influence the effect of reviewers' identity cues on consumers' purchase intention. Compared with secure attachment, people with an insecure attachment receive less social support and are less satisfied with the social support they receive (Liu and Ma, 2019). Individuals with differing regulatory focus could have different attitudes and decisions regarding the reviews of emotional strength (Zhang et al., 2018). In comparison to negative information, promotion-focused consumers have been shown to be more sensitive to positive information (Yu et al., 2016), whereas prevention-focused consumers are more sensitive to negative information (Tian et al., 2014). In addition, whether identity cues in positive reviews have a negative effect on purchase intention under influencing factors such as uniqueness seeking can also be considered.

Third, the impact of the review form can be considered. In general, the longer the review (Mudambi and Schuff, 2010), the more likely it is to include emotional expressions and identity cues. An excessive number (Park et al., 2007) of reviews will lead to the depletion of consumers' psychological energy, and the depth of reviews will affect the perceived usefulness of reviews (Fu and Wang, 2015). How to properly control the length and number of reviews in the experiment is a challenging research.

Last, products can be divided into tangible and intangible products according to tangibility, as well as search products, experience products, and trust products according to consumers' understanding of product characteristics. Compared with search products, the review content of experience products is mostly personal experience, and contains more identity cues. When purchasing experience products online, consumers will conduct more frequent and in-depth search behavior (the number of reading reviews increases), and are more vulnerable to others' opinions (Lim et al., 2015). In the future, the regulatory effect of products can be investigated using different classification methods.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors. Further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the participants was not required to participate in this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

JL and XL designed the study and wrote the protocol. XL was responsible for data collection, under the supervision of JL. XL conducted the statistical analyses and wrote the first draft of the manuscript. Both authors edited subsequent drafts and have approved the final manuscript.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.784173/full#supplementary-material

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Untying the Influence of Advertisements on Consumers Buying Behavior and Brand Loyalty Through Brand Awareness: The Moderating Role of Perceived Quality

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Consumer buying behavior is an important aspect in every marketing strategy to produce maximum output from the market. This study aims to determine how advertisement affects consumer buying behavior and brand loyalty by considering a mediator between brand awareness and the moderating role of perceived quality. For this purpose, this study targets the rising cosmetics industry. This study used the purposive sampling technique to collect data from 300 respondents with the help of an online survey method *via* Google doc. The partial least squares structural equation modeling PLS-SEM was applied to verify the hypotheses relationships. The findings have confirmed that advertisements substantially predicted brand awareness, brand loyalty, and consumer buying behavior. Furthermore, brand awareness partially mediated the association of advertisement with brand loyalty and consumer buying behavior. Also, perceived quality is significantly moderated on the association of brand awareness with brand loyalty and consumer buying behavior. Based on such findings, this study has contributed to the literature and provided new insights into the practical implications alongside the future roadmap of the survey.

Keywords: advertisement, brand awareness, brand loyalty, consumer buying behavior, perceived quality

INTRODUCTION

Fashion Trends is changing rapidly in the international market (Hur and Cassidy, 2019). Consumers are becoming increasingly brand conscious, and they value branded products to express their status symbol (Turunen and Pöyry, 2019). The consumer desires fashion items that are like their culture. Brittian et al. (2013) found that women have a higher desire to use branded products compared to men. Naturally, the human being is always looking for unique and innovative things. Before brand awareness, women used to wear whatever was available to them (Wei and Lu, 2013). Dörnyei (2020) showed that the emotions of having a unique product help the marketers establish market share by providing exceptional brand elements.

Furthermore, Oh et al. (2020) proposed that the word brand is not a new concept in marketing, rather in the modern era, it is a term exclusively used in the fashion industry. Nettelhorst et al. (2020) explained that marketers changed their mentality from what they want to what their

customers want. The brand is an important asset for any business in our local setup because it can change people's buying behavior. It can play a crucial role in enlarging any business (Choi et al., 2017). There is fierce competition among companies to get a large market share. Rehman et al. (2017) demonstrated that it is very difficult for a company to differentiate its product when many competitors have similar attributes to their product. Jung et al. (2020) discussed why people agree to buy clothes at higher prices. The study found that the consumer's thinking gets modified.

Similarly, Fazal-e-Hasan et al. (2018) showed that brands were considered highly valuable and helpful in building a relationship with customers. Scholz and Smith (2019) argued that a company's financial aspect emphasizes the brand's total value and grows successfully to serve the market. In the current globalizing and emerging markets age, business war depends on price and loyalty, attraction, and related matters (Kim et al., 2019). Alalwan (2018) explained that impressive brand awareness attracts the consumer's attention and insists they purchase again and again, which results in an increase in sales for a company.

Brand loyalty, brand image, psychical quality and top-of-the-mind brand, and brand recall are ways to measure brand awareness (Sürücü et al., 2019). In the past, women did use expensive items, but the word branded was not clear. These expensive cosmetic items are included in luxuries, but no brand name was used (Çifci et al., 2016). Historically, men and women were not involved in brands too much because of price constraints and their mindset. Through the opportunity to avoid it an early age, young and working-class individuals now confront it as brand slaves (Han et al., 2015). They are always in search of unique designs and better quality. Chung et al. (2017) explained that the quality of any product is judged by price, which is the main reason for satisfaction and dissatisfaction. Before customers buy any brand, they do a lot of research.

Akrout and Nagy (2018) described quality as a key aspect in achieving a company's wants and business success to grab a place in the global market. Priya et al. (2010) demonstrated that women are the most exclusive consumer for their direct purchase of 80% of total product sold. All types of consumers are highly affected by television advertisements. Nam et al. (2017) discussed how to search for information about brands, one requires internal and external data. Kim and Moon (2020) explained that advertisement and experience are a type of internal information. The data collected through the marketplace, peers, and family is external. The advertisement directly influences consumer awareness, which affects customer loyalty and consumer buying behavior, specifically in the fashion industry.

This study examines the functions of advertisement in building company success and its effect on consumers' buying behavior and brand loyalty. The aim is to know how the brand is perceived, especially the buying behavior of young men and women. To reinstate a product as top-of-the-mind for consumers, organizations from all areas of the world spend huge amounts on advertisement (Zhao and Yan, 2020). Given its effect on the sales and purchasing behavior of the organization, businesses are unable to decide how to make the most of their advertising and advertising communication (Bagnied et al., 2020). Looking into prior studies, most of the researchers have examined the relationship between consumer purchase intention and social media advertisement (Weismueller et al., 2020), personal factors of consumer buying behaviors (Rehman et al., 2017), brand equity, brand association, and brand awareness on customer buying intentions (Shanahan et al., 2019), social media advertising and customer purchase intention (Alalwan, 2018), and brand awareness, image, physical quality, and employee behavior (Sürücü et al., 2019) in the context of Western economies. Few empirical studies have investigated the impact of advertisement, brand awareness, brand loyalty, perceived quality, and consumer buying behavior in the context of developing countries (Rehman et al., 2017; Rahman, 2018; Shareef et al., 2019). Therefore, to fill this research gap this study is conducted to measure the influence of advertisement on consumer buying behavior and brand loyalty and mediation of brand awareness in this relationship. In addition, it also explores the impact of brand awareness on consumer buying behavior and brand loyalty and the moderation of quality on their relationship. Therefore, this study has proposed the following research questions:

RQ1: What is the influence of advertisement on brand awareness, brand loyalty, and consumer buying behavior?

RQ2: Does brand awareness mediate the relationship between advertisement, brand loyalty, and consumer buying behavior?

RQ3: Does quality moderate the relationship between advertisement, brand loyalty, and consumer buying behavior?

LITERATURE REVIEW AND THEORETICAL SUPPORT

Theoretical Support

This study used the theory of reasoned action to support this conceptual model. This theory is proposed by Ajzen (1991). According to this theory, attitude toward behavior is one of the important predictors of behavioral intention (Madden et al., 2016; Li et al., 2020). Attitude is defined as "an internal evaluation of an object such as [a] branded product." Kaur and Hundal (2017) established that consumer attitude and behavior toward the advertisement affects consumer exposure, attention, and reaction to the individual advertisement through a variety of cognitive and affective processes. In consumer buying behavior research, attitude toward the advertisement, attitude toward brand loyalty, and brand awareness are commonly used constructs for predicting the effectiveness of marketing communications on different media (Ayanwale et al., 2005; Alalwan, 2018).

Advertisement

An advertisement is a valuable tool to divert people's attitudes positively and attract people toward a product (Shareef et al., 2019). Advertisement is a mode of communication marketing through electronic or print media that persuade the customer to continue or adopt some action by paid content (Cheah et al., 2019). According to Sofi et al. (2018), it is a

non-personal way of sharing information related to a product produced by a sponsor with the help of media. Similarly, Ayanwale et al. (2005) proposed that advertising is a paid, non-personal way in which concepts, products or services, ideas, and information are publicized through media (verbal, visual, and te't) and identified promoter influence behavior. Zhang X. et al. (2020) described that in a company, to meet communication and marketing objectives, mass media plays a vital role and maximum information is provided to the target market about the product. Rehman et al. (2017) purported that the aim of advertising has popularity worldwide. Most companies are spending large amounts of money on advertisement to attract the customer to their products and services. Lichtenthal et al. (2006) summed up that such advertisement is a picture representing the whole story or in written form that the viewer cannot ignore, and it is beneficial for many advertising media.

Fennis and Stroebe (2020) identified that advertising is a promotional marketing strategy to attract people to a product or service. People are in favor of those brands with which they resonate emotionally. The medium can be chosen by your own choice. Some of the mediums are T.V., social media, magazines, and outdoor advertisements.

1. T.V. is the fastest medium of telecommunication for receiving and transmitting multi-colored images and pictures seen by people throughout the world regularly (Masui et al., 2020).
2. Social Media: Most commonly used by the customers, marketers target their customers by posting links on social sites (Zhou et al., 2021).
3. Magazines: Lee and Rim (2017) found that magazine advertisement has a huge impact on customers' decision-making as the reader is interested in the magazine and forms a relationship with it.
4. Outdoor Advertisement: It includes billboards, posters, broachers, and banners (Weismueller et al., 2020).

Repeated Exposure

Repetition of advertising increases product exposure to increase customer popularity (Cox and Cox, 2017). In previous studies, researchers assessed that the repeating and selection of advertising methods should be in accordance with the product categorization, brand positioning, format, and advertising goals (Green et al., 2008; Montoya and Horton, 2020). Prior studies have identified the various impacts of repeated advertising and supporting advertising appeals on brand purchase intention for distinct product classes (Belanche et al., 2017; Wang et al., 2017). More exposure to advertising repetition develops a favorable customer mindset. As a consequence, it is more effective to repeat announcements of known goods compared to announcements of new ones (Yang, 2018). Repeating ads enables marketers to inform customers about the goods and familiarize them with an advertised brand, which improves the likelihood of the products being purchased indirectly. Repeated exposure to advertising has a beneficial impact on customers' purchasing decisions and helps them remember the brand's goods (Montoya et al., 2017).

Celebrity Endorsement

Advertisers also use celebrity endorsements in their advertisements to sway customer attitudes (Gilal et al., 2020). Celebrities are people who are well-known among the general public for reasons other than their support of certain brands or goods (Schimmelpfennig and Hunt, 2020). Advertisers' employment of celebrity has a great impact on consumers' attitudes about advertising (Osei-Frimpong et al., 2019). Only when a well-known celebrity is supporting an advertisement will people buy the goods, regardless of whether or not they know anything about them. Popular celebrity endorsement affects buying intention more than unknown celebrity endorsement (Yang, 2018). According to the experts who conducted the experiments cited above, celebrity endorsements have a favorable effect on customers' purchasing intentions (Zhang X. et al., 2020).

Sexual Appeals

Marketers' goal was to make the commercial more glamorous and enticing to persuade customers to buy the goods by pushing its picture in their minds (Wirtz et al., 2017). As a result, customers are more likely to buy the goods because of the advertisement's sexual attractions. When words alone are not doing the job, sex appeal is often utilized in commercials to draw customers' intention (Black and Morton, 2015). Sexual appeal in advertising has a greater impact on women's purchasing decisions and self-esteem. Using sexually explicit advertising reduces customers' desire for product knowledge while increasing efficiency by influencing their purchasing decisions (Gong and Shurtliff, 2020). The advertisements featuring attractive models attracted customers of the opposite sex and impacted their purchasing decisions (Ekici et al., 2020). More and more image-based advertisements include sexual themes, and cosmetic product advertising is a good place for testing the impact of these themes on consumer advertising attitudes (Vargas-Bianchi and Mensa, 2020).

Consumer Buying Behavior

Consumer behavior involves making a purchase decision based on available resources, i.e., effort, money, and time (Chiang et al., 2016). Furthermore, Tsao et al. (2019) proposed a holistic view of consumer buying behavior. Consumer behaviors are those activities and processes in which individuals choose and utilize ideas, products, services, and experiences. Li et al. (2021) stated that consumer behavior analysis is another tool to examine the complexity of marketing operations. Meanwhile, Sumi and Kabir (2018) demonstrated that today's consumers are kept in the dark about when and what they desire, all of which results in interactive advertising. Consumer behavior is a mixture of consuming and purchasing products and services (Sundararaj and Rejeesh, 2021). Therefore, Anetoh et al. (2020) explored seven steps of consumer buying decision

which needs recognition: search for information, pre-purchase, evaluation, purchase, consumption, post-consumption evaluation, and divestment.

Brand Loyalty

Brand loyalty describes a client's connection with a brand (Coelho et al., 2018). Brand loyalty is the tendency to be loyal to a brand, and loyalty demonstrates the consumer's buying intention (Atulkar, 2020). Additionally, Zhang X. et al. (2020) stated that a loyal consumer characterizes a basis for a price premium, a barrier to entry, protection against deleterious price accomplishment, and responding to competitors. The basic dimension of brand equity is brand loyalty. Similarly, the objective of brand management is brand loyalty. If the company needs to examine the strength and weaknesses of its consumer loyalty, whether the consumer is promoting its product more compared to competitors can be examined (Coelho et al., 2019). Moreover, it is the attitude of the consumer on brand preferences from prior shopping experiences of a product summed up (Bairrada et al., 2018). Furthermore, attitudinal loyalty is the degree of dispositional guarantees for some preferences linked with the brand whereas behavioral loyalty is the repeated buying intention of a consumer (Diallo et al., 2020).

Brand Awareness

Brand awareness plays a significant role in creating consumer buying decisions by bringing three benefits: learning, consideration, and choice (Foroudi, 2019). Sürücü et al. (2019) designate that brand awareness might be known by thickness and deepness. Thickness expresses how easily a brand name will arise in the customer's mind while purchasing a product. Deepness means how quickly a customer identifies or recalls a brand. Brand awareness will be greater if a product at once possesses both brand thickness and brand deepness; customers will have thought of a definite product when they need to purchase a product (Romaniuk et al., 2017). Furthermore, the brand name is the most vital part. Brand recall and brand recognition are the components of brand awareness. Brand recall means the customer can recall a brand name accurately when they see a product, and brand recognition means the capability of a customer to detect a brand whenever there is a brand sign (Cheung et al., 2019). Brand awareness is a customer's capability to recall or memorize brand information (Romaniuk et al., 2017). Any product or service variation in the buying behavior is due to brand awareness related to any good or service.

Perceived Quality

This quality is possessed by an entity capable of specific or indirect desires (Yang et al., 2019). Among handlers, it is the indication of the assured attributes in a product that create pleasure or frustration (García-Fernández et al., 2018). Konuk (2018) express the quality of a product based on the foundation of performance, strength, consistency, advantages, and technology. It is based on consumers' judgment and experience. Wang et al. (2020) explain the close link between product and service quality, company profitability, and customer gratification. The assessment of the benefits and strength of the client is service product quality. The chief aim of a lot of investigators is perceived quality (Chi et al., 2020). Pooya et al. (2020) determine that perceived quality describes the buyer's individual quality decisions about a brand's whole fineness or advantage. The important element of consumers' preferences and attitudes is the perceived quality, which is a significant issue in defining affective commitment.

HYPOTHESES DEVELOPMENT

Advertisement and Consumer Buying Behavior

Advertisement is a source that convinces people to purchase the product at least once in their lives. Celebrities or personas used in ads may positively influence peoples' buying intention (Shanahan et al., 2019). Consumer buying behavior should be referred to as the choice to buy a product (Sundararaj and Rejeesh, 2021). Advertisers are adapting different techniques to create purchase decisions through effective commercial messages. Additionally, market advertisers use celebrities in commercials to sponsor their product image (Alalwan, 2018). The involvement of celebrities affects the buying intention of the consumer. This study shows that advertisements have a positive effect on consumer buying intention.

Consequently, Vargas-Bianchi and Mensa (2020) remarked that advertisement has a crucial role in the current age as it is an instrument to build society's behavior regarding products. Ads help people to get information and make a purchasing decision. People's psychological, emotional, and behavioral aspects are important while making a purchasing decision (Wirtz et al., 2017). Consumer buying behavior can be predicted by relevant brand awareness in the market (Alalwan, 2018). In conclusion, advertisement has a direct relation with consumer buying behavior. If advertisement increases, it will eventually lead toward an increase in buying intention of the consumer. Therefore, the following hypothesis is proposed:

H1: Advertisement substantially predicts consumer buying behavior.

Advertisement and Brand Loyalty

Nowadays, organizations aim to build strong customer relationships rather than provide only products or services to ensure customer loyalty (Kwon et al., 2020). The process of introducing products to customers, making the product known, and selecting the product agreed upon by customers makes customers loyal to a brand (Balakrishnan et al., 2014). Moreover, Ramaseshan and Stein (2014) explained that the degree of commitment when a customer purchases a product of a special brand is named loyalty. Prior researchers enlightened different factors that affect brand loyalty, but this study reveals five factors: easy usage, quality, brand awareness, brand image, and advertisement (Tidwell et al., 1992; Iglesias et al., 2011; Hoewe and Hatemi, 2016).

Advertisement is one of the essential tools to increase the level of identification. Advertisement is a type of cost. According

to Shanahan et al. (2019) it is not a cost if an advertisement lasts for a long period. Besides, every year millions of companies are generating revenue that results in brand loyalty and in making customers loyal to a special brand or firm. Consequently, Casteran et al. (2019) demonstrated that advertisement has a direct impact on brand loyalty. Thus, it is concluded that if advertisement spending is increased, there will be an increase in customer loyalty level. Moreover, the following hypothesis is assumed:

H2: Advertisement substantially predicts brand loyalty.

Advertisement and Brand Awareness

Rahman (2018) has commented that advertisement means attracting potential customers from the market. In contrast, Kanungo and Dutta (1966) have commented that advertisement means communicating with customers. In this regard, it will be essential to state that advertisement means attracting potential and existing customers from the market by creating awareness of the brand, product, or service (Chang and Chang, 2014). Similarly, several prior research studies have stated that brand awareness can be predicted by the active marketing campaign of the brand, such as advertisement and promotional activities (Wang and Yang, 2010; Lee et al., 2017). From this perspective, this study proposed the hypothesis:

H3: Advertisement substantially predicts brand awareness.

Brand Awareness as a Mediator

According to Foroudi (2019), brand awareness is created to sell the product or service to the customer. Sundararaj and Rejeesh (2021) stated that brand awareness is a mandatory element of the overall knowledge system in the mind of the customer - how likely a customer is to recognize the brand under different situations, how frequently the brand name comes into the customer mind, and how much they like the brand. Moreover, Çifci et al. (2016) explored that customer's ability to remember or recall brand information is called brand awareness. Li et al. (2021) summed up that it supports customers to make the best purchase decision where an exceedingly competitive market exists. Kanungo and Dutta (1966) showed that companies try to better use brand awareness by adapting marketing strategies to create awareness among customers. Cheung et al. (2019) identified that it has two aspects: width and depth. Width represents the outcomes when a customer makes a purchase decision when a brand name comes into their mind, and depth refers to the way customers can recall a brand.

According to Alalwan (2018), when companies establish a new market or product, their core purpose is to focus on creating awareness among customers to get the best results, as brand awareness creates positive brand loyalty. Coelho et al. (2018) explored that brand loyalty is a customer's past psychological attachment and affection to any brand. It can be measured by taking note of repeated purchases from the same brand. Moreover, Atulkar (2020) examined that to maintain and create a brand, companies must realize the increasing importance of unaided and aided awareness in customers and develop strategies related to it. Market communication should be made with different concerns on public relations and advertisement. Advertising options like radio, television, and social media create awareness.

Zhang H. et al. (2020) explained that a brand's purchase intention depends upon searching information, problem arousal, comparing alternatives, post-purchase, and purchase behavior. The purchase intention of the customer consists of how much awareness he/she has about a brand. Marketers popularize products with the help of promotional activities to create awareness. When customers use and become aware of any brand, their personal experience will turn into brand loyalty (Sürücü et al., 2019). That effect in purchasing the product again and again in case of a good experience refers to direct loyalty. Thus, we hypothesize:

H4: Brand awareness substantially mediates between advertisement and consumer buying behavior.

H5: Brand awareness substantially mediates between advertisement and brand loyalty.

Perceived Quality as a Moderator

In this section, this study discusses the modifying aspect of quality on the association of brand awareness and consumer buying behavior. There is an important relationship between brand awareness and perceived quality (García-Fernández et al., 2018). Few researchers have explored the moderating role of perceived quality on the relationship between brand awareness and consumer buying behavior. It is further suggested that when the brand awareness is high, customer quality evaluation is also high (Yang, 2018). In addition, Wang et al. (2020) explored that perceived quality will affect consumer buying intention and that quality will positively influence purchase intention.

Li et al. (2021) assert that a highly well-known brand will have a greater purchase desire than a less well-known brand. Furthermore, prior studies remarked that perceived quality and purchase intention are positively correlated (Sürücü et al., 2019; Yang et al., 2019). Thus, there is a direct relationship between brand awareness and quality. Romaniuk et al. (2017) described that brand awareness has a significant and positive relationship with quality. Therefore, previous studies argued that higher awareness results in higher perceived quality (Sürücü et al., 2019; Chi et al., 2020). Thus, the following hypothesis is predicted:

H6: Perceived quality substantially moderates the relationship between brand awareness and consumer buying behavior.

In this section, perceived quality has a moderating effect on the relationship between brand awareness and brand loyalty. Konuk (2018) explained that perceived quality is related to emotional value. Zhang H. et al. (2020) explained that the road map to brand loyalty is perceived quality. Moreover, Chang and Chang (2014) describes that brand quality is a limitation to measure brand excellence. Furthermore, Yang et al. (2019) elaborated that different people have different perspectives on the same product; when evaluating a product, their attitudes, values, and experiences are considered. Their attitude toward

the product is important to measure quality, and feedback is obtained from people who use the product to assess the brand's quality. Prior studies show that perceived quality will influence brand loyalty and trust and affect purchase behavior (Pooya et al., 2020). Thus, perceived quality and brand loyalty are significantly and positively correlated, and brand loyalty will increase if the perceived quality is increased.

H7: Perceived quality substantially moderates the relationship between brand awareness and brand loyalty.

Theoretical Model

To identify the impact of advertisement on consumer buying behavior and brand loyalty, as well as the mediating role of brand awareness and moderating influence of quality, we have conceptualized this theoretical model. **Figure 1** shows the research model for consumer buying behavior and brand loyalty.

METHODOLOGY

The current study aims to determine how advertisement affects consumer buying behavior and brand loyalty by considering a mediating role of brand awareness and the moderating role of perceived quality. This study is quantitative and descriptive. However, this study followed deductive reasoning because the foundations of the study are linked with existing literature. Similarly, this study followed a cross-sectional design to gather data from respondents. A questionnaire survey technique was implemented to attain the online feedback of customer responses by using the purposive sampling technique.

Data Collection Procedure

The target population of the study was consumers of cosmetics brands. Therefore, this study has developed an online questionnaire by using Google docs. The link of the questionnaire has been spread over different social media platforms to gather responses. From this perspective, it can be stated that the present study has followed the purposive sampling method because it allows researchers to request respondents to spread the link to the questionnaire. When the responses of the questionnaire reached 328, the study compiled data in the SPSS file. However, twenty-eight questionnaires consist of empty responses and are considered invalid. Therefore, this study has employed analysis on the valid responses, which are 300 responses with a participation rate of 91%.

Measures

All the measures were adapted from earlier valid and reliable scales (See **Appendix** here). To measure the items, a 5-point Likert scale (5 demonstrating "strongly agree," 4 signifying "agree," 3 signifying "neutral," 2 signifying "disagree," and 1 demonstrating "strongly disagree") was used.

Advertisement

The brand advertisement was measured using three dimensions, namely repeated exposure, celebrity endorsement, and sex appeal, adapted from the study of Kaur and Hundal (2017). Each item has three measurement constructs. A sample item for repeated exposure is "repetition makes me remember the ad." A sample item for celebrity endorsement is "products endorsed increases the loyalty of the customers." A sample item for sexual appeal "sex appeal make the ad more attractive and attention-seeking."

Brand Awareness

Brand awareness was assessed using a five-item scale adapted from the study of Sasmita and Mohd Suki (2015). This scale was tested and validated by prior researchers (Foroudi, 2019). A sample item is "I know how this particular product/brand looks."

Brand Loyalty

Brand loyalty was measured using a three items scale and adapted from the study of Sürücü et al. (2019). This scale was widely accepted and used by previous researchers in the field of

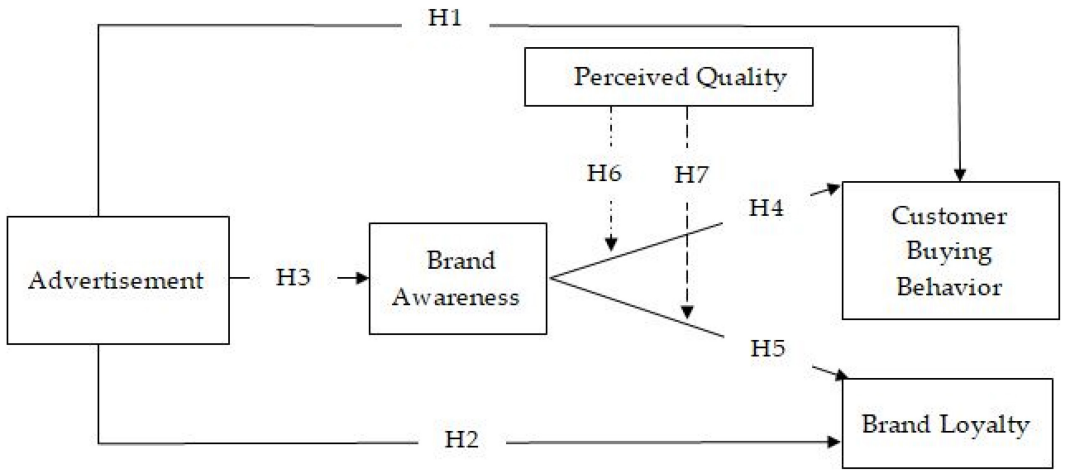


FIGURE 1 | Conceptual model.

TABLE 1 | Demographic information.

Description		Frequency and percentage
Gender	Male	105 (35%)
	Female	195 (65%)
Age	20–25	239 (79.7%)
	26–30	41 (13.7%)
	31–35	14 (4.7%)
	36–40	3 (1%)
	40– Above	3 (1%)
User of brands	MAC	27 (9%)
	Etude	17 (5.7%)
	L'OREAL	58 (19.3%)
	Avon	9 (3%)
	Nivea	23 (7.7%)
	Dove	101 (33.7%)
	Other	65 (21.7%)
Marital status	Single	251 (83.7%)
	Married	49 (16.3%)
Employment status	Employed	58 (19.3%)
	Unemployed	13 (4.3%)
	Students	219 (73%)
	Other	10 (3.3%)
Qualification	Matric	4 (1.3%)
	Intermediate	33 (11%)
	Bachelor	153 (51%)
	Masters	70 (23.3%)
	MS/M.Phil./PhD.	40 (13.3%)

marketing (Zhang S. et al., 2020). A sample item is "this brand would be my first choice."

Consumer Buying Behavior

To measure consumer buying behavior, we adapted four items scale from the study of Sürücü et al. (2019). This scale was tested and verified by existing studies (Li et al., 2021). A sample item is "I mostly buy luxury brand goods for myself."

Perceived Quality

Perceived quality was measured using a five items scale and adapted from the study of Shanahan et al. (2019). A sample item is "this brand is of high quality."

Profile of the Respondents

Table 1 show that most respondents were among the age group of 20–25, with a percentage of 79.3%. A further 13.7%, 4.7%, 1%, and 1% were from the age groups of 20–25, 26–30, 31–35, 36–40, and 40+, respectively. Regarding education, 1.3, 11, 51, 23.3, and 13.3% of respondents belonged to matric, intermediate, bachelors, masters, and MS/M.Phil., respectively. Likewise, 19.3, 4.3, 73, and 3.3% of respondents reported themselves as employed, unemployed, student, and others, respectively. Additionally, 16.3% were married, and 83.7%were unmarried. Similarly, 9% of respondents were users of MAC and 5.7, 19.3, 3, 7.7, 33.7, and 21.7% of respondents were users of Etude, L'OERAL, Avon, and Nivea, Dove, and others, respectively.

TABLE 2 | Measurement model.

Variable and constructs	Loadings	α	CR	AVE	VIF
Advertisement		**0.888**	**0.910**	**0.530**	
ADV1	0.825				4.454
ADV2	0.805				4.790
ADV3	0.793				3.924
ADV4	0.755				2.298
ADV5	0.756				2.652
ADV6	0.743				2.704
ADV7	0.737				3.120
ADV8	0.790				3.380
ADV9	0.724				3.499
Brand awareness		**0.926**	**0.945**	**0.774**	
BRA1	0.863				2.889
BRA2	0.790				2.175
BRA3	0.884				3.217
BRA4	0.934				4.864
BRA5	0.919				4.319
Consumer buying behavior		**0.895**	**0.927**	**0.761**	
CBB1	0.830				2.078
CBB2	0.883				2.668
CBB3	0.893				2.857
CBB4	0.883				2.669
Brand loyalty		**0.902**	**0.939**	**0.837**	
BRL1	0.926				3.183
BRL2	0.917				3.128
BRL3	0.900				2.499
Perceived quality		**0.932**	**0.949**	**0.787**	
PRQ1	0.908				4.111
PRQ2	0.892				3.464
PRQ3	0.861				2.702
PRQ4	0.860				2.515
PRQ5	0.912				4.269

α, Cronbach's alpha; CR, composite reliability; AVE, average variance extracted; VIF, variance inflation factor.

RESULTS

Measurement Model

The measurement model was analyzed through reliability and validity. Construct reliability was assessed using Cronbach's alpha and composite reliability. **Table 2** shows the values of Cronbach's alpha and composite reliability for advertisement (0.888, 0.910), brand awareness (0.926, 0.945), consumer buying behavior (0.895, 0.927), brand loyalty (0.902, 0.939), and perceived quality (0.932, 0.949). According to Hair et al. (2014), the values of Cronbach's alpha should be >0.70 and the values of composite reliability should be >0.80. Therefore, the values of Cronbach's alpha and composite reliability were acceptable and above the threshold value (Sarstedt and Cheah, 2019). Moreover, construct validity was analyzed using average variance extracted AVE. The values of AVE were presented in **Table 2**. The values of AVE for advertisement were (0.530), brand awareness (0.774), consumer buying behavior (0.761), brand loyalty (0.837), and perceived quality (0.787). Thus, all

TABLE 3 | Fornell-Larcker criterion.

	ADV	BRA	BRL	CBB	PRQ
ADV	**0.728**				
BRA	0.486	**0.880**			
BRL	0.538	0.427	**0.915**		
CBB	0.489	0.331	0.413	**0.873**	
PRQ	0.268	0.344	0.360	0.363	**0.887**

items with diagonals are the square root of the AVE. Items under diagonals are the correlations. ADV, advertisement; BRA, brand awareness; CBB, consumer buying behavior; BRL, brand loyalty; PRQ, perceived quality.

TABLE 4 | Heterotrait-Monotrait ratio (HTMT) criterion.

	ADV	BRA	BRL	CBB	PRQ
ADV					
BRA	0.534				
BRL	0.599	0.465			
CBB	0.550	0.359	0.458		
PRQ	0.292	0.369	0.391	0.395	

ADV, advertisement; BA, brand awareness; CBB, consumer buying behavior; BL, brand loyalty; PRQ, perceived quality.

the values of validity fall within the range of the threshold value of 0.50 suggested by Sarstedt et al. (2011). Furthermore, to check the multicollinearity issue, variance inflation test VIF was performed. The values of VIF were also shown in **Table 2**. According to Hair et al. (2014), the values of VIF must be lower than 5. Hence, the entire construct's VIF were under the threshold value and there is no issue of multicollinearity in the data.

Discriminant Validity

Discriminant validity test was assessed using both criteria's Fornell and Larcker (2018a) and Heterotrait-Monotrait HTMT ratio. The findings were shown in **Tables 3**, **4**. As per criteria (Fornell and Larcker, 2018b), the square root of the AVE is called discriminant validity and must be higher than correlations values. Moreover, the values of the HTMT ratio should be less than 0.85. Thus, it is seen that the maximum achieved HTMT value was 0.599, and below the threshold value as suggested by Sarstedt et al. (2011). Thus, all the measurement constructs were acceptable for structural model analysis.

Structural Model

The structural model was analyzed through Smart-PLS software and partial least squares structural equation modeling technique PLS-SEM was performed using the bootstrap method with 5000 sub-samples. This software was widely used and accepted in the field of management and social sciences studies (Vinzi et al., 2010; Hair et al., 2014; Sarstedt et al., 2014a; Cai et al., 2021). The fitness of the structural model was assessed through the standardized root mean square residual SRMR value. According to Sarstedt, Ringle, and Sarstedt et al. (2014b) a good structural model must have <0.080 SRMR value. Therefore, the value of SRMR was 0.070, which indicates an acceptable

TABLE 5 | Strength of model.

	R square	*R* square adjusted
BRA	0.236	0.234
BRL	0.359	0.355
CBB	0.299	0.295

BRA, brand awareness; CBB, consumer buying behavior; BRL, brand loyalty.

and adequate level of structural model fitness. Moreover, the structural model was also assessed using the value of the determination coefficient R^2. As suggested by Chin (2010), the desired R^2 should be greater than 0.1 or zero. **Table 5** and **Figure 2** shows that the structural model explained 23.6% variance in brand awareness, 29.9% in consumer buying behavior, and 35.9% in brand loyalty. Consequently, the values of R^2 were acceptable.

Additionally, for the predictive relevance of the model, the cross-validated redundancy measure (blindfolding) Q^2 test was performed. According to Götz et al. (2010), the value of Q^2 must be >0.1 or zero. **Table 6** explains that the values of Q^2 exceeded 0.1 and the positive predictive significance level of the model.

Testing of Hypothesis

The results of the hypotheses were presented in **Table 7** and **Figure 3**. To test hypothesis H1, findings show that advertisement has a positive and significant impact on consumer buying behavior (β = 0.407, C.R = 9.216, $p < 0.000$). It means that if there is a more attractive advertisement about the brand, it will ultimately increase customers' buying behavior. Therefore, H1 was accepted. Moreover, H2 results illustrate that advertisement has a positive and significant influence on brand loyalty (β = 0.420, C.R = 9.770, $p < 0.000$). Increased advertisement creates more brand loyalty among customers to satisfy their needs. Hence, H2 was supported. Moreover, H3 results indicate that advertisement has a positive and significant impact on brand awareness (β = 0.486, C.R = 11.085, $p < 0.000$). Hence, H3 was accepted. Furthermore, findings show that brand awareness has a positive and significant impact on consumer buying behavior (β = 0.087, C.R = 1.772, $p < 0.047$) and brand loyalty (β = 0.204, C.R = 4.333, $p < 0.000$). Additionally, this study also hypothesized that brand awareness plays a mediating role (indirect effect) on the relationship between advertisement, consumer buying behavior, and brand loyalty. The H4 findings illustrate that brand awareness positively and significantly mediates the relationship between advertisement and consumer buying behavior (β = 0.042, C.R = 1.723, $p < 0.046$). Therefore, H4 was accepted. Moreover, H5 results show that brand awareness positively and significantly mediates the relationship between advertisement and brand loyalty (β = 0.099, C.R = 3.801, $p < 0.000$). Thus, H5 was also supported.

Moderation Analysis

To assess the moderating role of perceived quality in the relationship between brand awareness and consumer buying behavior, **Table 8** results show that perceived quality has a positive influence on consumer buying behavior (β = 0.268, C.R = 6.046,

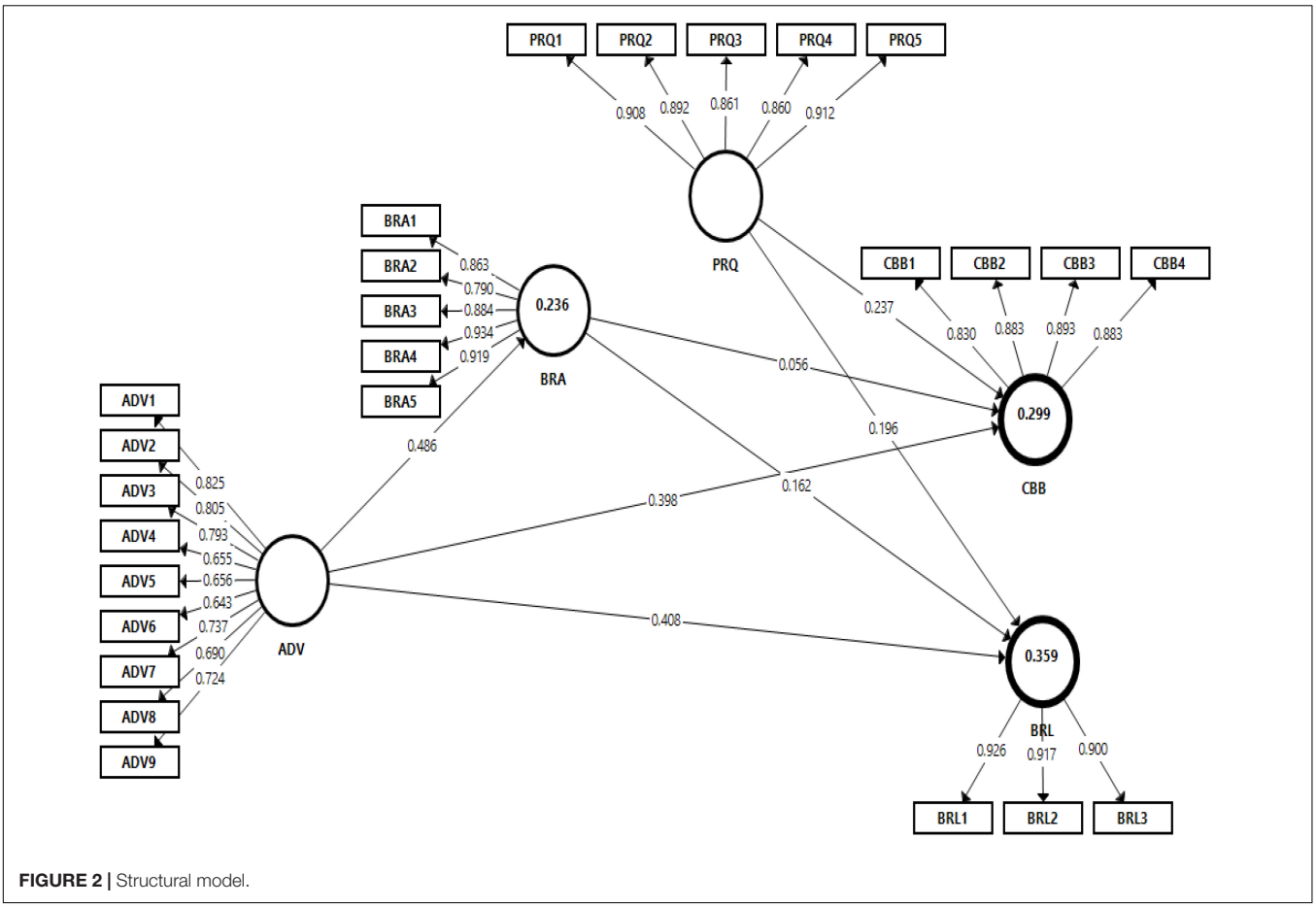


FIGURE 2 | Structural model.

$p < 0.000$) and also positively moderates the relationship between brand awareness and consumer buying behavior (β = 0.151, C.R = 3.386, $p < 0.001$). So, H6 was accepted. Meanwhile, H7 findings indicate that perceived quality has a significant impact on brand loyalty (β = 0.239, C.R = 4.867, $p < 0.000$) and significantly moderates the relationship between brand awareness and brand loyalty (β = 0.107, C.R = 3.298, $p < 0.001$). Thus, H7 was also supported.

DISCUSSION

This study aims to determine how advertisement affects consumer buying behavior and brand loyalty by considering a mediator between brand awareness and the moderating role of perceived quality. The study's findings have revealed that advertising substantially predicted consumer behavior while brand loyalty mediated it, and perceived quality is moderated on their association. This study has confirmed that buying behavior is substantially predicted by advertisement and brand awareness. Similarly, Foroudi (2019) has confirmed that brand awareness is created by significant marketing campaigns of the companies, such as advertisements. It is also confirmed by the present study that advertisements are substantially linked to brand awareness in the cosmetics branding context. Furthermore, this study has also confirmed that brand awareness is significantly linked with consumer buying behavior. In this regard, Romaniuk et al. (2017) has commented that consumers create variation in their buying pattern due to significant brand awareness. However, several prior research studies have demonstrated that brand awareness attracts consumers toward the product or service and increases potential customers (Kim et al., 2019; Shanahan et al., 2019). From this perspective, this study has concluded that brand awareness created by advertisements influences the buying behavior of cosmetics consumers.

Sofi et al. (2018) stated that advertisement substantially predicts consumer buying behavior, while such an association becomes stronger when advertisement actively produced positive outcomes. In the same sense, this study has proved the mediation effect of brand awareness between advertisement and consumer buying behavior. It implies that consumer buying behavior

TABLE 6 | Cross-validated redundancy.

	SSO	SSE	Q^2 (=1-SSE/SSO)
BRA	2430.000	1991.731	0.180
BRL	1458.000	1031.349	0.293
CBB	1944.000	1511.844	0.222

BRA, brand awareness; CBB, consumer buying behavior; BRL, brand loyalty.

TABLE 7 | Structural model path coefficients.

	Relationships	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	*T* statistics (| O/STDEV|)	*P* values
	Direct effects					
H1	ADV → BRA	0.486	0.487	0.044	11.085	**0.000**
H2	ADV → BRL	0.420	0.417	0.043	9.770	**0.000**
H3	ADV → CBB	0.407	0.405	0.044	9.216	**0.000**
-	BRA → BRL	0.204	0.209	0.047	4.333	**0.000**
-	BRA → CBB	0.087	0.088	0.049	1.772	**0.047**
	Indirect effects					
H4	BRA → ADV → CBB	0.042	0.043	0.024	1.723	0.046
H5	BRA → ADV → BRL	0.099	0.102	0.026	3.801	0.000

ADV, advertisement; BRA, brand awareness; CBB, consumer buying behavior; BRL, brand loyalty; PRQ, perceived quality. Items with diagonals are indicated in bold.

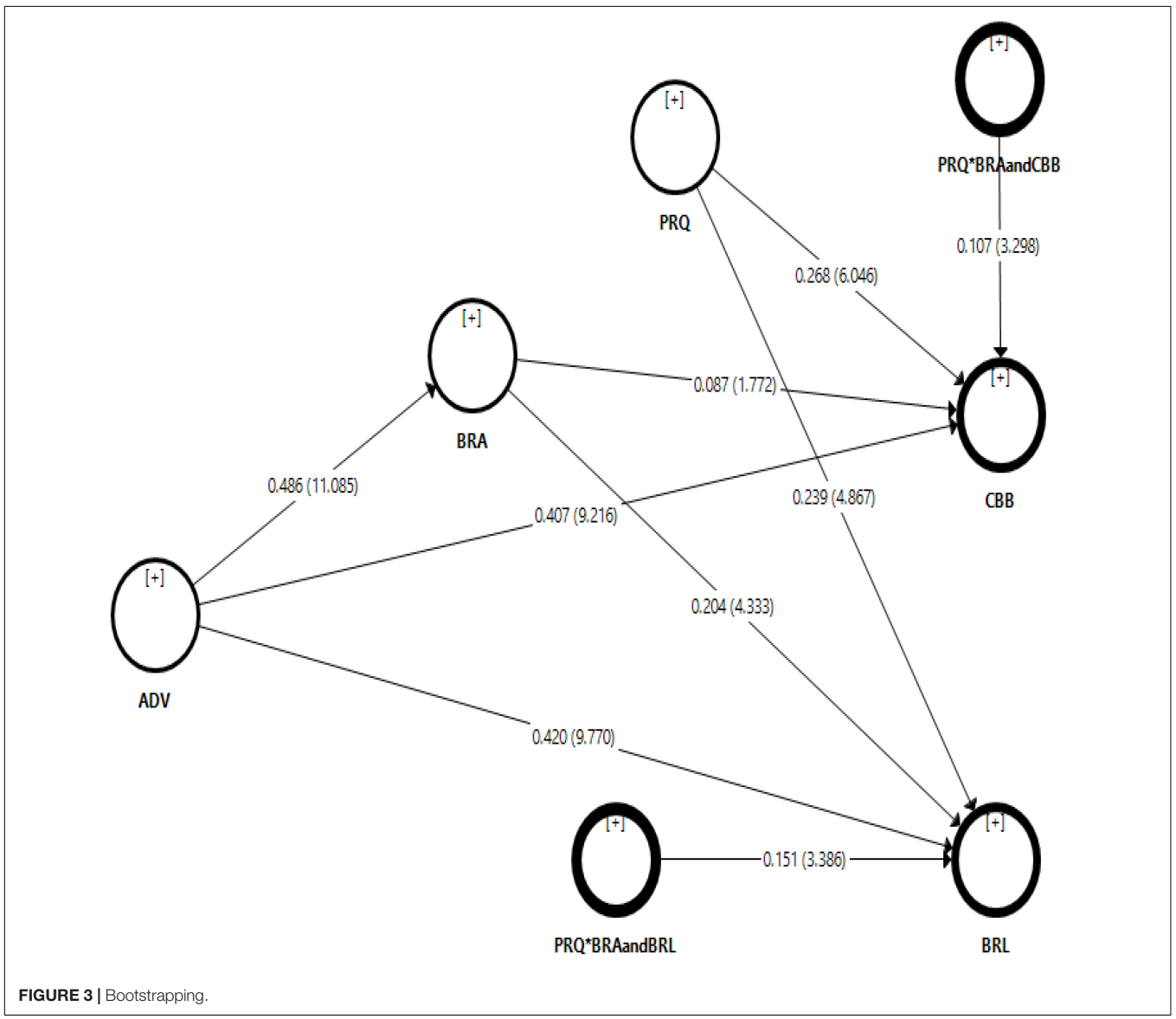


FIGURE 3 | Bootstrapping.

increases with an increase in an advertisement while such an increment becomes robust when brand association plays an active role. In contrast, this study has also confirmed the mediation effect of brand awareness between the association of advertisement and brand loyalty. In this regard, several prior research studies have stated that consumers become more loyal

TABLE 8 | Moderation analysis.

	Moderating effects					
-	PRQ → CBB	0.268	0.269	0.044	6.046	0.000
-	PRQ → BRL	0.239	0.235	0.049	4.867	0.000
H6	PRQ * BRA and CBB	0.151	0.144	0.044	3.386	0.001
H7	PRQ * BRA and BRL	0.107	0.110	0.033	3.298	0.001

BRA, brand awareness; CBB, consumer buying behavior; BRL, brand loyalty; PRQ, perceived quality.

toward the brand when brand awareness substantially works (Sasmita and Mohd Suki, 2015; Sürücü et al., 2019). Therefore, this study has concluded that consumers become more loyal and demonstrate constructive buying behavior because of the advertisement, and such association becomes robust based on brand awareness.

Furthermore, this study has found that perceived quality moderated the relationship between brand awareness, brand loyalty, and consumer buying behavior. In this regard, several prior research studies have stated that perceived quality attracts potential consumers from the market, and consequently, the company's growth increases (Akrout and Nagy, 2018; García-Fernández et al., 2018). However, this study has tested moderation of perceived quality which is statistically supported by the findings. Therefore, it is concluded that brand awareness increases loyalty and buying patterns and that when perceived quality is offered, brand awareness substantially predicts consumer buying behavior and brand loyalty.

Theoretical and Practical Implications

This study has contributed to the literature by evaluating the moderation effect of perceived quality on brand awareness with loyalty and consumer buying behavior. However, Teo et al. (2019) have confirmed that when a brand offers substantial-quality products and increased awareness in the market, it predicts the consumers' higher purchasing behavior. It implies that perceived quality can be taken as a moderator. Therefore, this study has considered perceived quality as a moderator and tested empirically. Furthermore, the cosmetics industry is a growing industry worldwide and lacks research attention (Amberg and Fogarassy, 2019). Therefore, this study has focused on the cosmetics industry to analyze the theoretical framework of the study. In this regard, this study has contributed to the literature of the cosmetics industry by stating that young people have a higher intention to demonstrate higher buying behavior. Therefore, managers have to focus on marketing campaigns focused on the younger population to produce a higher market share.

The findings of the study have confirmed that consumers preferred branded cosmetics products because they are more sensitive about their social standards. These consequences have important suggestions for international selling directors. With the increase in the quantity of cosmetics brands, brand managers and selling directors must evolve and understand the promotional activities from the Pakistani point of view. Outcomes would lead cosmetics product brand managers to develop policies to progress their branding decisions to gain a more competitive edge and stability of business through loyal customers. Consequences suggested that managers focus on brand awareness to increase consumer loyalty and consumer buying behavior by using promotional activities like advertisements. Teenagers are spending more time on social media sites like Facebook, Instagram, and Twitter, consequently, it will also be helpful for managers to create awareness in the mind of customers through social media. Meanwhile, to increase loyalty and consumer buying behavior, cosmetics product managers should pay more attention to building trust between their consumers by meeting or going beyond their expectations.

Limitation and Future Direction

The study's findings are generalizable to the entire cosmetics industry, although this study has some limitations, just like other studies. For instance, one limit was due to the responses of the questions, which depended upon the Likert-type scale. Some people do not give a careful response, and others like to give careful answers. It means the presenter influenced the respondent's reaction. Future research could be carried out in other sectors, including the telecom sector, banking sector, and textile sector, to show the cross-sector investigation of c consumer buying behavior and their outcome on performance, and the data should be collected using a mixed approach. Using this, the result might change. In the future, sample size should also be increased. Different promotional tools can be considered for further study to evaluate consumer behavior concerning perceived quality and brand awareness.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee of the Jiangsu University China. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

RB and MM proposed the research, analyzed the experimental results, and wrote the manuscript. JZ, FM, and AS designed and carried out the revision of this manuscript and extensively edited the manuscript. All authors contributed to the article and approved the submitted version.

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APPENDIX

	Customer buying behavior
CBB1	I can imagine buying (product) from this company.
CBB2	I am very interested in buying (product) from this company.
CBB3	I mostly buy luxury fashion goods for myself.
CBB4	I mostly buy imported fashion goods for myself.
	Advertisement
Repeated exposure	
ADV1	Repetition makes me remember the ad and helps in making better choices.
ADV2	First time repetition forms an attitude about new product and makes it familiar.
ADV3	Two and three repetitions have a psychological impact on mind.
Celebrity endorsement	
ADV4	Products endorsed by celebrities are of superior quality.
ADV5	Celebrity endorsements increase the loyalty of the consumers.
ADV6	Adding a celebrity in the ad increases the purchase intention.
Sexual appeal	
ADV7	Sex appeal makes the ad more attractive and attention seeking.
ADV8	Sex appeals make me willing to pay even more price to buy the product.
ADV9	Sex appeal makes me feel confident after using the advertised product.
	Brand awareness
BRA 1	I am aware this particular product/brand appeared in social media.
BRA 2	I can recognize this particular product/brand in comparison with the other competing product/brand that appeared in social media.
BRA 3	I know what this particular product/brand looks like.
BRA 4	Some characteristics of the particular product/brand that appeared in social media come to my mind quickly.
BRA 5	I can quickly recall the symbol or logo of the particular product/brand that appeared in social media.
	Brand loyalty
BRL1	I consider myself to be loyal to this brand.
BRL2	This brand would be my first choice.
BRL3	I will not buy other brands if this brand is available at the store.
	Perceived quality
PRQ1	This brand is of high quality.
PRQ1	The likely quality of this brand is extremely high.
PRQ1	The likelihood that this brand would be functional is very high
PRQ1	The likelihood this brand is reliable is very high.
PRQ5	This brand must be of very good quality.

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Effect of Product Presentation Videos on Consumers' Purchase Intention: The Role of Perceived Diagnosticity, Mental Imagery, and Product Rating

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The product presentation videos on E-commerce platforms have a significant influence on consumers' purchase decisions, and enterprises have focused on choosing the type of product presentation videos. Based on the resource matching theory, mental imagery theory and cue utilization theory, this study investigated the influence of product presentation videos type (product appearance video vs. product usage video) on consumers' purchase intention and the moderating effect of product rating (low vs. high). Through three pre-experiments and two formal experiments, the results showed that the product usage video has a stronger effect on consumers' purchase intention more than the product appearance video, which is mediated by perceived diagnosticity and mental imagery. In addition, product rating moderated the influence of product presentation videos type on consumers' purchase intention. The product usage video would improve consumers' purchase intention more than the product appearance video when the product rating is high; however, there is no significant difference in the impact of two types of videos on consumers' purchase intention when the product rating is low. This study supplements the research on product presentation videos and provides a reference for online retailers to select effective product presentation videos.

Keywords: electronic commerce, product presentation videos, perceived diagnosticity, mental imagery, product rating, purchase intention

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INTRODUCTION

With the rapid development of E-commerce, people are increasingly choosing to shop online. According to the report released by E-marketer (2021), it is estimated that the global E-commerce sales will reach $4.92 trillion in 2021, and its proportion in the total retail sales will rise to 19.6%. However, unlike buying products in physical stores, consumers cannot directly view the products, nor can they touch, taste, or try the products when shopping online. So, they rely, to a large extent, on the product presentation information provided by online retailers to judge the product quality and product fit (Jiang and Benbasat, 2004). If consumers cannot obtain enough and needed product information, they will refuse to buy the product (De et al., 2013). Therefore, the major E-commerce platforms and online retailers have focused on optimizing product presentation to convey the product information to consumers more effectively. Now, online merchants are increasingly using videos in addition to traditional image text to present products on the home

pages of E-commerce platforms. Videos cannot only provide dynamic visual information and auditory information (Jiang and Benbasat, 2007; Vonkeman et al., 2017) but also, are more vivid than pictures and texts. Furthermore, videos are more suitable for fragmented time to browse. The product experience that videos bring to consumers is closer to the direct product experience in physical stores (Kumar and Tan, 2015). According to a report released by the JD Research Institute (2021) in China, more and more consumers are accustomed to understanding, recognizing, using, and giving feedback on products through product presentation videos. What is more, videos play an important role in consumers' purchase decisions, and high-quality product videos significantly improve the product conversion rates. Although online retailers have devoted an amount of time and money to understanding and creating effective product presentation videos, less is known about which presentation tactics are optimal. Taking canvas shoes as an example, some retailers use videos to mainly present the appearance information of canvas shoes, such as the size, color, and style of canvas shoes, while other retailers use videos to mainly present the user experience information of canvas shoes, such as the overall result of wearing canvas shoes. Which type of product presentation videos improves consumers' purchase intention more effectively? This is an important issue that online retailers face.

However, existing research on product presentation videos is not enough. Prior studies mainly investigated the influence of product presentation videos on product sales (Kumar and Tan, 2015), product attitude (Flavián et al., 2017; Orús et al., 2017), purchase channel selection (Flavián et al., 2017), and purchase intention (Flavián et al., 2017; Orús et al., 2017). In general, previous studies did not classify product presentation videos based on information content. The primary function of product presentation videos is to convey product information to consumers and whether the product information in videos meets consumers' needs will determine the effect of videos (Flavián et al., 2017). Therefore, it is more valuable and necessary to classify videos based on the product information in videos, and then, explore the influence of product presentation videos type on consumers' purchase intention. In addition, prior studies that mainly focused on product factors and consumer factors, proved that product type (Li and Meshkova, 2013; Huang et al., 2017), need for touch (Flavián et al., 2017), information processing motivation (Orús et al., 2017), and impulse buying tendency (Adelaar et al., 2003) are important moderating factors. No scholar has ever investigated the moderating effect of product rating. However, when consumers buy products online, they not only watch the product presentation videos provided by sellers but also view the product rating generated by post-purchase consumers (Utz et al., 2012). The product rating significantly affects the consumers' perception of the truthfulness of product presentation videos. Therefore, investigating the moderating effect of product rating is not only lost to the online shopping situation but also is very valuable in theory.

Based on the above, this study focuses on the following research questions: First, will different types of product presentation videos have different effects on consumers' purchase intention? Second, do perceived diagnosticity and mental imagery mediate the effects? Third, did product rating moderate the effects? To answer the above questions, this study develops a research model to investigate the impact of product presentation videos type on consumers' purchase intention and explore the moderating effect of product rating based on the resource matching theory, mental imagery theory, and cue utilization theory.

LITERATURE REVIEW AND RESEARCH HYPOTHESES

Online Product Presentation Videos

Scholars defined the online product presentation videos mainly based on their function. For example, Flavián et al. (2017) defined online product presentation videos as audiovisual resources that help online consumers to know the product. Similarly, Orús et al. (2017) proposed that online product presentation videos are audiovisual content showing product characteristics and are used to introduce products to consumers.

Existing research on online product presentation videos can be divided into three categories. Studies in the first category mainly compared product presentation videos with text descriptions (Aljukhadar and Senecal, 2017), pictures (Park et al., 2008; Roggeveen et al., 2015; Huang et al., 2017; Wu et al., 2020; Jai et al., 2021), interactive images (Overmars and Poels, 2015), and virtual experience (Jiang and Benbasat, 2007; Kang et al., 2020; Cowan et al., 2021). These studies investigated the difference between the influence of product presentation videos and other presentation formats on the consumers' cognition, emotion, and behavior intention. Among them, most studies compared product presentation videos with product pictures. The majority of scholars have proposed and proved that product presentation videos are more effective than product pictures. For example, Park et al. (2008) found that product presentation videos (compared with product pictures) increase consumers' perceived information amount, which in turn, would have a significantly positive influence on consumers' emotions. Roggeveen et al. (2015) argued that product presentation videos increase involvement with the product experience in a manner presumably similar to that of the actual product experience and improve consumers' mental imagery. However, some scholars pointed out that product videos are not necessarily better than product pictures; using product pictures (rather than product videos) to present search products will improve product evaluation (Huang et al., 2017).

Studies in the second category focused on product presentation videos and have examined the effect of product presentation videos on product sales (Kumar and Tan, 2015), product attitude (Flavián et al., 2017), purchase intention (Orús et al., 2017), and purchase channel selection (Flavián et al., 2017). For example, Orús et al. (2017) divided product presentation videos into factual videos and animated videos based on the expressing form of videos. They proved that factual videos have a stronger influence on product attitude and purchase intention. In addition, Kumar and Tan (2015) explored the effect

of joint product videos on product sales and found that the sales of clothing and accessories significantly increase after online retailers provide product presentation videos.

Studies in the third category combined product presentation videos with other presentation formats, then investigated the influence of different combinations on product preference (Jovic et al., 2012) and consumer trust (Yue et al., 2017). For example, Jovic et al. (2012) combined seven product presentation elements (i.e., text, picture, video, animation, voice, background music, and special effects sound) into nine product presentation formats. The results showed that using both video and image-text presentations have a stronger influence on consumer preference, and the best combination format is text + picture + video + voice + background music. In addition, Yue et al. (2017) named the combination of static pictures + video + 3D image as high media richness presentation. They found that high media richness presentation (vs. picture presentation) significantly reduces perceived risk, which in turn, improved consumer trust.

In general, most of the previous studies have focused on comparing or combining product presentation videos with other presentation formats. There is no research to classify product presentation videos based on information content, and then explore the influence of product presentation videos type on consumers' purchase intention. Furthermore, prior studies mainly focused on product factors and consumer factors proved that product type (Li and Meshkova, 2013; Huang et al., 2017), need for touch (Flavián et al., 2017), information processing motivation (Orús et al., 2017), and impulse buying tendency (Adelaar et al., 2003) are important moderating factors. No scholars have ever investigated the moderating effect of product rating.

Effect of Product Presentation Videos Type on Consumers' Purchase Intention

According to the definition, the primary function of product presentation videos is to convey product information to consumers, and the information in videos determines the effects of videos largely (Flavián et al., 2017). Therefore, this research focuses on the product information in videos. Based on the main product information provided by videos in current marketing practice and referring to the classification of product review information (Huang et al., 2014; Li et al., 2017), this study divides the product presentation videos into product appearance video and product usage video. The product appearance video mainly contains the product appearance attribute information, such as color, shape, size, and style, while the product usage videos mainly contain the product use experience information, such as the demonstration of product function and the results of product use.

To reveal the influence of product presentation videos on consumers' purchase intention more deeply, this study considers the videos for both search products and experience products. Whether consumers buy search products or experience products online, they tend to make decisions through a two-stage process because they cannot view all the products. In the first stage, that is, the early stage of decision-making process, consumers need to select products that will be further viewed from a large number of products on the list page. In the second stage, that is, the later stage of decision-making process, consumers will deeply evaluate the products that they chose before (Haübl and Trifts, 2000). At the later stage of decision-making process (evaluation stage), consumers tend to use complex and more cognitively effortful decision rules (Weathers et al., 2015). In this stage, consumers want to obtain information about product use experience (Weathers et al., 2015; Li et al., 2017), such as product use method/step, product use process, and product use result. In addition, according to resource matching theory, the balance and match between cognitive resource used to process information and cognitive resource required to process information significantly improve individual judgment and evaluation (Anand and Sternthal, 1989). Information processing is the most efficient and effective when the amount of cognitive resource available matches the amount of cognitive resource required (Mantel and Kellaris, 2003). On the contrary, if the amount of cognitive resource required is more or less than the amount of cognitive resource available, the decision performance of individuals will be poor (Anand and Sternthal, 1989). When the information supplied matches the information demanded, the task performance of individuals will be significantly improved (Anand and Sternthal, 1989). Smith et al. (2011) also proposed that the effectiveness of product presentation is determined by the fit between the information provided and the information sought by consumers. If the information provided by online merchants meets the consumers' need, the consumers' perception of the usefulness of product presentation will be improved, which will help consumers evaluate the product.

In the context of this research, whether consumers purchase search products or experience products on the E-commerce platforms, they will evaluate the product deeply when they enter the product home page through "click a product" on the list. At this time, consumers are in the later stage of the decision-making process and tend to use complex and more cognitively effortful decision rules. They want to obtain product use experience information to make evaluations and purchase decisions (Weathers et al., 2015; Li et al., 2017). Product usage video (vs. product appearance video) provides consumers with more complex product experience information, which requires consumers to make more cognitive efforts. The cognitive resource required to process video information matches the cognitive resource that consumers provide, thus enhancing the persuasiveness of video (Anand and Sternthal, 1989; Meyerslevy and Peracchio, 1995; Peracchio and Meyerslevy, 1997; Hahn and Hwang, 1999). In addition, the product usage video conveys product experience information to consumers, which will satisfy the consumers' information need and stimulate consumers to imagine the use experience (e.g., use process and use effect, etc.), so the consumers' purchase intention will be improved. Therefore, the following hypothesis is proposed:

> **Hypothesis 1:** Different types of product presentation videos will have different influences on consumers' purchase intention. The product usage video improves consumers' purchase intention more than the product appearance video.

Mediating Effect of Perceived Diagnosticity

Perceived diagnosticity refers to the degree to which consumers think that the shopping experience is helpful to evaluate products and make reasonable decisions (Kempf and Smith, 1998). Kempf and Smith (1998) proved that perceived diagnosticity is helpful for consumers to cognitively evaluate product attributes. Jiang and Benbasat (2007) defined perceived diagnosticity as the degree to which consumers think that a website helps them understand products. They found that product presentation videos and virtual product experience improve consumers' perceived diagnosticity, which in turn, has a significantly positive influence on the perceived website usefulness, resulting in a higher intention to return. If consumers feel that they know better about a product, they are more likely to buy it (Berger et al., 1994; Kempf, 1999). In addition, Verhagen et al. (2016) found the positive influence of perceived diagnosticity on consumers' purchase intention in the context of online product presentation.

According to Weathers et al. (2015) and Li et al. (2017), when consumers are in the later stage of decision-making process, they want to get information about product experience, such as product use process, product use method, and product use result. In the context of this research, when consumers enter the product home page through "click a product" on the list, they are in the later stage of decision-making process. Product experience information is exactly what they need, which can help them better understand and be familiar with products. Therefore, the information in product usage video (vs. product appearance video) meets the consumers' need, which can help them understand products, thus improving consumers' perceived diagnosticity. With the perceived diagnosticity increasing, consumers are more likely to buy the products (Verhagen et al., 2016). Thus, the following hypothesis is made:

Hypothesis 2: Perceived diagnosticity mediates the effect of product presentation videos type on consumers' purchase intention.

Mediating Effect of Mental Imagery

As a kind of mental activity that visualizes a concept or relationship (Lutz and Lutz, 1978), mental imagery reflects the process by which individuals represent sensory or perceptual experience, such as thoughts, emotions, and memories in individuals' memory processing (MacInnis and Price, 1987). Mental imagery, as an important theory in consumer psychology, has received extensive attention in consumer behavior studies. In the field of marketing and consumer behavior, the research-related mental imagery theory includes mental imagery and information processing (Edell and Staelin, 1983; MacInnis and Price, 1987), mental imagery and advertising effectiveness (Babin and Burns, 1997; Fennis et al., 2012), mental imagery, and online product presentation (Kim and Lennon, 2008; Yoo and Kim, 2014). According to mental imagery theory, individuals mentally represent stimuli and actions based on what they have experienced in the past, combined with perceptual information available at that moment (Lee and Gretzel, 2012). Consumers can bring the sensory information in memory to their minds through mental imagery awakened by external stimuli, which are being considered as a quasi-sensory experience (Rodríguez-Ardura and Martínez-López, 2014). In addition, consumers can imagine the situations that they have not experienced before and will happen in the future through mental imagery (Schacter et al., 2008), that is, simulating the user experience psychologically. For example, consumers can simulate the situations in resorts (Walters et al., 2007), or imagine the comfort of wearing new sneakers through mental imagery (White et al., 1977). Existing empirical studies have proved that text and visual information in broadcast advertisements, print advertisements, travel advertisements, and online product pictures evoke consumers' mental imagery, which has an impact on consumers' evaluation (such as liking) and consumers' behavior (such as purchase intention) (Bone and Allen, 1992; Babin and Burns, 1997; Walters et al., 2007; Yoo and Kim, 2014; Maier and Dost, 2018). For instance, Burns et al. (1993) argued that the specific words in advertisements will evoke consumers' mental imagery, and then improving consumers' purchase intention. Moreover, Yoo and Kim (2014) found that product pictures with a relevant consumption background are more effective in evoking mental imagery, which in turn, will increase consumers' purchase intention by eliciting a positive emotion.

In the context of this research, the content of product usage video is mainly the demonstration of product function and the results of product use. Compared with product appearance video, the product usage video enables consumers to mentally imagine and simulate the product experience, thus evoking consumers' mental imagery so that they will have a mental simulation experience similar to the actual product experience through mental imagery, resulting in higher purchase intention (Yoo and Kim, 2014; Maier and Dost, 2018). Therefore, the following hypothesis is proposed:

Hypothesis 3: Mental imagery mediates the effect of product presentation videos' type on consumers' purchase intention.

Moderating Effect of Product Rating

Product rating, also called review rating or star rating, is an important form of electronic word of mouth. It is an overall evaluation of products or services in the form of star rating scored by post-purchase consumers (Guo and Zhou, 2016). Most online consumers will search information before making purchase decisions. They not only search for product information provided by sellers but also search for review information generated by post-purchase consumers (Utz et al., 2012). Judging the credibility of sellers' information through electronic word of mouth (such as product star rating) has become the dominant strategy for most consumers (Metzger et al., 2010). Studies have shown that positive electronic word of mouth increases product sales, and negative electronic word of mouth decreases product sales (Chevalier and Mayzlin, 2006; Dellarocas et al., 2007). In addition, electronic word of mouth has a significant impact on consumers' perceived trust in sellers. The more electronic word of mouth is positive, the higher consumers' perceived trust in sellers (Utz et al., 2012).

According to the clue utilization theory, the stability and credibility of product star rating make it more diagnostic.

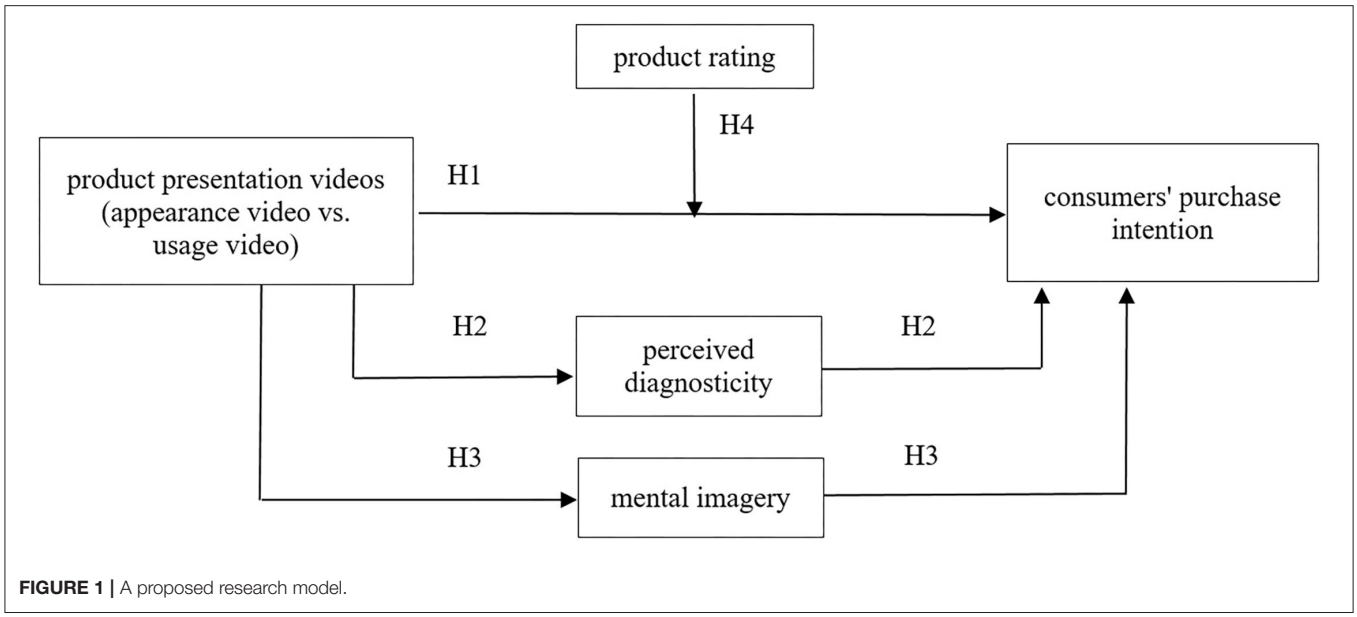


FIGURE 1 | A proposed research model.

Sellers need to invest a lot of resource to manipulate it, so it belongs to high-scope clues (Purohit and Srivastava, 2001). But the product presentation video is provided by sellers, which is easier to be manipulated than product star rating. In addition, sellers do not need to invest a lot of resource to manipulate product presentation video, so it belongs to low-scope clues. The influence of low-scope clues will be enhanced or weakened by high-scope clues (Purohit and Srivastava, 2001; Miyazaki et al., 2005; Akdeniz et al., 2013). When faced with multiple clues, individuals rely more on high-scope clues to make decisions, and the influence of other clues will be weakened (Hu et al., 2010). Moreover, when faced with consumer review information, the influence of other low-scope clues on consumers will become insignificant (Utz et al., 2012). In the context of this research, when the product rating is high, consumers will trust in sellers, and they think that the product information in videos is true. In addition, the information in product usage video meets the consumers' need and evokes consumers' mental imagery, so the product usage video will improve consumers' purchase intention more than the appearance video. But when the product rating is low, consumers will not trust in sellers and think that the product information in videos is fictitious. Therefore, whether sellers provide the product appearance video or the product usage video for consumers, the purchase intention will be low, and there is no significant difference. Thus, the following hypothesis is formulated:

> **Hypothesis 4:** Product rating moderates the effect of product presentation videos' type on consumers' purchase intention. When the product rating is high, the product usage video improves consumers' purchase intention more than the product appearance video, but when the product rating is low, there is no significant difference between the influence of two types of videos on consumers' purchase intention.

The theoretical model is shown in **Figure 1**.

STUDY 1

Study 1 aimed to provide support for H1 that product usage video improves consumers' purchase intention more than product appearance video and for H2, that perceived diagnosticity mediates the effect of product presentation videos' type on consumers' purchase intention, and also for H3, that mental imagery mediates the effect of product presentation videos' type on consumers' purchase intention.

Pre-experiment 1

To ensure that the products in experiments belong to the search products or the experience products considered by participants, it was necessary to select appropriate products through pre-experiment. Therefore, the purpose of Pre-experiment 1 was to select suitable search products and experience products for Pre-experiment 2, Experiment 1, and Experiment 2. According to the procedure of selecting experimental stimuli in previous studies, we invited three doctoral students majoring in marketing to discuss the definition of product types based on their own online shopping experience. Finally, 6 products (expected to be 3 search products and 3 experience products) were selected as candidate products. These 6 products were: power strips, pillows, backpacks, electric kettles, smart bracelets, and canvas shoes. A total of 81 participants were recruited for Pre-experiment 1 through the "Wenjuanxing" platform, which is a professional questionnaire advisory body in China. At first, the participants were told that the purpose of this experiment was to classify products. Then, the participants were asked to fill in demographic information. Finally, the participants were asked to score 6 products respectively (1 = search products, 7 = experience products) based on the definitions of search products and experience products. The lower the score was, the more it indicated that the participant considered this product to be search product. The higher the score was, the more it

indicated that the participant considered this product to be an experience product.

The questionnaires of 81 participants (34 males and 47 females) were all valid. The single-samples *t*-test showed that the average scores of 6 products were consistent with expectation. Specifically, the average scores of canvas shoes ($M = 5.48$, $t = 19.49$, $p < 0.001$), backpacks ($M = 5.44$, $t = 20.27$, $p < 0.001$), and pillows ($M = 5.29$, $t = 22.23$, $p < 0.001$) were higher than the Median 4, indicating that the participants considered them to be experience products. In addition, the average scores of electric kettles ($M = 3.22$, $t = 19.71$, $p < 0.001$), power strips ($M = 3.34$, $t = 21.48$, $p < 0.001$), and smart bracelets ($M = 3.78$, $t = 24.83$, $p < 0.001$) were lower than the Median 4, indicating that the participants considered them to be search products. Among them, the average score of canvas shoes ($M = 5.48$, $t = 19.49$, $p < 0.001$) was higher than that of the other two experience products, and the average score of electric kettles ($M = 3.22$, $t = 19.71$, $p < 0.001$) was lower than that of the other two search products. Therefore, canvas shoes were selected as the experience products, and electric kettles were selected as the search products, which were used for Pre-experiment 2 and formal experiments.

Pre-experiment 2

The purpose of Pre-experiment 2 was the manipulation check of product presentation videos' type, and to determine whether the two types of product presentation videos could be used for Experiment 1 and Experiment 2. According to the experience products and search products selected through Pre-experiment 1, we filmed the appearance video of electric kettles, the usage video of electric kettles, the appearance video of canvas shoes, and the usage video of canvas shoes. The duration of each video was 20 s. Specifically, the appearance video of electric kettles mainly contained the appearance attribute information, such as color, size, and design. The usage video of electric kettles mainly presented the steps and procedure of using electric kettles to boil water by a model. The appearance video of canvas shoes mainly contained the appearance attribute information, such as color, size, and style. The usage video of canvas shoes mainly showed the results of wearing canvas shoes by models. A total of 95 participants were recruited for Pre-experiment 2 through the "Wenjuanxing" platform. At first, the participants were told that the purpose of this experiment was to classify product presentation videos. Then, the participants were asked to fill in demographic information and the item about whether they had watched product videos online before. Finally, the participants were asked to score 4 videos respectively (1 = product appearance video, 7 = product usage video) based on the definitions of appearance video and usage video. The lower the score was, the more it indicated that the participant considered this video to belong to the product appearance video. The higher the score was, the more it indicated that the participant considered this video to belong to the product usage video.

The questionnaires of 95 participants (41 males and 54 females) were all valid. The manipulation of product presentation videos' type was examined by independent-samples *t*-test. The result revealed that the average score of electric kettles usage video was higher than that of electric kettles' appearance video ($M_{appearancevideo} = 2.57$, $M_{usagevideo} = 5.42$, $t = -22.16$, $p < 0.001$). In addition, the average score of canvas shoes usage video was higher than that of canvas shoes' appearance video ($M_{appearancevideo} = 2.77$, $M_{usagevideo} = 5.45$, $t = -20.52$, $p < 0.001$). The manipulation of product presentation videos' type was supported. Therefore, the electric kettles' appearance video and electric kettles' usage video were used for Experiment 1. The canvas shoes' appearance video and canvas shoes' usage video were used for Experiment 2.

The Design of Experiment 1

This study used an experimental method. Single factor (videos' type: appearance video vs. usage video) between-group designs were implemented. Two videos that passed the manipulation check through Pre-experiment 2 were adopted, namely, the electric kettles' appearance video and the electric kettles' usage video. The two videos were the same in other aspects (e.g., duration, music, image quality, background, etc.) except information content. In addition, brand information was removed to eliminate the influence of product brand. Perceived diagnosticity was measured with three items based on the research of Kempf and Smith (1998), Jiang and Benbasat (2004, 2007), and modified to better reflect the context of this research, specifically "This video is helpful for me to evaluate the electric kettle," "This video is helpful in familiarizing myself with the electric kettle," "This video is helpful for me to understand the performance of the electric kettle." Mental imagery was measured with two items based on the research of Maier and Dost (2018), Yoo and Kim (2014), and modified to better reflect the context of this research, specifically "This video helps me imagine the use process of electric kettle in my mind," "This video helps me visualize a trial of electric kettle." Purchase intention was measured with three items based on the research of Fu et al. (2018) and Wu et al. (2020), specifically "I expect to purchase the electric kettle," "I would consider buying the electric kettle," "The probability that I would buy the electric kettle is high." All variables were measured using Likert 7-level scales, where 1 means "strongly disagree" and 7 means "strongly agree."

The Procedure of Experiment 1

The "Wenjuanxing" platform was used to design experimental questionnaires and generate links. The participants were also recruited through the "Wenjuanxing" platform. The experimental questionnaire consisted of four parts. The first part told the participants that this experiment was about investigating consumers' behavior. The second part described the experimental scenario, specifically "Imagine that you are shopping on an E-commerce platform like Tmall.com. After searching for "electric kettles," you enter the category overview page. Then, you click an electric kettle on the category overview page to enter the product home page. You see the following product video on the product home page. Please complete the items after watching the video." The third part was the measurement scales of related variables. In addition, the measurement item about product presentation video types was set to test the manipulation effectiveness of this experiment. The fourth part contained

TABLE 1 | Demographic information of participants in Experiment 1.

Variables	Distribution	Numbers	%
Gender	Male	63	43.8
	Fmale	81	56.2
Age	Under 20	50	34.7
	20–25 years old	55	38.2
	26–30 years old	29	20.1
	30 years and older	10	7.0
Education	High school and below	2	1.4
	College students	3	2.1
	Undergraduate	96	66.7
	Postgraduate	43	29.8
Monthly consumption expenditure	Less than 1,000 yuan	36	25.0
	1,000–2,000 yuan	73	50.7
	2,001–3,000 yuan	21	14.6
	More than 3,000 yuan	14	9.7

demographic information, such as the gender, education, and age of the participants.

The participants were randomly assigned to one of the two experimental groups (the appearance video group vs. the usage video group). At first, the participants imagined that they were on the product home page of an E-commerce platform by reading descriptions. Then, they would see the product presentation videos corresponding to their experimental groups. Finally, the participants would complete the relevant scales and demographic information. A total of 163 participants participated in the experiment, and 144 participants completed the experiment. The demographic information of participants is shown in **Table 1** (Akbari et al., 2019).

The Results of Experiment 1

Manipulation Check

The manipulation of product presentation videos' type was examined by independent-samples *t*-test. The result showed that the average score of electric kettles' usage video was higher than that of electric kettles' appearance video ($M_{appearancevideo} = 2.23$, $M_{usagevideo} = 5.91$, $t = -14.29$, $p < 0.01$). The manipulation of product presentation videos' type was supported.

Main Effect Testing

The test was performed using ANOVAs, and the results are shown in **Figure 2**. The main effect of product presentation videos' type on consumers' purchase intention was significant [$F_{(1,142)} = 10.78$, $p < 0.01$], where $M_{appearancevideo} = 4.49$, $M_{usagevideo} = 5.43$. It was indicated that the product usage video improves consumers' purchase intention more than the product appearance video. Therefore, H1 was verified.

Mediating Effect Testing

The bootstrapping method was used to test the mediating effect of perceived diagnosticity and mental imagery (Hayes, 2013). The analytic approach was informed by Preacher et al. (2007) who recommend bias-corrected bootstrapping to measure multiple indirect effects. In this case, 5,000 samples were taken, and the confidence level was selected as 95%. The total indirect effect for two mediators assessed simultaneously was significant ($Z = 8.61$, $p < 0.01$), which is consistent with the hypothesis that perceived diagnosticity and mental imagery mediate the effect of product presentation videos' type on consumers' purchase intention. We then examined the mediators individually, and the result showed that a 95% confidence interval for the indirect path through perceived diagnosticity was significant, $\beta = 0.1069$ (LLCI = 0.0339, ULUI = 0.2028, excluded 0), indicating that the mediation effect of perceived diagnosticity between product presentation videos' type and consumers' purchase intention was significant. Therefore, H2 was supported. In addition, a 95% confidence interval for the indirect path through mental imagery was significant, $\beta = 0.2685$ (LLCI = 0.1509, ULUI = 0.4137, excluded 0), indicating that the mediation effect of mental imagery between product presentation videos' type and consumers' purchase intention was significant. Therefore, H3 was supported. To determine the relative value of the two mediators, we conducted bias-corrected comparisons between mediators. The 95% confidence intervals for contrasts of perceived diagnosticity with mental imagery did not include zero, indicating that mental imagery was a significantly stronger mediator than perceived diagnosticity.

STUDY 2

Study 2 aimed to provide support for H4 that product rating moderates the effect of product presentation videos' type on consumers' purchase intention.

Pre-experiment 3

The purpose of Pre-experiment 3 was the manipulation check of product rating, and to determine whether the two types of product rating could be used for Experiment 2. After observing the distribution of product rating on major E-commerce platforms and referring to Chu et al. (2015), the low product rating was manipulated into a two-star rating and the high product rating was manipulated into a four-star rating. A total of 58 participants were recruited for Pre-experiment 3 through the "Wenjuanxing" platform. At first, the participants were told that the purpose of this experiment was to judge the product rating. Then, the participants were asked to fill in demographic information and the item about whether they had viewed the product rating online before. Finally, the participants were asked to score the two-star rating and the four-star rating, respectively (1 = low product rating, 7 = high product rating). The lower the score was, the more it indicated that the participant considered this product rating to belong to the low product rating. The higher the score was, the more it indicated that the participant considered this product rating to belong to the high product rating.

The questionnaires of 58 participants (31 males and 27 females) were all valid. The manipulation of product rating was examined by independent-samples *t*-test. The result showed that the average score of the four-star rating was higher than that of the two-star rating ($M_{two-star} = 2.63$, $M_{four-star} = 5.74$, $t =$

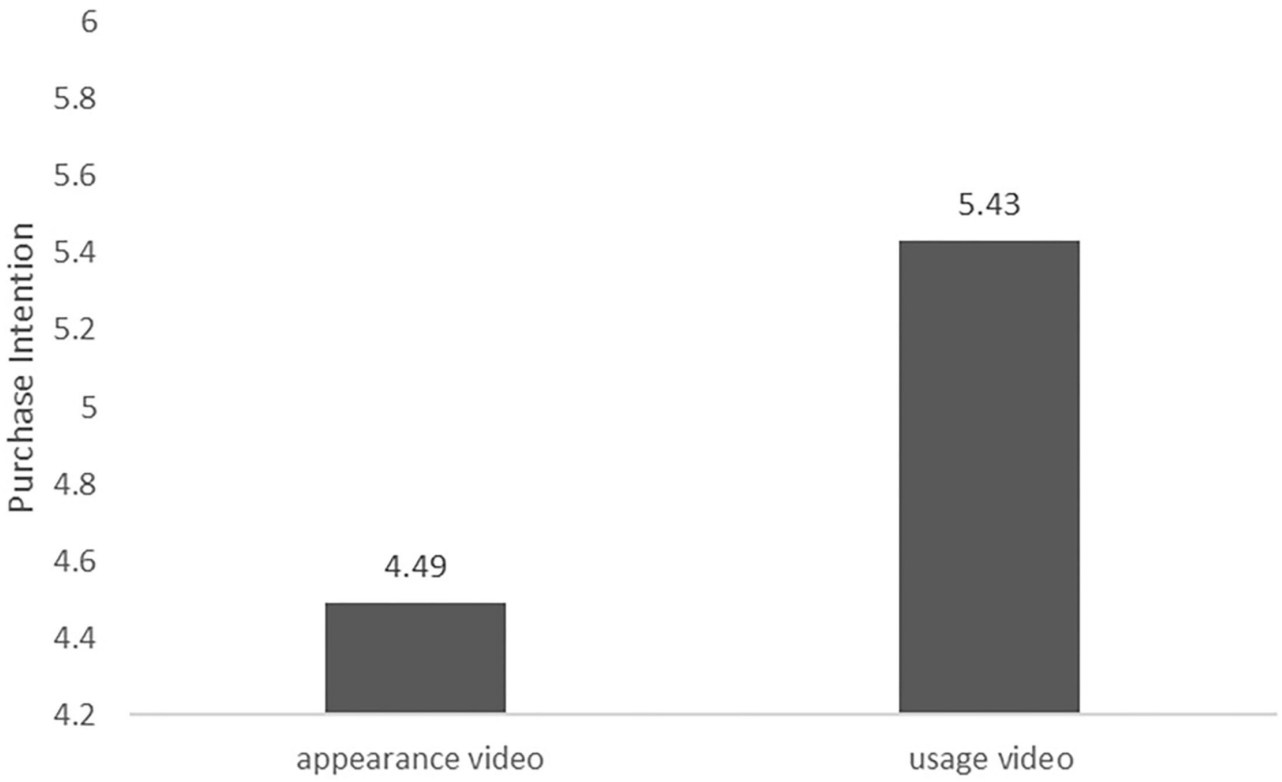


FIGURE 2 | Difference in purchase intention by the appearance video and the usage video (for a search product).

-21.37, $p < 0.001$). The manipulation of the product rating was supported. Therefore, the two-star rating was used as the low product rating, and the four-star product rating was used as high the product rating for Experiment 2.

The Design of Experiment 2

This study used an experimental method. About 2 (videos' type: appearance video vs. usage video)-×-2 (product rating: low vs. high) between-group designs were implemented. Two videos that passed the manipulation check through Pre-experiment 2 were adopted, namely, canvas shoes' appearance video and canvas shoes' usage video. The two videos were the same in other aspects (e.g., duration, music, image quality, background, etc.) except information content. In addition, brand information was removed to eliminate the influence of product brand. Perceived diagnosticity was measured with three items based on the research of Kempf and Smith (1998), Jiang and Benbasat (2004, 2007), and modified to better reflect the context of this research, specifically "This video is helpful for me to evaluate the canvas shoes," "This video is helpful in familiarizing myself with the canvas shoes," "This video is helpful for me to understand the performance of the canvas shoes." Mental imagery was measured with two items based on the research of Maier and Dost (2018), Yoo and Kim (2014), and modified to better reflect the context of this research, specifically "This video helps me imagine the results of wearing canvas shoes in my mind," "This video helps me visualize a trial of canvas shoes." Purchase intention was measured with three items based on the research of Fu et al. (2018) and Wu et al. (2020), specifically "I expect to purchase the canvas shoes," "I would consider buying the canvas shoes," "The probability that I would buy the canvas shoes is high." All variables were measured using Likert 7-level scales, where 1 means "strongly disagree" and 7 means "strongly agree."

The Procedure of Experiment 2

The "Wenjuanxing" platform was used to design experimental questionnaires and generate links. The participants were also recruited through the "Wenjuanxing" platform. The experimental questionnaire consisted of five parts. The first part told the participants that this experiment was about investigating consumers' behavior. The second part described the experimental scenario, specifically "Imagine that you are shopping on an E-commerce platform like Tmall.com. After searching for "canvas shoes," you enter the category overview page. Then, you click canvas shoes on the category overview page to enter the product home page. You see the following product video on the product home page." The third part was also a description, specifically "After watching the product video, you further view the product rating, and find that the product rating is two/four stars, please complete the flowing items." The fourth part was the measurement scales of related variables. In addition, the measurement items about product

TABLE 2 | Demographic information of the participants in Experiment 2.

Variables	Distribution	Numbers	%
Gender	Male	78	41.5
	Fmale	110	58.5
Age	Under 20	71	37.8
	20–25 years old	74	39.3
	26–30 years old	28	14.9
	30 years and older	15	8.0
Education	High school and below	3	1.6
	College students	9	4.8
	Undergraduate	122	64.9
	Postgraduate	54	28.7
Monthly consumption expenditure	Less than 1,000 yuan	73	38.8
	1,000–2,000 yuan	79	42.1
	2,001–3000 yuan	22	11.7
	More than 3000 yuan	14	7.4

presentation video types and product rating were set to test the manipulation effectiveness of this experiment. The last part contained demographic information, such as the gender, education, and age of the participants.

The participants were randomly assigned to one of the four experimental groups. At first, the participants imagined that they were on the product home page of an E-commerce platform by reading descriptions. Then, they would see the product presentation videos corresponding to their experimental groups. After that, they would be informed of the product rating. Finally, the participants would complete the same scales in Experiment 1 and demographic information. A total of 202 participants participated in the experiment, and 188 participants completed the experiment. The demographic information of the participants is shown in **Table 2** (Akbari and Moradipour, 2021).

The Results of Experiment 2

Manipulation Check

The manipulation of product presentation videos' type was examined by independent-samples *t*-test. The result showed that the average score of canvas shoes' usage video was higher than that of canvas shoes' appearance video ($M_{appearancevideo} = 2.26$, $M_{usagevideo} = 5.83$, $t = -13.37$, $p < 0.01$). The manipulation of product presentation videos' type was supported.

The manipulation of the product rating was also examined by independent-samples *t*-test. The result showed that the average score of the four-star rating was higher than that of the two-star rating ($M_{two-star} = 2.21$, $M_{four-star} = 5.61$, $t = -12.28$, $p < 0.01$). The manipulation of the product rating was also supported.

Main Effect Testing

The test was performed using ANOVAs, and the results are shown in **Figure 3**. The main effect of product presentation videos' type on consumers' purchase intention was significant [$F_{(1,186)} = 13.81$, $p < 0.01$], where $M_{appearancevideo} = 4.43$, $M_{usagevideo} = 5.84$. It was indicated that product usage videos improve consumers' purchase intention more than product appearance videos. Therefore, H1 was verified again.

Mediating Effect Testing

The bootstrapping method was used to test the mediating effect of perceived diagnosticity and mental imagery (Hayes, 2013). In this case, 5,000 samples were taken, and the confidence level was selected as 95%. The total indirect effect for two mediators assessed simultaneously was significant ($Z = 9.38$, $p < 0.01$), which is consistent with the hypothesis that perceived diagnosticity and mental imagery mediate the effect of product presentation videos' type on consumers' purchase intention. We then examined the mediators individually, and the result showed that a 95% confidence interval for the indirect path through perceived diagnosticity was significant, $\beta = 0.1272$ (LLCI = 0.0627, ULUI = 0.1832, excluded 0), indicating that the mediation effect of perceived diagnosticity between product presentation videos' type and consumers' purchase intention was significant. Therefore, H2 was supported again. In addition, a 95% confidence interval for the indirect path through mental imagery was significant, $\beta = 0.3047$ (LLCI = 0.1923, ULUI = 0.4566, excluded 0), indicating that the mediation effect of mental imagery between product presentation videos' type and consumers' purchase intention was significant. Therefore, H3 was supported again. To determine the relative value of the two mediators, we conducted bias-corrected comparisons between mediators. The 95% confidence intervals for contrasts of perceived diagnosticity with mental imagery did not include zero, indicating that mental imagery was a significantly stronger mediator than perceived diagnosticity.

Moderating Effect Testing

With purchase intention as the dependent variable, videos' type and product rating as the independent variables, a 2 (videos' type: appearance video vs. usage video)-×-2 (product rating: low vs. high) ANOVAs revealed a significant interaction effect of videos' type with the product rating [$F_{(1,185)} = 12.62$, $p < 0.01$], which indicates that the product rating (low vs. high) moderated the effect of product presentation videos' type on consumers' purchase intention. Furthermore, simple effect analysis showed that the purchase intention of the participants who were assigned to the usage video group ($M_{usagevideo} = 5.61$) was significantly higher than that of the participants who were assigned to the appearance video group ($M_{appearancevideo} = 4.52$) in the condition of the high product rating [$F_{(1,92)} = 10.11$, $p < 0.01$], as shown in **Figure 4**. There was no significant difference between the appearance video group and the usage video group in the condition of the low product rating [$M_{appearancevideo} = 3.16$,$M_{usagevideo} = 3.25$, $F_{(1,93)} = 2.01$, $p > 0.1$]. Therefore, H4 was supported.

GENERAL DISCUSSION

Summary

Based on the resource matching theory, mental imagery theory, and cue utilization theory, this study investigated the influence of product presentation videos' type (appearance video vs. usage

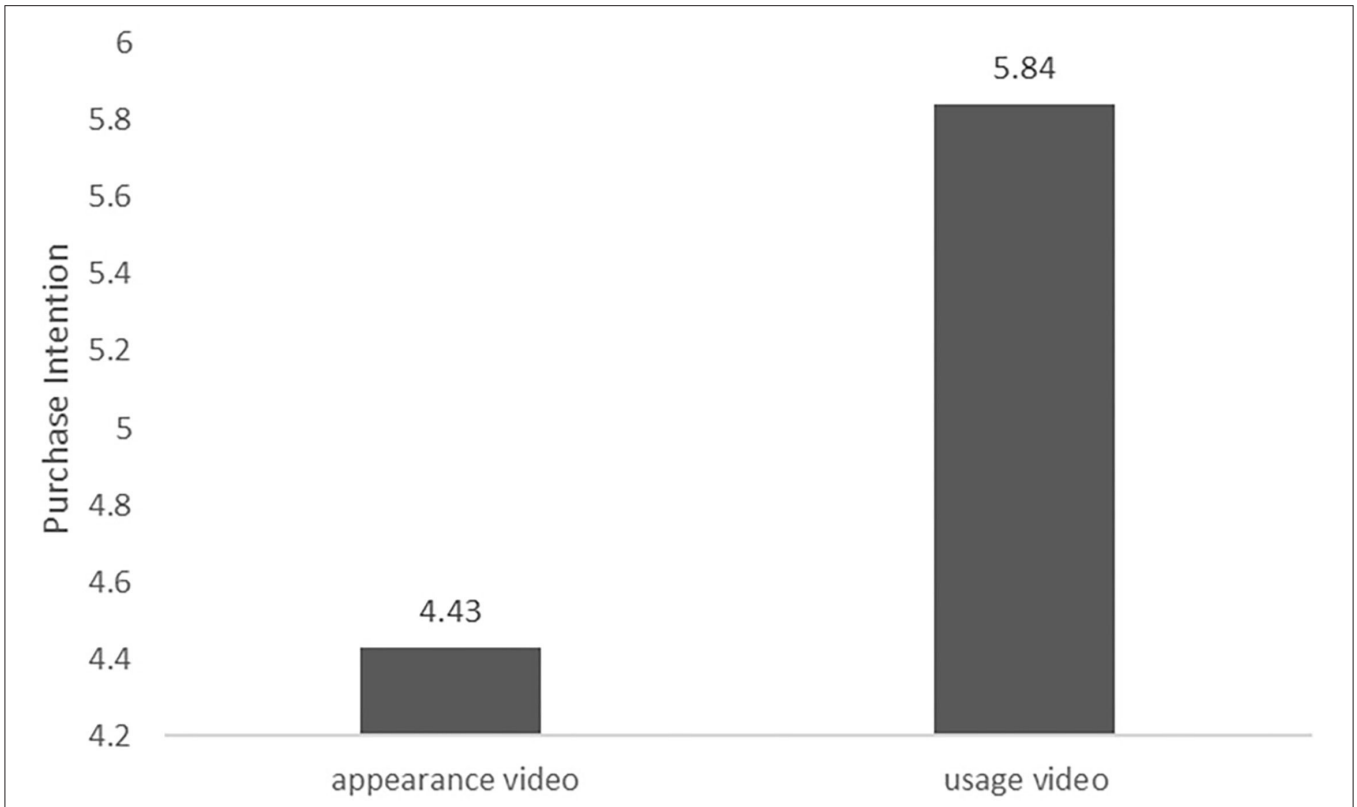


FIGURE 3 | Difference in purchase intention by the appearance video and the usage video (for an experience product).

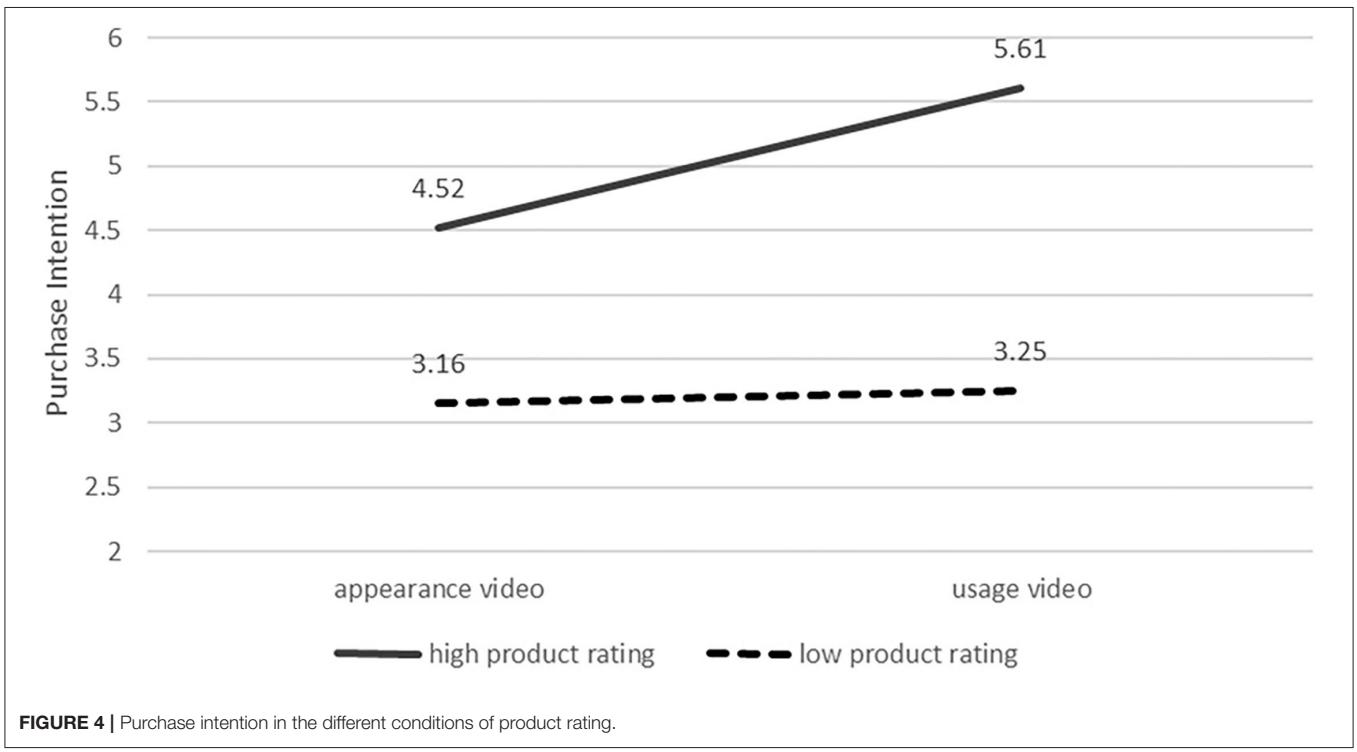


FIGURE 4 | Purchase intention in the different conditions of product rating.

video) on consumers' purchase intention and examined the moderating effect of the product rating (low vs. high). Moreover, the mediating role of perceived diagnosticity and mental imagery was also verified.

There are three findings in this study: First, the product presentation videos' type has a significant effect on consumers' purchase intention. The product usage video improves consumers' purchase intention more than the product appearance video for both search products and experience products. Second, perceived diagnosticity and mental imagery mediate the influence of product presentation videos' type on consumers' purchase intention. The product usage video improves consumers' perceived diagnosticity and mental imagery more than the product appearance video, resulting in higher purchase intention. Third, product rating moderates the influence of product presentation videos' type on consumers' purchase intention. The product usage video improves consumers' purchase intention more than the product appearance video when the product rating is high; however, there is no significant difference in the impact of two types of videos on consumers' purchase intention when the product rating is low.

Theoretical Contributions

This research has contributed to product presentation videos, product rating, and the resource matching theory. First, this study enriches the classification of product presentation videos. Previous studies mainly classified product presentation videos based on the expressing form of videos, but the information in different videos was kept the same. However, the effect of product presentation videos depends, to a large extent, on the information in videos. Focusing on the information content and referring to the classification of product review information (Huang et al., 2014; Li et al., 2017), this study divides the product presentation videos into product appearance video and product usage video.

Second, this study proposes and validates the moderate effect of the product rating, which is a new boundary condition for the influence of product presentation videos on consumers' purchase intention. Prior studies mainly focused on product factors and consumer factors, proved that product type, need for touch, information processing motivation, and impulse buying tendency are important moderating factors; no studies have ever investigated the moderating effect of product rating. However, when consumers buy products online, they not only watch the product presentation videos provided by sellers but also view the product rating generated by post-purchase consumers (Utz et al., 2012). The product rating significantly affects the consumers' perception of the truthfulness of product presentation videos.

Third, this study extends the application of resource matching theory by introducing it into the research field of online product presentation videos. Past studies mainly based on the dual coding theory and the media richness theory to explore the influence of product presentation videos on consumers' behavior. Focusing on matching between cognitive resource needs and supplies, this study finds that providing product usage video for consumers on the product home pages will make consumers' cognitive resource needs match the cognitive resource supplies, resulting in higher purchase intention.

Implications

The current research is of great significance to the marketing practice of enterprises. First, this study would suggest online merchants pay attention to the selection and management of product presentation videos. Consumers cannot directly experience the products when shopping online, so they have higher perceived uncertainty and perceived risk. If consumers cannot obtain enough and needed product information, they will refuse to buy the product. Therefore, it is very important for online merchants to design and manage product presentation videos effectively. This study finds that product presentation videos' type influences consumers' purchase intention significantly, which provides reasons for online merchants to attach importance to the management of product presentation videos.

Second, this study provides a reference for online merchants to design effective product presentation videos on product home pages. The results of this study show that product usage video improve consumers' purchase intention more than product appearance video for both search products and experience products. So, the online merchants should present the product usage videos to consumers on product home pages. In addition, online merchants should consider the specific characteristics of search products and experience products when designing the product usage videos. Specifically, for search products, the content of videos should be the demonstration of the use procedure and function by models. Taking smart bracelets as an example, it is better to use videos to demonstrate the functions of smart bracelets so as to vividly show consumers how to use the smart bracelets. For experience products, the content of videos should be the demonstration of use results and performance by models. Taking T-shirts as an example, it is better to use videos to show the image of wearing the T-shirt by models so as to let consumers see what it looks like after wearing the T-shirt.

Third, this study is helpful for online merchants to rationally recognize the influence of product presentation videos on consumers' purchase decisions. The results of this study show that product rating moderates the influence of product presentation videos' type on consumers' purchase intention. When the product rating is low, consumers will not trust in sellers and think that the product information in the videos is fictitious. Therefore, on the one hand, online merchants should not blindly exaggerate the product performance through product presentation videos, or else will lower the product rating, and then weaken the effects of product presentation videos. On the other hand, online merchants should not only ensure the information in videos is true and the quality of products is high but also pay attention to guiding consumers to give products higher ratings, which will strengthen the effects of product presentation videos. For example, online merchants could encourage consumers to make higher rating by giving coupons.

Limitations and Further Research

Whereas, the findings of this study are valid and valuable, there are still some limitations that provide directions for further research. First, the participants of the experiments in

this study were mainly students instead of general populations of consumers. The reason is that the homogeneity of students is relatively high and other interference variables are relatively few. In addition, students have rich online shopping experience and are the desired representatives of online shoppers. Future research can expand the scope of the sampling groups to enhance the universality of the research. Second, this study explored the influence of product presentation videos on consumers' purchase intention through scenario experiments. The reason is that this study belongs to the causal exploratory research about consumer behaviors, which requires to control many factors strictly. So, we used the method of the scenario experiment, which can ensure high internal validity. Big data and other quantitative methods can be used for further research, such as cooperating with online merchants and conducting natural experiments to further verify the relationship between product presentation videos' type and product sales. Third, only two kinds of products were selected for analysis in this study. The reason is that the results of Pre-experiment 1 showed that the participants consider electric kettles and canvas shoes are most consistent with the definition of search products and experience products, so the two kinds of products are more representative. In addition, electric kettles and canvas shoes are similar in price, importance, and purchase frequency, which can eliminate the influence of some interference factors, such as price, involvement, and familiarity. Future research could use other products for verification and improve the robustness of research. Lastly, the duration of product videos in experiments is all 20 s, without considering the possible influence of time pressure. In addition, the product presentation videos investigated in this study were shot and provided by merchants, without considering the possible impact of video co-creation. The future study could investigate the influence of videos with different lengths of duration and the influence of videos created by buyers-sellers on purchase intention.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Economics and Business Administration Department Research Ethic Committee. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

ZC contributed to the conceptualization, methodology, statistical analysis, data curation, and writing. BS contributed to the revision, investigation, supervision, funding acquisition, and project administration. YZ contributed to the revision and funding acquisition. All the authors contributed to the manuscript revision and read and approved the submitted version.

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Sharing or Not: Psychological Motivations of Brand Rumors Spread and the Stop Solutions

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Brand rumors can harm brands' image and bring significant impacts on customers' decision-making and sharing behavior. Finding practical strategies for preventing the spread of brand rumors continues to be a challenge. Building on the social contagion theory, the current research enriches the discussion on understanding why people spread rumors and how to deal with the spreading of rumors. Sharing brand rumors is motivated by a variety of complex psychological reasons, but prior research didn't adequately analyze the problem from a complexity perspective. Therefore, using a sample of 416 interviewers within eight types of brand rumors, this study employs fuzzy-set qualitative comparative analysis (fsQCA) to investigate the combination of rumor psychological communication motivations in brand activities and solutions to prevent the spread of brand rumors. The current study discoveries three and two first-level configurational solutions, respectively, that can promote positive and negative rumor spreading. To summarize, emotional stimulation is a key component in the spread of rumors; altruism and relationship management motivation can coexist at times; and untrusted rumors are disseminated through other motivation factors. Solutions to prevent rumors from spreading are also provided. Furthermore, the findings help to understand the psychology of configurational motivation and how it can help brands reduce the spread of brand rumors. Finally, these discoveries' theoretical contributions and practical implications are presented.

Keywords: brand rumors, consumer cognition, sharing rumors motivation, social contagion theory, fsQCA

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INTRODUCTION

Although no one trusts rumors, people believe in "facts" (Fine, 2007). Rumors significantly impact customers and brands because of their extensive spread and numerous influences. First, rumors that surface under the pretext of the "truth" mask surround customers and become consumers' shopping basis; this influences their purchasing decisions, causing economic losses. Evidence shows that when consumers lack theoretical knowledge and critical thinking ability, rumors and options provided by those around them influence their decision-making, and this causes a herd mentality. Rumors can provide reasonable explanations for uncertain or ambiguous situations (DiFonzo et al., 1994; Bordia and DiFonzo, 2002). Therefore, due to anxiety, consumers are more likely to follow

the choices made by crowds to gain a sense of security and avoid the risk of making the wrong decision; as a result, they are more likely to make blind purchasing decisions (Loxton et al., 2020).

Second, brands compelled to be associated with rumors frequently appear passive and overwhelmed. *This is because the consumer loyalty and brand image have contributed to high product sales and market share (Kovacova and Lewis, 2021), but some research indicates that brand rumors impact brand image, sales share, and brand satisfaction and loyalty (Kimmel, 2004; Kimmel and Audrain-Pontevia, 2010).* Negative rumors negatively impact the brand (Kimmel and Audrain-Pontevia, 2010). For example, rumors about KFC's mutant chickens with 8 wings had a major blow to the market share and brand image of the company. Although the final rumormongers were ordered to pay KFC $91191, this could not offset the economic losses caused by the rumor. Scholars ignore the positive brand rumors, which have a complex influence but undoubtedly harm consumer interest. While positive rumors boost the market share of a brand, customers who buy the goods lose interest once the rumors are proven to be false, thereby damaging the brand value (Aditya, 2014). Whilst positive rumors may promote a brand to gain long-term market share, the market share of some brands quickly fall into a trough after a short-term surge, particularly when rumors are exposed as false. For instance, although studies have demonstrated that ginger shampoo is ineffective (Miao et al., 2013), this well-known care brand has continued to sell well because the idea that ginger is good for hair growth is deeply ingrained in consumers' minds. In early 2020, Shuang-Huang-Lian (a type of Chinese herb) was rumored to prevent COVID-19, prompting consumers to rush to buy it; however, 3 days later, the news was pronounced as fake. Although the Shuang-Huang-Lian company did not create this rumor, the turmoil caused a rapid fall in the company's stock price to the bottom after three consecutive days of rising. Current research on the strategies' companies adopt to prevent the spread of brand rumors is scarce, causing loss of brands due to rumor infringement. Therefore, this study looks at the psychological path of consumers who spread rumors and investigates the psychological path analysis to prevent the spread of rumors. The findings will provide more approaches for companies to maintain their brands when major rumors arise, and offer specific guidance and reference for healthy brand development.

Individual participation is inextricably linked to the spread of rumors. Individuals serve as the information transmission box, spreading rumors in the dissemination process. Rumors are defined as using simple associations or assumptions to create and disseminate different or contradictory statements to facts (DiFonzo and Bordia, 2007). Individuals sharing rumors essence is a group behavior characterized by the dissemination of information. Contrary to the idea that original rumors spread face-to-face, the number, spread speed, and scope of influence of online rumors are constantly expanding in the internet age due to the rapid advancement in internet technology and the continuous growth of social media users (Bloch et al., 2017). However, the ease with which information may be accessed and transmitted through social media has resulted in ambiguity, misinformation, and doubt (Sharma and Kapoor, 2022). Moreover, internet rumors are anonymous, interactive, and free of charge; this reduces the spread of psychological and material costs and promotes the spread of rumors (Difonzo, 2013). In this view, the present study primarily focuses on internet rumors with a wide range of influences on consumers.

While rumors are certainly a societal phenomenon, psychological reasons at an individual level are a critical component of the rumor puzzle (Bordia and Di Fonzo, 2017). Previous studies lacked a comprehensive examination of the psychological motivations of individuals to spread rumors from a holistic standpoint. Current exploration on the primary psychological motivations behind rumor spreading focuses on the net effect of passive psychological factors, including information uncertainty, anxiety, conformity, and gullibility (Donovan, 2003; Difonzo, 2013; Duffy et al., 2020). These investigations are geared toward the net effect of psychological motivation elements. The scholars ignore that people's psychological motivation to spread rumors is a multifaceted effect associated with the internal and external environment, and personal characteristics. Furthermore, few scholars recognize the contribution of rumor psychology spreading in marketing strategy (Kimmel and Audrain-Pontevia, 2010). Therefore, to protect the interests of consumers and brands, the present work investigates the combined psychological path of rumors spreading and unravel approaches to prevent the spread of brand rumors under various circumstances. The analysis is based on previous research on stimulating the psychological communication factors of rumors.

The theoretical significance of the present study is reflected in four aspects. First, this research significantly theoretically contributes to the sharing and dissemination of rumors. It thoroughly investigates and compares the psychological communication motivations for positive and negative brand rumors, thereby filling the gap in previous research that focuses primarily on negative brand rumors but ignores the psychological path taken by positive brand rumors. Second, considering the cognitive evaluation theory, this study investigates the rumor spreading and prevention psychology pathways, exploring the overall effect of multiple psychological stimuli. Third, the present investigation has some practical implications; for instance, when the brand encounters major rumors, this work explores strategies to maintain brands, providing guidance and reference for healthy brand development and reducing the economic loss and reputation loss of brands. Fourth, unlike traditional statistical methods for investigating the net effect, the present study employs fuzzy-set qualitative comparative analysis to evaluate the combined impact of psychological motivation to stimulate rumor spreading, opening up avenues for brands to assist in rumor prevention.

LITERATURE REVIEW

Social Contagion Theory

The term' social contagion' was coined by Redl (1949). Scholars have the view that individual cognition and behavior are contagious within a group or society, and particular behavior

and cognitions of members of a group continuously change as a result of their environment and interactions with others (Bandura, 1986); this results in contagious social behavior (Redl, 1949). According to social contagion theory, individual and group factors and their interactions must be accounted for when evaluating contagious social behaviors (Redl, 1949; Turner and Killian, 1957). Social contagion behavior refers to the spread of emotions, attitudes, cognition, and behavior from "initiator" to "recipient" (Wheeler, 1966). Social contagion behavior facilitates the transmission of information, emotion, and behavior from the initiator to the receiver during the contagion process (Burt, 1987). Invariably, some recipients in social networks nearly accept information and behavior diffused by initiators who are motivated either by active or passive psychological motives during dissemination (Redl, 1949).

Social contagion theory examines the impact of the social environment on the attitudes and behaviors of an individual and the internal mechanism of social contagion between individuals and groups (Burt, 1987). Numerous studies have demonstrated that individual and group factors are the primary factors of social contagion behavior; however, their interaction triggers social contagion events (Barsade, 2002). Also, studies on the internal logic of the two interactions are rare (Redl, 1949). Therefore, the present research addresses this research gap in conjunction with the research questions about rumor spreading.

Brand Rumor Spreading and Social Contagion Theory

A brand is no longer defined by what we tell consumers; rather, it is defined by what customers tell one another (Gavurova et al., 2018). Thus, as socially contagious events, group interaction with individual factors should be considered when evaluating rumors spread within consumer groups. Depending on various situations and individual differences, rumor spreading has varying effects on infectious social events (Levy and Nail, 1993). *While technologies such as data-driven predictive algorithms are helping to manage online rumors, the psychological motivations of those spreading rumors should be addressed (Kovacova and Lewis, 2021).* As a form of contagious event behavior, rumor spreading mainly necessitates the establishment of distinct channels of communication between individuals and groups (Dubois et al., 2011).

The initiator of the behavior has distinct transmission paths based on their cognitions and motivations (Mitchell, 1982). Psychological motivations for rumor spreaders are primarily active and passive. First, considering passive psychology, individuals spread rumors from three distinct emotional, cognitive pathways: positive, negative, or herd mentality. Evidence shows that different psychological motivation models have varying effects on the manner and content of group rumors (Reeve, 2005). Spreading rumors based on passive psychological stimulation is primarily motivated by the emotional cognition of an individual (Lemerise and Arsenio, 2000; Waddington and Fletcher, 2005). Some studies have revealed that emotional contagion is the process whereby an individual or group influences another by inducing emotional states, attitudes, and behaviors (Schoenewolf, 1990). Emotional cognition transmits emotional information to the cognition of others based on their circumstances, consequently influencing their cognition and behavior (Van Kleef, 2009, 2016; Van Kleef et al., 2015). Additionally, rumor dissemination motives based on active psychology influence how rumors are transmitted due to their internal needs, including altruistic behavior, self-enhancement, and relationship management motivation.

In this view, according to social contagion theory, this study, by combining consumer motivational psychology with the transmission and reception pathway of rumors, deeply analyses the relationship between the configuration path of the interaction mode between consumers and groups and the relationship between positive and negative rumors. The research findings suggest solutions for businesses to prevent the spread of brand rumors.

Motivation for Passively Sharing Rumors

Rumors may be created intentionally or inadvertently and spread by individuals. According to the findings of Allport and Postman (1947), the primary motivation for the spread of rumors stems from the ambiguity and importance of the rumor to people. The ambiguity of rumors deepens as they spread. On the other hand, activating certain psychological factors, including anxiety (Rosnow, 2004) or hope (Esposito, 1987), promote people's perception of the importance of rumors. Moreover, studies have revealed other variables associated with rumors spread research, including the herd mentality caused by the spread of large-scale rumors (Bordia and DiFonzo, 2004; Fine, 2007), involvement (DiFonzo and Bordia, 2007), and psychological control (DiFonzo and Bordia, 2007). The following sections describe the contributions of people's passive psychological motivations, such as anxiety, hope, and herd mentality, to the spread rumors.

Anxiety Management Motivation With Sharing Rumors

Anxiety is one of the significant factors for rumor dissemination at the psychological stage of the distribution of rumors (DiFonzo and Bordia, 2007). Uncertainty impairs individuals' ability to cope with their environment effectively, eliciting feelings of helplessness and anxiety. DiFonzo and Bordia (2002) found that highly anxious subjects can spread rumors with less stimulus than non-anxious individuals. Sharing rumors is a successful strategy to alleviate anxiety for individuals who cannot clarify or lack accurate facts (DiFonzo and Bordia, 2007). Anxiety is a kind of negative emotional state developed when one worries about potential outcomes. A previous meta-analysis by Rosnow (1991) of seven rumors revealed a strong average linear impact ($r = 0.48$) on the relationship between fear and spreading rumors. In addition, for individuals with little information or messages about the truth, rumor-spread disinformation can motivate incorrect decision making or cause economic losses.

Hope Management Motivation With Sharing Rumors

Hope is a type of positive emotional state based on the pathway of successful planning (Snyder et al., 1991). Emerging evidence

indicates that hope is relevant to people's actions (Kemp et al., 2017). Brand rumors that provide consumers with hope are accompanied by optimism and possibly increase consumer purchase intent (Miceli and Castelfranchi, 2010). Especially, positive messages (maybe rumors) in marketing and advertising frequently imply that consumers will become more beautiful, healthy, younger, or stronger as a result of using the product, regardless of whether this is true (Kemp et al., 2017). Rumors of hope invoke an anticipated repercussion, prompting customers to believe and behave according to the content of the rumors. Hope is linked to the spread of medical, beauty, and wellness rumors (Chua, 2015). People believe and consider the realness of hope rumors because hope can alleviate tension and negative feelings (Miceli and Castelfranchi, 2010).

Herd Mentality With Sharing Rumors

People develop herd mentality, a naturally formed unified action or thinking, to escape social strain (Loxton et al., 2020). As social beings, people typically have "social" behavioral characteristics. Herd mentality demonstrates succumbing to the strain of communities (Crutchfield, 1955). The wishes of individuals have to obey common choices because residents recognize that their deviation from social norms may significantly harm their social standing. Therefore, retaining a group attitude and behavior (like a herd) is a strategy to decrease personal risks in the face of group pressure. The theory put forward by Fine (2007) indicates that people tend to follow the crowd to escape failure or punishment, especially when they lack critical thinking abilities or appropriate information. The herd mentality effect is associated with the widespread of rumors, prompting consumers to make stupid buying decisions.

Motivation for Actively Sharing Rumors

Apart from passively spreading rumors, research has revealed that people are motivated to actively spread rumors (DiFonzo and Bordia, 2007; Bordia and Di Fonzo, 2017; Sudhir and Unnithan, 2019). Aside from motivation to find the truth because of uncertainty, Bordia and Di Fonzo (2017) emphasized the motivation to actively spread rumors from the social interchange service. The main components essential for good social interchange are as follows: acting effectively, building relationships and self-improvement, and the ability to predict each other's intentions or behaviors (Haroush and Williams, 2015; Bordia and Di Fonzo, 2017). Acting effectively is related to trust in a manner that people collect information to make decisions. It is also imperative to establish and maintain interpersonal relationships in society. Regarding self-improvement, people tend to validate their self-awareness and boost their self-esteem in various ways using the social system. Moreover, altruism contributes significantly to the spread of rumors when perceived as helpful information (Apuke and Omar, 2021).

Trust and Sharing Rumors

Trust is a critical mechanism of social operation and a vital component of the synthetic power of a society. Trust influences consumer behavior. Rumors and trust are inseparable in the study of brand rumors. Studies show that rumors influence individual beliefs, attitudes, and behaviors (Bordia and Di Fonzo, 2017) because rumors spread like "true information" before they are verified as rumors. Research evidence indicates that people who trust rumors are more likely, intentionally or accidentally, to spread rumors (Fine, 2007; Chua and Banerjee, 2018). Additionally, people share rumors to discover the truth and reduce feelings of lack of control and anxiety when they are unsure whether rumors are true or false (Bordia and Di Fonzo, 2017).

Additionally, various factors in social media influence the establishment of user trust. First, consumer trust in brands impacts the spread of brand rumors. A high level of brand trust among consumers reduces doubts and inferences about positive rumors regarding a brand; instead, consumers regard this as positive brand information to promote spread. Negative rumors about a brand can be supplemented with counter-arguments and online debates (Amine, 1998). Second, users can doubt the credibility of brand rumors due to the anonymity of online rumors. However, the likelihood of consumers believing them and joining the propagation team increases when social, interpersonal relationships surrounding consumers spread rumors (Wang et al., 2021).

Relationship Management Motivation and Sharing Rumors

Relationship management motivation refers to customers sharing rumors when they find it beneficial to improve their relationship with other consumers (DiFonzo and Bordia, 2007). Generally, the reason for spreading rumors is to reap their benefits (DiFonzo and Bordia, 2007). Consumers share "information" (rumors) to other consumers for closer connections. If consumers think that the "information" can bring losses to other consumers, they distribute it broadly to prevent losses. In contrast, if consumers feel that the "information" can profit others, they share it with other consumers, helping them achieve benefits and strengthen relationships. The sharers and recipients of rumors converse and communicate during the "information" distribution process in order to increase the likelihood of developing long-term relationships (DiFonzo and Bordia, 2007).

Self-Improvement Motivation and Sharing Rumors

Self-enhancement motivation shared by rumors refers to the motive by consumers to relay rumors to another customer to increase self-confidence and self-esteem (DiFonzo and Bordia, 2007). Self-enhancement motivation emphasizes the need to feel good in sharing rumors, that is, the cognitive processing of rumors. People may post and condemn the rumors if the substance of the rumors contradicts their beliefs to boost their confidence. When people think that the rumor concurs with their values, they strengthen their ideas and become willing to believe that the rumor is true. This boosts their self-image and self-esteem when customers use "information" (rumors) to promote their favorite brands. Word-of-mouth contact refers to non-commercial communicators who disseminate knowledge or evaluations to other consumers or potential consumers regarding goods, brands, organizations, and services (Sudhir and Unnithan,

2014). Businesses hope that customers provide their brand with positive word-of-mouth communication as one strategy to quickly increase market share. Therefore, some rumors are circulated by the merchants themselves to advertise the product. However, this motivation is rare in the research on the spread of brand rumors (Sudhir and Unnithan, 2014).

Altruism and Sharing Rumors

Altruism is a type of motivation that seeks to benefit others (Batson, 2010). In the context of information transmission, altruism refers to sharing information with others, expecting nothing in return (Ma and Chan, 2014). The notion of altruistic individuals serving others implies that they have an incentive to spread rumors whenever they are deemed valuable information (Ma and Chan, 2014; Plume and Slade, 2018). Altruism rumor sharing motivation refers to individual motivation to trade rumors to assist others (Apuke and Omar, 2021). Recent research shows that people are willing to share information to assist others, regardless of whether the information is true or false; individuals can take precautions to avoid losses based on this information (Destiny Apuke and Omar, 2020). Apuke and Omar (2021) revealed that individuals with a higher level of altruism are more likely to spread misinformation about COVID-19 and attempt to share helpful information with others. As such, one might anticipate a connection between altruism and rumor-sharing behavior.

In conclusion, the present research on the psychological motivation of rumors focuses on the passive psychological motivation influenced by external factors to share the rumors impulse (Difonzo, 2013; Wang et al., 2019; Duffy et al., 2020), the active sharing motivation based on their requirements (DiFonzo and Bordia, 2007), and personal cognitive level of trust in rumors (Ma, 2008; Difonzo, 2013; Duffy et al., 2020). However, the sole focus on the net effect of one or more psychological factors on individuals sharing rumors ignores the fact that various factors influence the spread of individual rumors; this cannot fully explain the complex psychological motivations of individuals sharing rumors. Furthermore, only a few studies have explored the psychological communication motivation of positive or negative brand rumors. To fill the gap, the present article examines psychological motivations for rumor spread configurations from the perspectives of passive psychological motivation, active psychological motivation, and personal cognitive level of trust in rumors, and the approaches to stop brand rumors from spreading in different situations. The conceptual model of this research, which is based on the literature review, is outlined in **Figure 1**.

METHODOLOGY

Overview of Fuzzy-Set Qualitative Comparative Analysis

Fuzzy-set qualitative comparative analysis (fsQCA) is a qualitative and quantitative research method different from traditional linear correlation quantitative analysis. This approach supports method mining for non-linear and asymmetric relationships (Rihoux and Ragin, 2012). The fsQCA studies address the complex causal hypotheses based on essential and sufficient conditions (Schneider and Wagemann, 2006). By comparing business research methods from Woodside (2013), fsQCA is an alternative data analysis and theory creation method. fsQCA is founded on configuration theory (Greckhamer, 2011) which employs the Boolean algebra rule for operations and focuses on element interaction, joint causes, and configuration effects (Ordanini and Maglio, 2009; Morgan, 2010). Furthermore, fsQCA is appropriate for measuring the essential and sufficient conditions for a specific result, particularly when multiple factors contribute to the outcome (Rihoux and Ragin, 2012). Also, it provides high-performance and non-high-performance detection for causal asymmetry (Fiss, 2011). According to the set theory and complexity theory, fsQCA technology focuses on "multiple concurrent causalities" across cases; in this view, the same result can be obtained by multiple combinations of elements (Ragin, 2013). Thus, fsQCA is receiving extensive use in management and consumer behavior research, which has to contend with a complex environment (Mikalef, 2017; Cruz-Ros et al., 2018; Kraus et al., 2018; Kaya et al., 2020; Phung et al., 2020). The present work explored the psychological factors and combinations of psychological factors encouraging individuals to spread brand rumors in the complex social environment. Therefore, fsQCA 3.0 was employed for analysis (Ragin, 2013).

Case Selection

FsQCA should have a clear hypothetical direction when selecting cases. In this manner, the chosen instances have a degree of similarity. Also, the degree of diversity should be considered in case selection. In the least number of instances, the main criterion should reach the highest degree of "heterogeneity" (Ragin, 2013). Case selection should not be mechanical random sampling in small and medium sample studies (Rihoux and Ragin, 2012). The total homogeneity of the case population is combined with the greatest heterogeneity of the case population (Benford and Ragin, 1996). Therefore, all selected rumor cases have been refuted in the official media to ensure the accuracy of case selection. First, select brand rumors that spread widely, including positive rumors and negative rumors. Second, these rumors have been refuted in mainstream media, including China Internet Joint Rumor Refutation Platform[1] and BBC News.[2] Based on the credibility, novelty, and valence of rumors, five experts analyzed and graded the rumors. Credibility refers to the rumors capacity for consumers' belief. Novelty emphasizes a new or unusual degree of rumors. Valence is the degree to which rumors are positive or negative. Therefore, selecting 2^3 types of rumors in the last 20 years, covering credibility, novelty, and valence, respectively (**Appendix A**), has enriched research into the spread of rumors; this has ensured that the investigation of rumors is not limited to the spread of a certain form of rumors.

[1] http://www.piyao.org.cn/

[2] https://www.bbc.com/

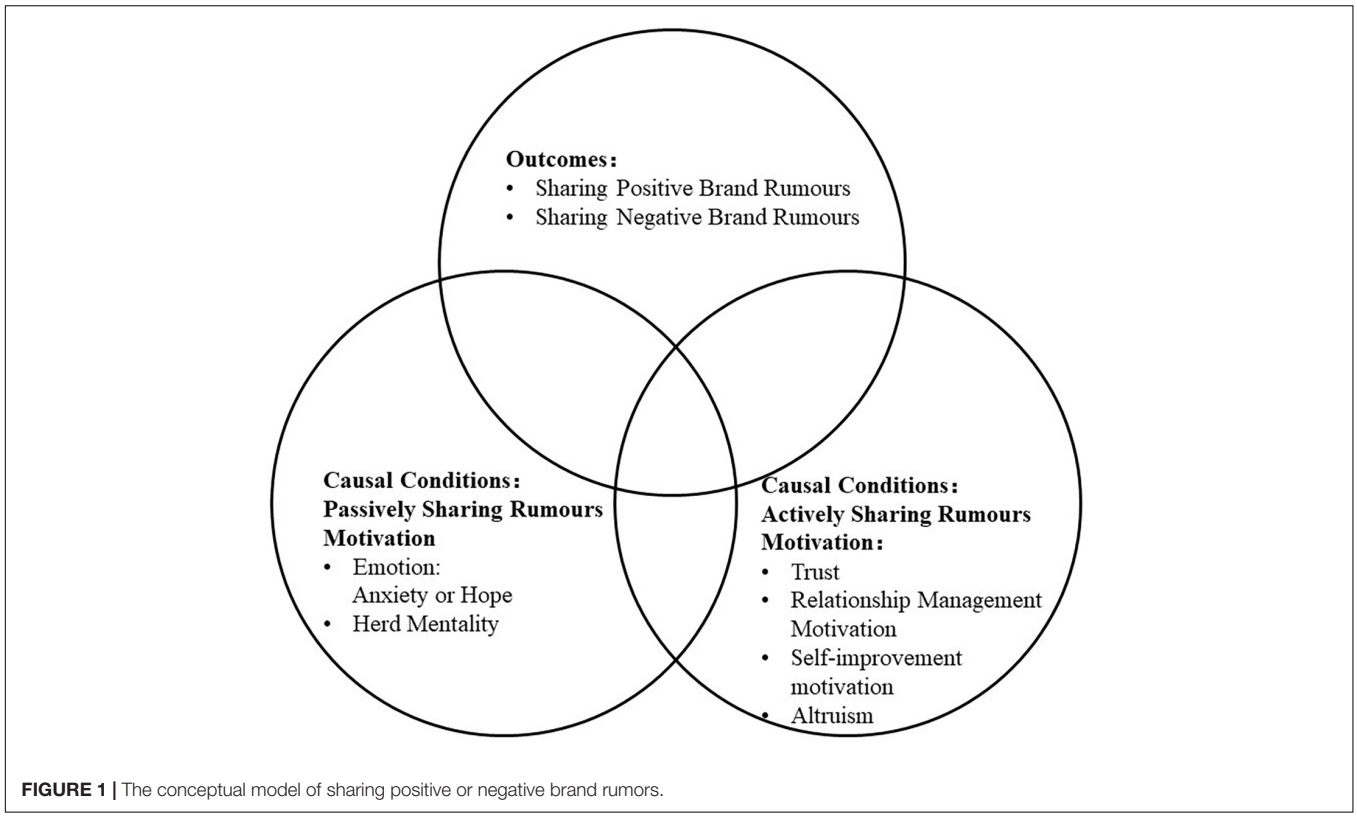


FIGURE 1 | The conceptual model of sharing positive or negative brand rumors.

Data Collection and Measure

An online survey questionnaire designed by www.wjx.cn was collected from September to December 2020. Respondents filled out the questionnaire anonymously and were allowed to exit the questionnaire at any time as they wished. Of the 547 survey invitations sent, 446 valid survey questionnaires were returned, with an 81% recovery rate. The respondents were mainly from mainland China. **Table 1** outlines other demographic features of the study.

Briefly, respondents read a piece of information (rumors) randomly and scored the following items based on their judgment on the content of the information. All variables were measured using a 7-point Likert scale: 1 denotes completely disagree, while 7 denotes absolutely agree. The details are as follows.

Outcome Factor

Information Sharing Intention

The outcome factor is the information sharing intention, "I intend to share the 'message' with others frequently."

Cause Conditions of Passively Sharing Rumors Motivation

Anxiety

The anxiety management motivation is centered on the fact that people share rumors to alleviate anxiety. There are four items to measure anxiety (Sudhir and Unnithan, 2014).

Hope

Hope emotion was measured by four items (Krafft et al., 2019). For example, "I will share this message because it is hopeful for me."

Herd Mentality

Herd mentality is the tendency of individuals to think and conduct in ways that correspond to the group's norms rather than acting independently, having four items (Song et al., 2019).

Trust

Trust is the proclivity of consumers to believe rumors and would like to share them with others. However, distrust rumors are also promote people to share due to alleviate the uncertainty associated with rumors. This was measured by four items (Gefen, 2000; Podsakoff et al., 2003). For instance, "I trust the information (rumors) that I shared to be true."

Cause Conditions of Actively Sharing Rumors Motivation

Relationship Management

The focus for relationship management is on the effect of individuals who regard rumors as valuable information for improving relationships. Based on the research of Sudhir and Unnithan (2014), we measure it by four items.

Self-Improvement

This is when people share rumors with others or group members to boost their esteem (Bordia and Di Fonzo, 2017). This too can be measured using four items (Sudhir and Unnithan, 2014).

TABLE 1 | Demographic characteristics of the sample.

Negative rumors	Number	Percentage	Positive rumors	Number	Percentage
Gender	208		Gender	208	
Male	105	50.5%	Male	103	49%
Female	103	49.5%	Female	105	51%
Age			Age		
18∼25	39	18.8%	18∼25	48	22.8%
26∼30	83	39.9%	26∼30	83	40.3%
31∼40	67	32.2%	31∼40	56	27.2%
>40	19	9.1%	>40	21	9.7%
Education			Education		
High school	52	25%	High school	52	24.8%
College/Associate degree	63	30.3%	College/Associate degree	66	31.6%
University/Bachelor degree	93	44.7%	University/Bachelor degree	90	43.6%

Altruism

Altruism refers to a type of motivation that seeks to benefit others rather than one's interests (Batson, 2010). Apuke and Omar (2021) outlined for different items for measuring altruism.

Dataset and Calibration

Data calibration, which allocates all variables a value between 0 and 1, is the most critical phase in the fsQCA research method (Ragin, 2013). The fsQCA technology requires that researchers not only make conscious choices but also explain them (Ragin, 2013). The basic criteria for designing fuzzy-sets entails calibrating membership ranking, thus calibration should not be mechanical (Ragin, 2013). Notably, researchers choose how many fuzzy sets to use, depending on study requirements (Ragin, 2013). Given that types of rumors and the corresponding causes are complex, this paper adopts the direct method, with percentile-based qualitative breakpoints, to guarantee the rationality of variable assignment. The percentile is used to complete data calibration, because the data can be biased. Particularly, 90% represents the full in-set membership, whereas 10 and 50% denote full out-set and intermediate set membership, respectively. The value of each variable is calibrated according to the logic function, which is suitable for the above three anchor points integrated into the fsQCA software. A summary of breakpoints is outlined in **Table 2**. The proportional reduction in inconsistency (PRI) should be higher than 0.70, while most coverage values range from 0.25 to 0.65 (Woodside, 2013; Kraus et al., 2018). Finally, the fsQCA method proposes that the researcher interprets three sets of solutions, namely the complex, parsimonious, and intermediate results. A summary of the variables, calibrations and descriptive statistics is presented in **Table 2**.

RESULTS

Necessary Conditions

Necessity conditions for each variable should be verified before building the truth table. Briefly, necessary condition refers to circumstances that must exist to generate a result, but whose presence does not necessarily cause the result to occur. Necessary conditions for sharing and not sharing positive and negative rumors are outlined in **Tables 3**, **4**. However, the agreement value of all conditions is less than 0.9, suggesting that dissemination of positive and negative rumors does not require necessary conditions. This affirms the need to analyze the effect of conditional configuration on positive and negative rumors.

Sufficiency Analysis for Sharing Positive and Negative Brand Rumors

FsQCA findings regarding study configuration, solution coverage, and solution consistency are outlined in **Tables 4**, **5**. The large symbols ● (present) and ⊗ (absent) denote core conditions, whereas small ones ● (present) and ⊗ (absent) represent peripheral conditions (Fiss, 2011). Blank spaces indicate Do not care solution. The overall solution coverage shows the degree to which sharing or not sharing positive and negative rumors can be calculated, based on a set of configurations. Overall, the findings show that the total consistency rate that makes people to share or not share positive and negative rumors approaches the agreed threshold of 0.80.

Configurations for Sharing and Absence Sharing Positive Rumors

Three first-level solutions cause people to spread positive rumors, and these have solution coverage and consistency of 0.598 and 0.932, respectively. Firstly, SPR1a, SPR1b, and SPR1c research findings indicate that emotional stimulation of hope plays an important role in spread of positive rumors. However, the likelihood of consumers spreading rumors solely based on hope is low, and requires an interaction with other conditions. For instance, SPR1b results demonstrate that individuals employ relationship management and self-improvement motivations to actively share positive brand rumors. In fact, the likelihood of them sharing these rumors is high, as evidenced by a Raw coverage of 0.335 and a Consistency of 0.970.

Secondly, altruism and the relationship management motivations of egoism do not conflict in the behavior of

TABLE 2 | Sets, calibrations and descriptive statistics after calibrations regarding positive and negative rumours.

	Fuzzy-set calibrations			Descriptive statistics					
	Full out	**Crossover**	**Full in**	**Mean**	**SD**	**Min**	**Max**	***N* Cases**	**Missing**
Positive rumors sets									
SR	2	4	6	0.588	0.320	0.01	0.99	208	0
Hope	2.667	4.667	6	0.498	0.330	0.01	0.99	208	0
HM	3.25	5.25	6.5	0.486	0.319	0.01	0.99	208	0
Trust	2.5	4.5	6.25	0.516	0.324	0.01	0.99	208	0
RM	2.225	4	5.75	0.488	0.336	0.01	0.99	208	0
SI	3.25	4.75	6.25	0.494	0.369	0.01	0.99	208	0
Altruism	3.5	5	6.5	0.491	0.344	0	0.98	208	0
Negative rumors sets									
SR	3	5	7	0.518	0.328	0	0.95	208	0
Anxiety	3	4,667	6	0.481	0.329	0	0.99	208	0
HM	3.25	5	6.5	0.522	0.32	0.01	0.97	208	0
Trust	2.725	4.5	6	0.508	0.335	0.01	0.99	208	0
RM	2	3.75	5.25	0.503	0.33	0.01	0.99	208	0
SI	2.725	4	5.5	0.483	0.362	0	1	208	0
Altruism	3.75	5.25	6.5	0.523	0.357	0	0.99	208	0

SR, Sharing Rumors; HM, Herd Mentality; RM, Relationship Management; SI, Self-improvement.

TABLE 3 | Outline of necessary conditions required for sharing positive and negative rumors.

Outcomes: Sharing positive rumors			Outcomes: Sharing negative rumors		
Rumors sets	**Consistency**	**Coverage**	**Rumors sets**	**Consistency**	**Coverage**
Hope	0.691	0.816	Anxiety	0.705	0.758
∼Hope	0.528	0.617	∼ Anxiety	0.541	0.541
HM	0.695	0.841	HM	0.733	0.727
∼HM	0.531	0.607	∼HM	0.511	0.555
Trust	0.638	0.726	Trust	0.651	0.663
∼Trust	0.568	0.691	∼Trust	0.573	0.604
RM	0.653	0.786	RM	0.694	0.714
∼RM	0.550	0.632	∼RM	0.542	0.565
SI	0.656	0.781	SI	0.632	0.677
∼SI	0.511	0.593	∼SI	0.557	0.558
Altruism	0.671	0.804	Altruism	0.690	0.684
∼ Altruism	0.532	0.615	∼ Altruism	0.524	0.569

HM, Herd Mentality; RM, Relationship Management; SI, Self-improvement. ∼ means the absence of. For example: ∼ Self-improvement = absence of Self-improvement.

consumers who spread positive brand rumors (SPR1a and SPR3a), implying that both altruistic and reciprocal behaviors can exist concurrently in personal behavior. This phenomenon, which was confirmed by West et al. (2007), is attributed to the fact that consumers make altruistic judgments for their benefit or act altruistically for mutual benefit in weak altruistic behavior. SPR1a and SPR3b results reflect the altruistic behavior of consumers who spread rumors to improve their chances of developing a long-term relationship. For instance, consumers are likely to share rumors with others when they have hope and are motivated by relationship management and altruism (SPR1a). According to the theory of social contagion, consumers are likely to share positive brand rumors with others (SPR3a) upon influence by herd mentality (core condition), when they encounter relationship management and self-enhancement motivation, or altruism.

Thirdly, consumers are likely to spread positive brand rumors even without stimulation by hope emotions. SPR2 research findings indicate that consumers are likely to spread positive brand rumors under the guise of herd psychology, if they believe them to be true and get a strong motivation to actively spread them (relationship management and self-enhancement motivation).

Fourthly, although trust affects a consumer's decision to spread positive rumors, we have discovered that they will spread them even if they do not trust them (SPR1c and SPR3b). Specifically, SP1c results indicate that consumers are still willing to share positive rumors with others under the combined

TABLE 4 | Configurations for sharing and absence sharing positive rumors.

	Sharing positive rumors solutions						Absence sharing positive rumors solutions	
	SPR1a	**SPR1b**	**SPR1c**	**SPR2**	**SP3Ra**	**SPR3b**	**∼SPR1**	**∼SPR2**
Hope	●	●	●	⊗			⊗	⊗
HM		●	●	●	●	●	⊗	⊗
Trust			⊗	●		⊗	⊗	
RM	●	●			●	⊗		●
SI		●		●	●	●	⊗	⊗
Altruism	●		●	●	●	⊗	⊗	⊗
Raw coverage	0.388	0.335	0.293	0.192	0.308	0.177	0.397	0.310
Unique coverage	0.065	0.051	0.046	0.005	0.0224	0.028	0.122	0.035
Consistency	0.949	0.970	0.955	0.940	0.975	0.934	0.907	0.931
Solution coverage: 0.598							Solution coverage: 0.432	
Solution consistency: 0.932							Solution consistency: 0.892	

HM, Herd Mentality; RM, Relationship Management; SI, Self-improvement; SPR, Sharing Positive Rumors; ∼ means the absence of. For example: ∼ SPR, absence of Sharing Positive Rumors. The large symbols ● (present) and ⊗ (absent) denote core conditions. The small symbols ● (present) and ⊗ (absent) denote peripheral conditions. Black spaces indicate "don't care."

TABLE 5 | Configurations for sharing and absence sharing negative rumors.

	Sharing negative rumors solutions				Absence sharing negative rumors solutions			
	SNR1a	**SNR1b**	**SNR1c**	**SNR2**	**∼S NR1**	**∼S NR2**	**∼S NR3a**	**∼S NR3b**
Anxiety	●	●	●		⊗	⊗	⊗	⊗
HM		●	●	●	⊗		⊗	⊗
Trust	●	●		⊗	⊗	⊗	●	●
RM	●	●	●	●		⊗	●	⊗
SI	⊗		●	●	⊗	⊗		●
Altruism	●	●	●	●	⊗	●	⊗	
Raw coverage	0.222	0.304	0.281	0.214	0.304	0.256	0.256	0.252
Unique coverage	0.022	0.001	0.004	0.0248	0.106	0.010	0.0306	0.047
Consistency	0.923	0.909	0.915	0.927	0.927	0.909	0.900	0.900
Solution coverage: 0.396						Solution coverage: 0.551		
Solution consistency: 0.919						Solution consistency: 0.871		

HM, Herd Mentality; RM, Relationship Management; SI, Self-improvement; SNR, Sharing Negative Rumors; ∼ means the absence of. For example: ∼ SNR, absence of Sharing Negative Rumors. The large symbols ● (present) and ⊗ (absent) denote core conditions. The small symbols ● (present) and ⊗ (absent) denote peripheral conditions. Black spaces indicate "don't care."

influence of altruism and herd psychology to possibly profit the recipients, even if the consumers distrust these rumors when hope stimulates positive emotions in them. However, if the consumer is self-centered and lacks an altruistic spirit, positive brand rumors will continue to spread due to the herd mentality and self-improvement motivation (SPR3b).

There are two configurations for preventing the spread of positive brand rumors, namely Overall coverage = 0.432, and Consistency = 0.892. Study findings indicate that in order to prevent the spread of positive rumors it is critical to dispel consumers' hope emotions, herd mentality, relationship management motivation, and altruism. Furthermore, ∼SPR1 results indicate that removal of a consumers' trust in rumors significantly increases the likelihood of spreading positive rumors (Raw coverage = 0.397, Consistency = 0.907). Indeed, relationship management alone cannot subjectively motivate consumers to spread positive brand rumors (∼SPR2).

Configurations for Sharing and Absence Sharing Negative Rumors

Two first-level solutions, with coverage and consistency values of 0.396 and 0.919, respectively, make individuals to spread negative brand rumors. Firstly, the research findings indicate that emotions also play a significant role in the spread of negative brand rumors (SNR1a, SNR1b, and SNR1c). Notably, negative brand rumors increase consumers' anxiety, compared to positive ones. However, anxiety-based emotional stimulation alone cannot sufficiently promote the spread of negative brand rumors, but requires a synergistic interaction with other factors. For instance, SNR1b results demonstrate that when negative brand rumors make consumers to experience anxiety emotions and herd mentality, they are likely to believe the rumors, and spread them to others out of altruism (with the aim of preventing harm to the interests of the recipients) and relationship management motivation.

Secondly, coexistence of relationship management motivation and altruism is more pronounced across all paths used to spread negative brand rumors. This means that that negative brand rumors are likely to harm the interests of individuals who buy these brand products. Therefore, consumers may spread negative brand rumors with the aim of not only reducing damage to the interests of other consumers (altruism), but also due to motivation to strengthen their relationship with them. For instance, SNR1a results demonstrate that consumers are likely to promote the spread of negative brand rumors without relying on self-reinforcing motivation when anxiety, relationship management motivation, and altruistic motivation are the primary motivating factors.

Thirdly, in the context of negative brand rumors, this study's findings also demonstrate that consumers are likely to spread negative brand rumors even if they do not believe in them. Consumers, will spread negative brand rumors (SNR2) due to herd mentality, relationship management, self-enhancement, and altruism. Additionally, negative brand rumors will be spread regardless of whether or not consumers trust the rumor, mainly due to existence of other cause conditions (SNR1c). To prevent the spread of negative brand rumors, three first-level solutions, are suggested. From the study results, it is evident that all configuration paths indicate the importance of reducing anxiety emotion generation. For example, ∼SN1 results demonstrate that, assuming that the motivation for consumer relationship management is irrelevant, limiting the occurrence and effect of other factors can help prevent generation of negative brand rumors. However, this is a difficult prospect in real life. On the other hand, ∼SNR2 results demonstrate that altruistic motivations alone are cannot sufficiently fuel the spread of negative brand rumors. In other words, altruists will not share negative brand rumors if they do not trust them, are not stimulated by anxiety, and lack motivation for relationship management as well as self-improvement. ∼SNR3a and ∼SNR3b results emphasize the importance of anxiety and conformity, even if consumers believe in negative brand rumors. Specifically, ∼SNR3a results demonstrate that reading negative brand rumors do not affect consumers' anxiety, herd mentality, or altruistic motives, and even if they believe the negative brand rumors and are motivated by relationship management, they may still choose not to spread the rumor. On the other hand, ∼SNR3b results demonstrates that trust and self-improvement motivation alone is insufficient to facilitate the spread of negative brand rumors.

Robustness Checks

The robustness test is an important part of fsQCA analysis. Specific methods of set and statistical theories are commonly used for robustness testing. Increasing the PRI is a better way to do robustness test. Therefore, we increased the PRI consistency from 0.7 to 0.75, while the configuration of positive and negative rumors sharing remained largely unchanged, respectively, and found that this resulted in a stable outcome. The details in **Appendices B,C**.

DISCUSSION, IMPLICATIONS AND CONCLUSION

Discussion and Conclusion

Numerous studies have solely focused on sources of negative rumors (Buckner, 1965; Fine, 2007; Kapferer, 2013), the conventional rumor transmission pathway before the internet (Caplow, 1947; Buckner, 1965), the integrated rumor pathway model on the internet and how to minimize the negative effect of rumors (Oh et al., 2013; Arif et al., 2016). Although many scholars have studied the spread of rumors and suggested a variety of remedies (Shah and Zaman, 2011; Pan et al., 2018), rumors are still prevalent, a phenomenon that threatens personal, brands and social interests. Collectively, these pieces of evidence indicate that the spread of rumors is a result of a combination of complex factors, and cutting off simply signal transduction may not prevent their spread. Therefore, investigating the spread of rumors, from a multi-dimensional perspective, coupled with the determination of how to prevent their spread, is imperative to effective prevention of the associated negative outcomes.

We investigated psychological motivations that make consumers spread positive and negative brand rumors, then compared similarities and differences between configurations that cause this spreading. Results indicated that emotional stimulation plays a critical role in the spread of both positive and negative rumors. Specifically, positive and negative rumors primarily arouse a consumer's feelings of hope and anxiety, respectively. In addition, we found that altruism and relationship management motivation (self-interest) can coexist, whether the rumors are positive or negative. This indicates that multiple influencing factors need to be considered when analyzing motivations for the dissemination of brand rumors because the seemingly contradictory antecedents may aid in the spread of brand rumors. Furthermore, our results demonstrated that consumers continue to spread positive and negative brand rumors even though they do not trust them, indicative of the propagation characteristics of uncertain information, according to social contagion theory. Finally, the distinction between paths used to spread positive and negative brand rumors is largely determined by the conditions controlling each configuration (see the "Result" section).

Theoretical Implication

Firstly, this research discusses the psychological factors that make people to spread brand rumors. These include an individual's passive and active psychological motivation, personal trust perception, as well as how to prevent the spread of brand rumors using a combination of the above factors. Unlike previously fragmented research, this study delves deeply into the correlation and combination of numerous factors, such as active rumor sharing and passive psychological stimulation, thereby enriching research on rumor spreading. Our findings indicate that numerous factors, and their combinations, contribute to the spread of positive and negative brand rumors. Notably, these causes are complex,

and a single one may not effectively contribute to the spread of a crazy rumor.

Secondly, this research contributes to the development of a new theoretical perspective on consumer behavior and the spread of rumors. This study compares the combinations of the main psychological motivations that different rumor properties incite people to spread them, revealing the heterogeneity of the psychological stimuli that confront people with different rumor properties. Moreover, based on social cognition theory, brand rumor sharing is the result of a combination of group and individual psychology, and it is difficult for a single positive or negative motivation to drive people to spread rumors.

Third, with regards to the methodology, previous studies have analyzed pure logical discussion, experiment, structural equation modeling or multiple regression analyses, focusing on one or more dependent variables with a significant influence and net-effect on various main factors. However, these analyses have completely ignored causal linkage and interdependence between variables (Woodside, 2013). In reality, wild rumors are generated by a combination of several factors, and each element has the different effect. The present study is the first report on the use of fsQCA to describe psychological motivation of rumor spreading from a set theory standpoint. Our results not only reveal the combination of factors that affect positive and negative rumor spreading but also demonstrate the disparity between the combinations. These findings are expected to provide valuable solutions to prevent the spread of positive and negative rumors.

Practical Implications

When faced with rumors against their brands, companies will issue a statement to dispel these rumors. However, brand rumors will continue to spread if the company's clarification statement is ineffective. Although eliminating uncertainty is one of the most effective ways to combat positive and negative rumors, full eradication of uncertainties in the short term is difficult, necessitating identification of additional methods. Results from the present study indicate that stopping the spread of rumors requires blocking many factors. Consequently, we have suggested different pathways for stopping or slowing down this spread. Notably, positive or negative rumors that can potentially hurt the brands or customers' long- or short-term interests, should be taken seriously.

Businesses often ignore positive brand rumors, that are beneficial to sale in the short term but could damage the value of the brand in the long term. These should be treated more cautiously. Brands may gain a lot of sales and profits in a short period. However, if the positive rumors are proven to be false, they are likely to cause significant damage to the brand, by causing loss of consumers' trust and harming brand reputation. When faced with positive rumors, companies should quickly and widely make comprehensive statements to crush the false expectations generated by these rumors, and gain customer trust in the brand as soon as possible. In addition, distributing real information to fight rumors, by taking advantage of the psychology of some customers who share the information with the aim of boosting their impact and close relationships with others, is imperative to limiting damage. Companies need to broadly spread the correct information to prevent rumors from stimulating consumers' herd conformity.

Negative brand rumors are sometimes detrimental to companies. When faced with interference from negative rumors, brands are advised to react swiftly using a variety of steps to minimize spread and the associated losses. Reducing the anxiety caused by rumors has become a key focus for companies, mainly because negative rumors trigger fear among consumers. Rather than denying that the rumors have nothing to do with the brand, companies need to debunk them by showing that these rumors are false. Notably, several rumors which are not based on fear may still be widely circulated among consumers, mainly because this certain customer enjoy following the public's choices. For instance, since consumers who have a herd mentality tend to believe in public opinions, encouraging and promoting the right behavior to minimize herding effect represents another way to squash rumors. Besides, sincere statements, as opposed to rigid official ones, can enhance consumers' trust. This is because they boost a consumers' willingness to share information, although this time correct information is used to repel rumors.

Limitations and Future Research

This study had some limitations. Firstly, although we identified factors that promote spread of positive and negative rumors, and the pathways that slow down these pathways, this classification only helps marketers to cope with various types of rumors but does not measure the effect of positive and negative rumors in detail. Further research is needed to determine the effect of spreading positive or negative rumors on a consumer's purchasing intention or loyalty. Secondly, we did not examine the time dimension, despite the fact that consumers are likely to have altered the path of positive or negative brand rumors over time. Further explorations are needed to ascertain the configuration pathways of positive or negative brand rumors from the rumor's life cycle standpoint. Future studies are needed to verify numerous brand rumors across different industries, as well as the effect of combining fsQCA with other research methods.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the patients/participants was not required to participate in

this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

XZ and HZ contributed to the conception and design of the study. CX organized the database. YH performed the statistical analysis. XZ wrote the first draft of the manuscript. All authors contributed to manuscript revision, read, and approved the submitted version.

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APPENDIX

Appendix A | Rumor messages used in this study (Brands have been masked).

No.	Message	Credibility	Novelty	Valence	Product
1.	While many people are unfamiliar with camel milk, it has long been regarded as an irreplaceable nutritional commodity in a number of countries. Recently, a Kenyan camel milk company teamed up with the Institute of Medicine to conduct research on the role of camel milk in the prevention and treatment of diabetes and coronary artery disease. Camel milk is very similar to human breast milk, and milk contains several immunologically active protein factors. Camel milk contains three times the vitamin D found in milk. Camel milk contains more than three thousand times the amount of insulin found in milk. Then, an analysis of the components of camel milk reveals that it contains a number of hypoglycaemic factors that can help regulate diabetes-related blood sugar levels.	High	High	Positive	Milk
2.	Breakfast is the most vital meal of the day. Oatmeal is a popular breakfast choice for many people. They believe they are nourishing and safe. However, there have been reports recently that the glyphosate content of 26 international oat brands' products exceeds the standard and may cause cancer if consumed in large amounts for an extended period of time.	High	High	Negative	Oat
3.	After washing rice, many individuals pour out the rice-washing water, but in fact, rice-washing water contains many nutrients and is a natural and safe detergent! Rice-washing water can enable the skin to cleanse and eliminate oil and whitening effects. In rice water, rice bran oil is rich in vitamins B and E, which are capable of protecting the skin against ultraviolet radiation and preventing the development of melanin to whiten the skin.	Low	Low	Positive	Rice Water Cosmetic
4.	Not only do some middle-aged and elderly people have gout today, but many young people have gout sickness. Gout is painful. Gout originates in the human body from the accumulation of uric acid, and uric acid is a purine metabolite. High-protein diets have higher levels of purine and are not ideal for patients with gout. Patients with gout need to be very careful about their diet. Many people claim that soy products are very high in nutritional value, but it contains a lot of calcium. Gout patients should not eat more because tofu contains a certain amount of purine, after eating, gout patients may be more harmful to the body.	Low	Low	Negative	Beans
5.	Recently, an article reported that a 14-year-old girl frequently ate breakfast bread from Brand A and had bowel cancer. Children often eat breakfast bread, according to physicians, excessive consumption of fine grains can affect nutrition and cause cancer. The little bread is in truth, full of poison! First, a lot of "carcinogenic" saccharin is contained in sweet noodles. Some studies suggest that excessive saccharin can cause cancer, and it is not good for human health to consume significant quantities of this synthetic chemical in the long term. Second, the risk of cardiovascular disease increases with emulsifiers.	Low	High	Negative	Food Additives
6.	People spend more time looking at the cell phone screen in the age of smartphones, but mobile phone displays, LEDs, and computer screen lights all create a lot of blue light that will damage the eyes and hands of people, trigger brown pigments, and make skin Macular spots and freckles will deepen the degree of myopia and cause visual fatigue. It is not conducive to normal sleep either. Scientific research has shown that the blue light emitted by electronic product screens can influence users' eye health, especially causing childhood and adolescent myopia. To achieve the successful blocking of blue light, the blue light cell phone film adopts blue light blocking technology to absorb and transform blue light. It can effectively block ultraviolet rays, short-wave blue rays, soft and dazzling stimulation of the light source.	Low	High	Positive	Anti-blue Glasses
7.	The grape seed extract is a nutritious food that is processed from effective active nutrients derived from vitamin E and other key raw materials from natural grape seeds. The extract of grape seed is a pure natural product and one of the most effective antioxidants found so far from plant sources. Tests have shown that it has 30-50 times the antioxidant effect of vitamin C and vitamin E. There are anti-aging properties of grape seed extract.	High	Low	Positive	Anti-aging drugs
8.	Formaldehyde, pungent odor, colorless gas, scratching human eyes and nose. Its irritation of the skin and mucous membranes is the main risk of formaldehyde. Formaldehyde is a toxic virgin substance that when inhaled in high concentrations, can bind to proteins, and cause severe respiratory tract irritation, oedema, eye irritation, and headache. Allergic dermatitis, stains, and necrosis may be caused by direct skin contact with formaldehyde.	High	Low	Negative	For maldehyde

Appendix B | Robustness checks of sharing and absence sharing positive rumors.

	Sharing positive rumors solutions						Absence sharing positive rumors solutions
	SPR1a	**SPR1b**	**SPR1c**	**SPR2**	**SPR3a**	**SPR3b**	**~SPR1**
Hope	●	●	●	●	⊗		⊗
HM		●	•	●	●	•	⊗
Trust			⊗	⊗	•	•	⊗
RM	●	•				•	
SI		●		●	●	•	⊗
Altruism	●		●		●		⊗
Raw coverage	0.388	0.335	0.293	0.260	0.192	0.308	0.397
Unique coverage	0.065	0.037	0.020	0.013	0.013	0.022	0.397
Consistency	0.949	0.970	0.955	0.970	0.940	0.975	0.907
Solution coverage: 0.583							Solution coverage: 0.397
Solution consistency: 0.936							Solution consistency: 0.907

HM, Herd Mentality; RM, Relationship Management; SI, Self-improvement; SPR, Sharing Positive Rumors; ~ means the absence of. For example: ~ SPR, absence of Sharing Positive Rumors. The large symbols ● (present) and ⊗ (absent) denote core conditions. The small symbols • (present) and ⊗ (absent) denote peripheral conditions. Black spaces indicate "don't care."

Appendix C | Configurations for sharing and absence sharing negative rumors.

	Sharing negative rumors solutions		Absence sharing negative rumors solutions		
	SNR1a	**SNR1b**	**~SNR1**	**~SNR2**	**~SNR3**
Anxiety	●	●	⊗	⊗	⊗
HM		●	⊗	⊗	⊗
Trust	●		⊗		●
RM	●	●	⊗	•	⊗
SI	⊗	•	⊗	⊗	●
Altruism	●	●		⊗	⊗
Raw coverage	0.222	0.281	0.306	0.255	0.210
Unique coverage	0.089	0.147	0.118	0.062	0.0536
Consistency	0.923	0.915	0.926	0.924	0.932
Solution coverage: 0.396			Solution coverage: 0.442		
Solution consistency: 0.919			Solution consistency: 0.915		

HM, Herd Mentality; RM, Relationship Management; SI, Self-improvement; SNR, Sharing Negative Rumors; ~ means the absence of. For example: ~ SNR, absence of Sharing Negative Rumors. The large symbols ● (present) and ⊗ (absent) denote core conditions. The small symbols • (present) and ⊗ (absent) denote peripheral conditions. Black spaces indicate "don't care."

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ORIGINAL RESEARCH
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Study on the Compromise Effect Under the Influence of Normative Reference Group

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The compromise effect is an important context effect, but its research is still insufficient under the influence of social factors and purchase tasks. This study explores the change of compromise effect in different group norm scenarios by constructing three different group norm reference points. Three conclusions were drawn. First, the compromise effect always exists under the influence of different groups' normative reference points if there is a compromise effect in a product set. Second, the effect value of the compromise effect will be significantly different with the change of group norm reference point. Third, group norms can indeed induce the compromise effect. Therefore, these findings would help to further enrich the literature results of the compromise effect and strengthen its application in marketing practice.

Keywords: reference group, compromise effect, consumer choice, experimental study, group norms

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INTRODUCTION

Consumers often face a choice set composed of multiple products when making purchase decisions. The probability of a product being selected often depends on the relative position of the product in a specific selection set (Novemsky et al., 2007), resulting in some context effect (or Decoy effect), such as compromise effect, attraction effect, and perceptual focus effect (Simonson, 1989; Simonson and Tversky, 1992; Reb et al., 2018; Banerjee et al., 2020). The compromise effect is one of the important context effects. It poses a severe challenge to the traditional preference consistency assumption and has important theoretical significance. At the same time, it is also widely used in product display, advertising, and other marketing practices. Although previous studies have carried out a lot of research on the occurrence mechanism and influencing factors of the compromise effect, relevant studies mainly focused on individual factors (Simonson, 1989), product factors (Mourali et al., 2007; Yoo et al., 2018), and purchase process (Hamilton et al., 2007), ignoring the social environment, purchase tasks, and etiquette situations. In addition, during the research process, some scholars believe that the experimental conditions of context effect are very difficult to achieve, so its effectiveness in practice is questionable (Frederick et al., 2014; Yang and Lynn, 2014).

Huber et al. (1982) considered that "group norms" may be one of the reasons for the context effect when studying the attraction effect. Simonson (1989) also incorporated the influence factors of the reference group in the study of the compromise effect. For example, in the experiment, subjects were asked to consider the evaluation of their classmates on the results of their choice behavior, but some of his hypotheses were not fully confirmed. According to the reference group theory, the product selection is more vulnerable to the norms of the reference group only when the product has the characteristics of public or luxury (Bearden and Etzel, 1982). By analyzing the experimental process of Simonson (1989), it can be found that the products selected in the

experiment do not meet the characteristics of display or luxury, which may be an important reason why his hypothesis has not been fully verified. Therefore, the choice of experimental products is very important because it may affect the experimental results. This study measures group norms based on the perspective of face in the Chinese context, because consumers will be affected by the norms of the reference group when they are involved in "face" consumption decisions, to determine the appropriate test scenario. In conclusion, further research on the compromise effect under the influence of reference group norms will help to further enrich the literature results of the compromise effect and strengthen its application in marketing practice.

LITERATURE REVIEW AND HYPOTHESIS

Compromise Effect

Simonson (1989) put forward the concept of compromise effect based on the research of Huber et al. (1982). When a product becomes a compromise product or intermediate product, even if there is no advantage relationship, its possibility of selection will rise. Specifically, if the third product C is added to the core product sets A and B, compared with product B, product C is not at a disadvantage, but the market share of product B has increased significantly. This phenomenon is the so-called compromise effect. That is, the compromise effect occurs when products change from extreme products to intermediate products (Khan et al., 2011).

The compromise effect originates from the changing process of consumers from standard conflict to standard reconciliation in the selection process, so its occurrence is a complex cognitive process (Dhar and Simonson, 2003). Some factors may lead to the phenomenon of compromise choice, such as complexity of decision-making (Simonson, 1989; Novemsky et al., 2007), consumer choice motivation (Mourali et al., 2007), and product attribute imbalance (Simonson and Tversky, 1992). The method proposed by Mourali et al. (2007) can be used to calculate the compromise effect value. If A is a competitive product, B is a target product, and C is a temptation product, P(A;B,C) and P(B;A,C) represent the selected share of products A and B in the extended set {A,B,C}, respectively, and P_C (B; A) represents the selected share of product B relative to product A in the extended set {A,B,C}, then:

$$P_C(\mathrm{B};\,\mathrm{A}) = \frac{\mathrm{P}(\mathrm{B};\,\mathrm{A},\,\mathrm{C})}{\mathrm{P}(\mathrm{B};\,\mathrm{A},\,\mathrm{C}) + \mathrm{P}(\mathrm{A};\,\mathrm{B},\,\mathrm{C})}$$

Then the compromise effect value (generally calculated by the difference of proportions) is equal to:

$$\Delta \mathrm{P_B} = \mathrm{P_C}(\mathrm{B};\,\mathrm{A}) - \mathrm{P}(\mathrm{B};\,\mathrm{A})$$

Whether ΔP_B is significant can be tested by the chi-square test. Since the compromise effect obeys binomial distribution, according to the large sample normality principle of maximum likelihood estimation parameters, Z statistics can also be constructed for testing.

Reference Group and Its Normative Influence

Simonson (1989) believes that when consumers face decision-making difficulties and "correct" their behavior, they will increase their preference for compromise products. Mourali et al. (2007) objected to this. They believed that the "correction" of consumers' motivation orientation was the key reason for the formation of the compromise effect. Normative influence may lead to group punishment for consumer's choice (Childers and Rao, 1992). Loss aversion may change consumer's choice motivation orientation, such as forcing them to shift from pursuing product attribute function to pursuing product social function (White and Dahl, 2006). To please the reference group, consumers buy more "safe" compromise products (Simonson, 1989) to avoid being criticized by the reference group. For Chinese people who prefer the golden mean (middle is the right choice in the world; normal is the fixed word on earth), making a compromise choice may itself be a potential social norm.

It is assumed that the following product preference order "$A \prec B \prec C$" meets the group specification. When the product specifications (such as quality and price) selected by consumers are not lower than the specifications of the reference group, we call it "specification consistency" behavior. Suppose there is a product set {A, B, C} with a compromise effect, where A is a competitive product, B is a target product, and C is a temptation product. The cost that consumers need to pay for purchasing the product (including price, time, and physical strength) is A $<$ B $<$ C. When consumers make a consumption, the preference order of referring to the group norms is $A \prec B \prec C$. We establish the following analysis framework.

Reference Group Norms Take Competitive Products as the Reference Point

According to the reference dependence theory (Tversky and Kahneman, 1991), the consumer's choice of any product in the product set is a "normative consistency" behavior when the group norm takes the competitive product (product A) as the reference point. When consumers choose product A, the benefits obtained by them include the benefits of product function. When choosing product B or C, consumers will not only get the functional benefits of the product but also will pay higher purchase costs. Because the purchase of product A is in line with the norms, according to the principles of loss aversion and diminishing sensitivity (Tversky and Kahneman, 1992), whether consumers buy product B or C will not be constrained by the group norms. That is, in the scenario where the group norms are very easy, consumers will mainly choose according to the product attributes rather than the group norms. Therefore, we propose the following hypotheses.

> Hypothesis 1: The compromise effect still exists when the reference group norms take product A (competitive product) as the reference point.

Hypothesis 2: The compromise effect value will not change significantly when the reference group norms take product A (competitive product) as the reference point.

Group Norms Take Core Products as the Reference Point

When the group norm takes product B as the reference point (that is, choosing product B or C is the "norm consistency" behavior), if consumers choose product A, their group image income with "face" as the core is negative (White and Dahl, 2006). If consumers are sensitive to the normative impact of the group and based on loss aversion, they will give up the choice of product A. Choosing product B is in line with the norms and the "golden mean" of Chinese people in terms of group norms. Therefore, consumers will not cater to product C which is more expensive. Under the joint action of compromise effect and group norms, the market share of competitive product (product A) will be lost, and the compromise effect will be significantly strengthened. Therefore, we propose the following hypotheses.

Hypothesis 3: The reference group norms will strengthen the compromise effect and the compromise effect will increase significantly when the group norms take the target product (product B) as the reference point.

Hypothesis 4: The effect value of the compromise effect reaches the maximum when the group norms take the target product (product B) as the reference point.

Group Norms Take Temptation Products as the Reference Point

When the group specification takes product C (temptation product) as the reference point, because a certain attribute of product C is obviously different from products A and B, whether consumers choose product A or B is not the behavior of "specification consistency." Due to loss aversion, group norms will significantly reduce the probability of selecting the target product (product B) and another endpoint product (product A), and significantly increase the probability of selecting the temptation product (product C), resulting in another extreme reversal–polarization phenomenon (Simonson and Tversky, 1992). Since the competitive product (product A) deviates furthest from the group norms, the market share of product A suffers more than that of product B, which will lead to the existence of the compromise effect. Therefore, we assume that:

Hypothesis 5: The compromise effect still exists when the reference group norms take the temptation product (product C) as the reference point.

Hypothesis 6: The group norms pressure will lead to the polarization of preference for temptation products in the selection results when the reference group norms take the temptation product (product C) as the reference point.

METHODS AND RESULTS

Pilot Study

The pre-test mainly tests whether the product selection can distinguish different group norms pressure. Through discussion with college students (majoring in Marketing), they believe that restaurant hospitality can better show the public and luxury characteristics of Bearden and Etzel (1982). Through the research conclusion of Li and Su (2007) on the relationship between "face" and reference group norms, students believe that they can choose the "dining environment" and "total consumption amount" of restaurants to test the pressure of reference group norms faced by consumers when choosing restaurants. Referring to the compromise effect experiment of Simonson (1989), the students recommended three restaurants around the school (restaurants A, B, and C). We approximate the dining environment of three restaurants provided by students (0 = worst and 100 = best) and the total consumption amount of two people (unit: RMB) to form the following ternary product set (**Table 1**).

Then, we invited 123 college students to conduct a questionnaire test on the group norms pressure of restaurant selection. The questionnaire contains three test scenarios: "(scenario 1) suppose that classmate Zhang chose restaurant B for dinner and classmate Li chose restaurant A for dinner. Please choose classmate Li's treat behavior according to your own feelings and in combination with the Chinese view of the face: 1 = lose face; 2 = fight for face; and 3 = up to face." Scenario 2 and scenario 3 replace restaurant A in scenario 1 with restaurant B and restaurant C, respectively. The experimental design adopts the between-group experiment, and the test results are shown in **Table 2**. When classmate Zhang treats to restaurant B, if classmate Li chooses restaurant A, 82.93% of the subjects think it is a kind of "losing face" (lower than the group norm). If choosing restaurant B, 85.37% of the subjects thought it was a kind of "fight for face (in line with group norm)." If choosing restaurant C, 80.49% of the subjects think it is an "up to face" behavior (higher than the group norm)." Therefore, the product set in **Table 1** can be used to represent three different group consumption norms ($\chi^2 = 417.64$ and $p < 0.01$).

Study 1

Method

This study mainly tests whether there is a compromise effect in the experimental product set. To meet the requirements

TABLE 1 | Experimental product set and product attribute composition.

Product set	Product attribute	
	Dining environment (0 = worst 100 = best)	Total consumption amount
Restaurant A	70	100
Restaurant B	80	180
Restaurant C	90	260

TABLE 2 | Consumer's perception of group norm pressure when the reference point is product B.

Group norm pressure		Restaurant A	Restaurant B	Restaurant C
Lower than the group norm	Losing face	102 (82.93%)	6 (4.88%)	0 (0.00%)
In line with group norm	Fight for face	18 (14.63%)	105 (85.37)	24 (19.51%)
Higher than the group norm	Up to face	3 (2.44%)	12 (9.76%)	99 (80.49%)
Total		123 (100%)	123 (100%)	123 (100%)

of the reference group's norms on products (or services), we chose the restaurant in the pre-experiment as the experimental product. Referring to the experimental process of Simonson (1989) and Chuang and Yen (2007), we verify the compromise effect and set up a binary product set {restaurant A, restaurant B}, including competitive products and target products. On this basis, temptation products are added to form a ternary product set {restaurant A, restaurant B, restaurant C}. The subjects were shown two attributes of the restaurant: the dining environment and the total amount of consumption for two people (**Table 3**).

Manipulation

We set up two experimental scenarios. Scenario 1 is: "if you invite a classmate to dinner, there are two restaurants A and B to choose from. Except for the difference between the dining environment (0 = worst and 100 = best) and the total amount of consumption, other aspects are similar (such as dish quality and hygiene conditions), which restaurant would you choose?" Scenario 2 expands the restaurant into three restaurants A, B, and C. To avoid the significant influence of the "correction" behavior of the subjects on the compromise effect (Simonson, 1989), a between-group design was used in the experiment. A total of 60 volunteers were recruited and randomly assigned to two experimental scenarios. Subjects choose products according to their experimental scenario.

Results

The product selection results of consumers under scenario 1 (binary product set) and scenario 2 (ternary product set) are shown in **Table 4**. In scenario 1, the probability of subjects choosing restaurant B is p (B; A) = 20%. After adding temptation product restaurant C (scenario 2), the probability of subjects choosing restaurant B is p (B; A, C) = 53.3%, and the probability of choosing restaurant A is p (A; B, C) = 36.7%. Then in the extended ternary product set {A, B, C}, the selected share of product B relative to product A is:

$$P_C(B;A) = \frac{P(B;A,C)}{P(B;A,C)+P(A;B,C)} = \frac{53.3\%}{53.3\%+36.7\%} = 59.2\%$$

Compromise effect = P_C (B; A)–P (B; A) = 39.2% ($\chi^2(1) = 9.24$, $p = 0.002$), that is, there is a compromise effect in the extended product set {A, B, C}.

TABLE 3 | Compromise effect experimental product set.

Restaurant name	Binary product set		Ternary product set	
	Dining environment	Price (RMB)	Dining environment	Total consumption amount (RMB)
Restaurant A	70	100	70	100
Restaurant B	80	180	80	180
Restaurant C			90	260

TABLE 4 | Consumer choice statistics of target products.

Restaurant name	Dining environment	Price (RMB)	Dining environment	Total consumption amount (RMB)
Restaurant A	70	100	24 (80.0)	11 (36.7)
Restaurant B	80	180	6 (20.0)	16 (53.3)
Restaurant C	90	260	—	3 (10.0)
Total	—	—	30 (100)	30 (100)

The data in brackets are percentages (%).

Study 2

Method

This study mainly tests the influence of reference group norms on the compromise effect. According to the purpose of the study, three experimental groups were set up, taking restaurants A, B, and C as the reference point of group norms. Since the reference group norms are easily regulated by consumers' normative susceptibility and attention to social comparative information, we first tested the "consumers' susceptibility (norms)" and "attention to social comparative information" of the sample, in which consumers' susceptibility is measured by Schroeder (1996). Paying attention to social contrast information was tested with the scale of Bearden et al. (1990). According to the test results, the samples were randomly assigned to three experimental groups.

Manipulation

Three experimental scenarios were simulated, and three restaurants were used as the reference point of group norms. Scenario 1 takes restaurant A as the reference point of group norms: "if you invite a classmate (or friend) to dinner, there are three restaurants A, B, and C to choose from. Except for the difference in dining environment (the highest score is 100 points) and total consumption amount, other aspects are similar (such as dish quality and sanitary conditions). If the classmate (or friend) usually goes to a restaurant with similar conditions as A, which restaurant would you choose?" Scenario 2 (the reference point of group norms is restaurant B) and experiment scenario 3 (the reference point of group norms is restaurant C) are similar to experiment scenario 1, except that the norm is set to "if the student (or friend) goes to a restaurant with similar conditions as B (or C), which restaurant would you choose for dinner?" A total of 106 undergraduates (all samples did not participate in the prediction test and study 1) were recruited to participate in the experiment.

TABLE 5 | Consumer choice statistics of target products.

Restaurant name	Dining environment	Price (RMB)	Group norm reference point		
			Reference point 1	Reference point 2	Reference point 3
Restaurant A	70	100	11 (36.7)	1 (3.23)	5 (14.28)
Restaurant B	80	180	19 (63.3)	26 (83.87)	11 (31.43)
Restaurant C	90	260	0 (0.0)	4 (12.90)	19 (54.29)
Total	—	—	30 (100)	31 (100)	35 (100)

The data in brackets are percentages (%).

Results

When the group norm takes restaurant A as the reference point, the subject's choice of restaurants is shown in **Table 5**. The probability of restaurant B being selected is p (B; A, C) = 63.3%. In the extended set {A, B, C}, the selected share of restaurant B relative to restaurant A is P_C (B; A) = 63.3%, and the compromise effect = P_C (B; A)–P (B; A) = 43.3% ($\chi^2(1) = 11.58$, $p < 0.01$). That is, when the group norm takes restaurant A as the reference point, the compromise effect is still significant. Therefore, hypothesis 1 was supported. The change value of compromise effect = 43.3–39.2% = 4.1% ($\chi^2(1) = 0.10$, $p < 0.75$), that is, the change of effect value is not significant. Therefore, hypothesis 2 was supported.

When the group norm takes restaurant B as the reference point, the probability of restaurant B being selected is p (B; A, C) = 83.9%. In the extended set {A, B, C}, the selected share of restaurant B relative to restaurant A is P_C (B;A) = 96.3%, and the compromise effect = P_C (B; A)–P (B; A) = 76.3% ($\chi^2(1) = 33.60$, $p < 0.01$). That is, when the group norm takes restaurant B as the reference point, the compromise effect is significant. The change value of compromise effect = 76.3–39.2% = 37.1% ($\chi^2(1) = 10.71$, $p < 0.01$), that is, the effect value has changed significantly. Therefore, hypothesis 3 was supported.

When the group specification takes restaurant C as the reference point, the probability of restaurant B being selected is p (B; A, C) = 31.4%, the share of product B relative to product A in the extended set {A, B, C} is P_C (B; A) = 68.75%, and the compromise effect = P_C (B; A)–P (B; A) = 48.75% ($\chi^2(1) = 10.64$, $p < 0.01$), that is, the compromise effect still exists. Therefore, hypothesis 5 was supported.

In addition, $D_C(B) = P_C(B;A)\text{-}P(B;A) = 68.75\text{–}20\% = 48.75\% > 0$, $D_B(A) = P_B(A;C)\text{-}P(A;C) = 20.8\text{–}83.3\% = -62.5\% < 0$, $D_A(B) = P_A(B;C)\text{-}P(B;C) = 36.7\text{–}66.7\% = -30.0\% < 0$. For example, $D_C(B)$ measures the degree to which the addition of C to the set {B, A} changes the relative popularity of B and A. Based on this, if the group norm takes restaurant C as the reference point, the subject's choice behavior shows the polarization phenomenon of preference for restaurant C. Therefore, hypothesis 6 was supported. This shows that when the group norms prefer luxury goods, consumers have a very strong desire to consume luxury goods to improve their face (Li and Su, 2007), rather than making choices based on product attributes.

The above results show that when the group norm takes the target product restaurant B as the reference point, the compromise effect reaches the maximum (76.3%), which is significantly higher than that of the competitive product restaurant A ($\Delta P1 = 33.0\%$, $t = 2.79$, and $p < 0.01$) and temptation product restaurant C ($\Delta P2 = 27.6\%$, $t = 2.42$, and $p < 0.01$) is the value of compromise effect at the reference point. Therefore, hypothesis 4 was supported, which shows that the compromise effect can be induced by social factors, such as group norms.

DISCUSSION

The conclusion shows that for a group of product sets with compromise effect, even under the influence of social factors (such as reference group norms), the target products are still easier to choose than competitive products, which shows that the compromise effect has strong stability (Simonson, 1989). However, the effect value of the compromise effect will be affected by the reference point of the reference group norm. If the preference order of the group norm is $A \prec B \prec C$, the group norm pressure is very small and the effective value of the compromise effect will not be significantly affected when the group norm takes product A (competitive product) as the reference point. When group norms take product B (target product) as the reference point, under the joint action of group norms and compromise effect, the effect value of compromise effect reaches the maximum, indicating that group norms will also induce compromise effect. When the group norm takes product C (temptation product) as the reference point, the probability of selecting competitive product A and target product B decreases significantly. At this time, there is a polarization phenomenon of preference for product C. Compared with compromise product B, competitive product A is farther away from the reference point of group norms and its market share decreases more, so the compromise effect still exists. According to previous research results, the change of consumer choice can be explained as the result of "coding" according to product attributes, gains, or losses of group relations under different reference points (Kahneman and Tversky, 1979; Kahneman et al., 1991). Consumers evaluate the expected results to minimize negative results through coding (Lim and Hahn, 2020).

Theoretical Implications

Huber et al. (1982) believed that group norms may be one of the causes of context effect. Simonson (1989) was aware of the impact of reference group norms on the compromise effect, but the hypothesis has not been fully confirmed. We absorbed the research results of Bearden and Etzel (1982) on the impact of reference group norms, fully considered the two characteristics of "public" and "luxury" in the selection of experimental products, and confirmed that reference group norms will not only affect the compromise effect but also induce the compromise effect. This shows that the occurrence mechanism of the compromise effect is very complex. It can be induced not only by some factors, such as individual psychological characteristics (Simonson, 1989),

material phenomenon (Hamilton et al., 2007), physiological response (Hedgcock and Rao, 2009), and consumer information processing mode (Hamilton et al., 2007) but also by social factors, such as friendship, sense of security, sense of belonging, and being respected by others.

Simonson (1989) believes that the mechanism of compromise effect may be due to the complexity and difficulties faced by consumers in the decision-making process, which affects the preference fluency of consumers. Novemsky et al. (2007) also believe that preference fluency leads to a compromise effect by affecting consumers' attitude toward risk and the trade-off between "price and quality," or by affecting the objective conditions of the selection set (such as cognitive load and variety). By increasing the complexity and difficulty of consumer decision-making, that is, expanding consumer decision-making from a single product reference point to two reference points of "product attribute + social impact," we find that consumers always follow the principle of prevention-focused (Pham and Higgins, 2005), and take avoiding wrong selection as the core starting point of choice, that is, consumers are always loss averse. Therefore, we believe that the generation mechanism of consumer compromise effect is more due to the correction of consumer's purchase motivation. For example, when the group norms take restaurants B and C as the reference points, respectively, the market share of restaurant A decreases significantly, which indicates that consumers have gradually transferred their purchase motivation to the group norms. This shows that the occurrence or change of the compromise effect is more likely to be the result of the correction of consumers' purchase motivation. In this sense, the conclusion of this article supports that the compromise effect is induced by motivation (Malaviya and Sivakumar, 2002; Mourali et al., 2007).

Another question worth discussing is whether the standardization of reference groups would weaken the rationality of consumers' purchase behavior. We found that there is a polarization of choice when taking restaurant C (luxury goods) as the reference point. From the perspective of product attributes, group standardization does weaken the rationality of consumers' purchase behavior (Rook and Fisher, 1995). However, from the perspective of social relationship value acquisition, it is rational. Consumers make decisions in accordance with group norms and gain more face benefits. It is shown that what consumers need is not the product itself, but the problems that the product can solve and the social significance given by the product.

Practical Implications

First, if the company takes the compromise effect as the competitive strategy of its products, it is necessary to construct an effective product perception map around the target group. The company must clarify which products are competitive products and which products can be used as temptation products, to build a product set that can produce the psychological perception of compromise effect, and take it as the direct basis for the company's product strategy formulation, advertising delivery, product display, and price promotion.

Second, the market often understands the norm impact as high price and high quality. If the compromise effect is established, the use of a "price-quality heuristic" for the target product can effectively improve the effect of the compromise effect. According to the research of Hoch and Deighton (1989), when consumers can only judge the quality (if the quality is related to identity consumption and face consumption) based on price, the effect of norm influence should be better. "Love her, treat her Haagen Dazs," an advertisement of Haagen Dazs in China, has adopted a high-price strategy with normative advertising and achieved good results.

Third, the impact of norms is unstable, and consumers are unlikely to internalize forced behavior. Enterprises should pay special attention to the limitations of using group norms to affect the compromise effect. The most important premise of using norms is to internalize group values and norms (Bearden and Etzel, 1982; Ito et al., 1998), that is, norms should transform consumer's purchase of products from external motivation to internal motivation. This requires that the products sold by enterprises to consumers are not only the products themselves but also give specific social significance to the purchase behavior according to the product use scenario, to trigger the emotion of consumers.

Limitations and Future Research

Following the general research paradigm of compromise effect, this study deliberately obscures the real name of restaurants to make the research simpler, but this may also lead to research bias. First, an important clue of group norms affecting consumers is the brand name. Second, to avoid expected regret, consumers often make decisions based on product popularity when choosing products in product concentration (Simonson and Tversky, 1992). In addition, this study only analyzes the norm impact of identity reference groups and does not consider the dissociative reference groups.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study of human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

QD contributed to designing, analyzing, and writing the study. KL contributed to collecting research data and writing the study. Both authors contributed to the article and approved the submitted version.

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The Impact of Different Factors on Repeat Visits to Selected International Tourism Enterprises: Case Study From Czechia

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The aim of this article is to identify the influence of the different factors on the repeat visits to selected international tourism enterprises based on the responses of customers in Czechia. The selected factors were divided into three main groups: service, environment, and offer, and each of these groups consists of other different factors. Primary data were analyzed using SPSS software. Statistical hypotheses were formed, reflecting the relationship between the difference in customer responses and selected quality factors, which can affect repeated visits to selected tourism enterprises. Most customers of repeat visits to selected tourism enterprises are affected by professional behavior, staff empathetic approach, offer knowledge and ability to provide as much information as possible, cleanliness and tidiness, overall atmosphere of the establishment, lighting and thermal comfort, air cleanliness, and plenty of space, taste and quality of food and ingredients, and last but not least also corresponding ratio of price/quality, good experience and attractive price level. Studying consumer behavior is important because it helps marketers understand what influences consumers' buying decisions not only in the tourism area in the Czechia but can fill in the market gap and identify the new products and services that are needed.

Keywords: consumer behavior, factors, service, environment, offer, Czechia, international tourism enterprises

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INTRODUCTION

The article focuses on current issues, which is useful for analyzing consumer buying behavior and for detecting factors that influence tourism demand. This article becomes even more important in the period of the COVID-19 pandemic. In this respect, it could bring us new significant information on the example of a case study from Czechia.

The COVID-19 pandemic and the restrictions imposed in response have had a massive impact on the hospitality sector worldwide. The bar and restaurant industry has been severely affected by regulations and restrictions, such as the shutdown policy over weeks, issued in many countries (Neise et al., 2021). Therefore, in addition to consumer buying behavior, we must also take into account the COVID-19 pandemic.

Consumer ideology follows the basic definition of the term "ideology," which is the body of ideas reflecting social needs and aspirations of an individual, a group, a class or culture (Dmitrovic and Vida, 2010, p. 149).

According to Upadhyay et al. (2017), consumer buying behavior is one of the most important areas of study in marketing science. Some of the researchers (Kivela et al., 2000; Kotler and Keller, 2009; Fetscherin, 2014; Holmqvist and Renaud, 2015; Dung et al., 2020) have elucidated their works based on either theory or survey.

According to Kajzar (2021, p. 55–56), travel and tourism are an extremely complex activity for several reasons. First, it relates to goods and tangible products (souvenirs, gifts, food, etc.) as well as intangible services (sightseeing tours, package tour, cultural performances, etc.). Second, the tourism product consists of a multitude of these goods and services put together, and in turn, there exist a multitude of options to choose from within each of the tangible goods and intangible service categories. The tourism services sector is characterized by a wide variety of stakeholders representing services related to catering, transport, accommodation, tourist attractions, etc.

The aim of this article is to identify the influence of the different factors on the repeat visits to selected international tourism enterprises based on the responses of the customers in Czechia.

In the survey, the main factors were divided into three main groups, service, environment and offer, and each of these groups consists of other selected factors. In the first group, we can find factors such as professional behavior, language skills, empathetic approach of staff, offer knowledge, and ability to provide as much information as possible. The level of service and human resources are essential to the success of any business, and even more so in the tourism industry.

The second group is connected to the environment. The environment refers to tangible and intangible factors and conditions that surround selected tourism enterprises. Factors such as facility availability and location, parking, attractive interior design, cleanliness, and tidiness, plenty of space, music production, overall atmosphere of the establishment, the fashionability of the establishment visited, and lighting and thermal comfort, air cleanliness play an important role to retain existing customers and also in attracting new ones.

Factors such as attractive novelties in offer, seasonal offer, taste of food, quality of food and ingredients, the way the food is served, wide range of food and beverages, home cooking, good experience, corresponding ratio of price/quality, etc. belongs to the factors for repeat visits to selected international tourism enterprises in Czechia.

To be better prepared to face these challenges, especially during the COVID-19 pandemic, restaurant owners and managers need to know the factors that influence the choice of restaurants (Janyan, 2018, p. 4).

THEORETICAL BACKGROUND OF CONSUMER BEHAVIOR

The history of consumer behavior research is closely intertwined with the history of marketing thought, so each marketing era has had an effect on consumer behavior research (Chrysochou, 2017). Solomon et al. (2002) wrote that consumer behavior is the study of the process involved when individuals or groups select, purchase, use, or dispose of products, services, ideas, or experiences to satisfy needs and desire.

Kotler and Keller (2009) presented a model in which consumer behavior is portrayed to result from the cultural, social, and personal characteristics of consumers, as well as consumer psychology. On the other hand, Renner et al. (2012) developed a comprehensive survey measuring eating motivation that includes 15 dimensions: liking, habits, need/hunger, health, convenience, pleasure, traditional eating, natural concerns, sociability, price, visual appeal, weight control, affect regulation, social norms, and social image. Another model like TPB (Theory of planned behavior) authors Huamin and Xuejing (2019, p. 163) used to explain the behavior and the intention of the behavior. The results of their research demonstrated that 5 factors, including subjective norm, behavior control perception, attitude, activity, destination image, value of tourists, and other variables, have significant influence on leisure tourism intention.

Before the COVID-19 pandemic, dining-out motivations included hunger, social image, health, hedonic value, atmospheric, subjective well-being, celebration, socialization, convenience, natural concerns, traditional eating, price, affect regulation, take-away, and habits (Dedeoglu and Bogan, 2021). The COVID-19 pandemic has substantially affected the restaurant sector, especially businesses whose revenues come mainly from face-to-face service. The global drop in restaurant reservations and on-site consumption in March reached 100% compared to the same period in 2019 in different countries (Hakim et al., 2021). Perhaps the biggest changes have happened in the takeaway market over the last 5–10 years or so, though, has been the rise of home delivery services. These companies promise to connect the consumer (i.e., the home diner) with a range of takeaway options (Spence et al., 2021, p. 2).

According to Kim and Lee (2020), it is important to understand how the perceived threat of COVID-19 affects various behaviors, including the preference for restaurants. They predict that consumers who perceive the threat of COVID-19 as high will prefer private dining restaurants or private tables in a restaurant (Alan et al., 2017). In order to understand how different components, including economic challenges, contribute toward psychological distress. It was developed a scale to measure COVID-19 phobia, which refers to an overwhelming and debilitating fear or anxiety about COVID-19. Some of the most frequently identified reasons behind panic buying include the perception of scarcity and an increased demand for commodities (Seih et al., 2021, p. 2). Which is also important to consider when identifying consumer behavior.

Chi et al. (2022) draw on the Protection Motivation Theory (PMT) to propose and develop a conceptual framework and support their arguments. PMT has been conceptualized as an individual's response to a fear appeal. During the COVID-19 pandemic, PMT has been applied in communications with the aim of promoting better health outcomes, and PMT also attracted the general attention of behavioral, social, and environmental psychologists. PMT focuses on threats and perceived efficacy; it is based on the premise that people will take action if they perceive a serious threat. Fear of contracting the COVID-19 virus and

spreading to loved ones can deter one from making the decision to eat out or travel.

In many parts of the world, restaurants have been forced to close in unprecedented numbers during the various COVID-19 pandemic lockdowns that have paralyzed the hospitality industry globally. This highly challenging operating environment has led to a rapid expansion in the number of high-end restaurants offering for example take-away food, or home-delivery meal kits (Spence et al., 2021, p. 1). Consumers experience products or services, and then the process does not end; it continues. When it comes to restaurants, which constitute an important field in the hospitality sector, determinants of the intention to revisit intention are accepted as perceived quality and satisfaction with the emotions of consumption of the service cape, customer satisfaction and switching barriers customer satisfaction feeling emotion food quality, service quality, atmosphere, price, etc. with customer satisfaction (Alan et al., 2017).

Tourism companies around the world are required to adopt advanced marketing strategies and techniques. Tourism digitization will become a challenge not only for marketing tools that have substantial benefits and influences in different settings and domains (Mathew and Soliman, 2020). As most research on tourism consumer behavior assumes thoroughly planned decisions, the habituated aspects of tourist decision making and its implications for tourism marketing are in urgent need of research (Cohen et al., 2013).

According to Hakim et al. (2021), it is assumed that consumers' intention to visit restaurants during COVID-19 would be predicted by a set of marketing-oriented stimuli (price, perceived safety, and brand), politically oriented stimuli (social trust, politics, and culture), and perceptions (risk perception) and characteristics (age, employment status). In country-specific factors, such as economic situation, the severity of the pandemic, and national culture, are all parameters affecting the general public's behavior. Regarding the voluntary and mandated distancing measures taken to regulate physical social interaction between individuals (Atalay and Solmazer, 2021).

DATA AND METHODS OF RESEARCH

Within the project related to institutional support "Trends and innovations in tourism in the Czech Republic 2020–2022," the author has focused, among other things, on the prediction and estimation of the development of the tourism trend in the area of selected tourism enterprises, providing services in Czechia, and also on customers, their preferences, and shopping decision making that has been analyzed within the trends found. This project follows institutional support for "Touristic trends in the Moravian Silesian region (MSR) in 2017–2019" (Kajzar et al., 2020). Another upcoming study is devoted to the issue of trends and innovation from the perspective of selected tourism companies in the Czechia. According to Novotný and Duspiva (2014), they were precisely defined, which determined that the respondent had to be a resident of Czechia and the age of the respondent had to be 15 years and older. Once the criteria were established, a sample of the number of respondents was collected according to the formula for unknown composition of respondents as reported by Kozel (2006).

$$n(z2 * p * q)/\Delta 2$$

where n is the minimum number of respondents;
where p, q are the percentage of respondents who are knowledgeable or inclined to choose to option one (p) and ignorant or leaning toward option two (q),

if we do not know these numbers exactly, we have to create the product of the maximum p × q maximum,

i.e., 50% × 50%; where Δ is the maximum allowable error;
where z is the critical value of the normalized normal distribution in the chosen region.

Significance level.

To calculate the minimum sample size, the 95% confidence level (selected quantiles) of the normalized normal distribution can be found for the construction of the 95% confidence interval value 1.96 Hindls et al. (2007) and the margin of error was 5%.

Based on these data, the following result was calculated:

$$n \geq n(1,962 * 0,5 * 0,5)/0,052$$

$$n \geq 384$$

The result shows that in order for the research to be representative according to the chosen criteria, 384 or more participants are required respondents.

The survey was conducted randomly, anonymously, using questioning in the period between March and November 2021 in Czechia. The questionnaire focused on tourism trends at selected tourism establishments in the Czechia. The questionnaire contained a total of 18 questions. In addition to the identification questions (age, gender, etc.), the questionnaire addressed questions focused on trends that customers prefer when visiting tourism facilities, which factors determine the choice of facilities, what customers perceive as innovation and whether they have encountered some innovations when visiting the selected tourism facility, etc. The research was also conducted in cooperation with The Czech Association of Hotels and Restaurants z.s. that brings together the owners and operators of hotels, boarding houses, restaurants, vocational schools, but also partners offering various products for the accommodation or restaurant operations.

The aim of this article is to identify the influence of the different factors on the repeat visits to selected international tourism enterprises based on the responses of customers in Czechia. The selected factors were divided into three main groups: service, environment, and offer, and each of these groups consists of other different factors. Primary data were analyzed using SPSS software. The research was carried out using the Survio online questionnaire system and matching the selected criteria for the research was obtained from 500 respondents. The number of correctly completed questionnaires was sufficiently representative, as there were more than 384 questionnaires according to the predefined criteria. The structure of the questionnaire was broader than the structure of the article.

Analyses of frequency responses and frequency distribution of data were used. The primary data were analyzed using SPSS software.

In this case study, the research question has been identified:

- Do professional behavior, the empathetic approach of the staff, the cleanliness and cleanliness of the company premises, the good experience and the corresponding price/quality ratio belong to significant factors that influence repeat visits to selected international tourism enterprises based on the responses of customers in Czechia?

The following hypotheses are presented:

- The decision on repeat visits depends on the gender of the respondents and the availability and location of the facility.
- The decision on repeat visits depends on the education of the respondents and the discount offers.
- Younger customers prefer music production when making repeat visits to restaurants.

The Chi-square test was used to determine whether there is a significant relationship between two nominal (categorical) variables. Based on the Chi-square test, the existence of a dependence between the quality of the service factors and the possibility of repeated purchase of the service was examined at the significance level $\alpha = 0.05$. Common factors were chosen for individual tourist facilities. The hypothesis assumption was based on a comparison of critical values and statistical tests (Kajzar, 2021). H0 can be rejected at the materiality level α if the critical criterion is less than the test criterion.

$$\chi 2(r-1)*(c-1)(1-\alpha),$$

Furthermore, it is possible to use a negative value comparison (p-value) with the significance level (α) for the rejection or acceptance of Hypothesis H0.

H0 cannot be rejected if p-value > α (in our case, the significance level is 0.05). The expected value of observation eij is based on the mathematical relation (2) and (3) the value ni and the value n.j are expressed as the sum of the individual observations.

$$e_{ij} = \frac{n_i \rightarrow n_j}{n}$$

$$n_{i.} = \sum_{j=1}^{s} n_{ij} \qquad n_{.j} = \sum_{i=1}^{r} n_{ij}$$

RESULTS OF THE SURVEY

The first question was dedicated to the gender of the respondents. In the survey, 500 respondents were attended, of which 164 were men and 336 were women; see **Figure 1**.

226 respondents were between 18 and 25 years old, 84 respondents were between 26 and 30 years old, 71 respondents were between 41 and 54 years old, and only 4 respondents were 76 years old and more; see **Figure 2**.

Another demographic question in this survey was about education. Of 500 respondents, 267 respondents had secondary school diploma, only secondary school had 80 respondents, and 138 respondents on the other hand, had university education; see **Figure 3** below.

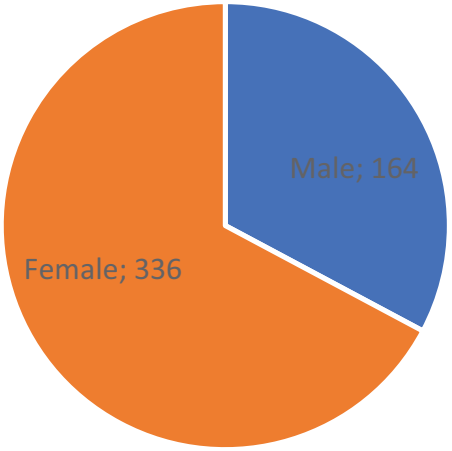


FIGURE 1 | Gender. *Source*: Own processing.

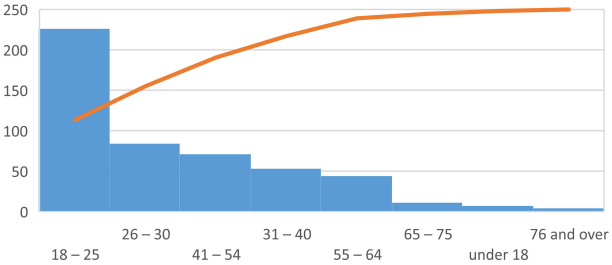


FIGURE 2 | Age. *Source*: Own processing.

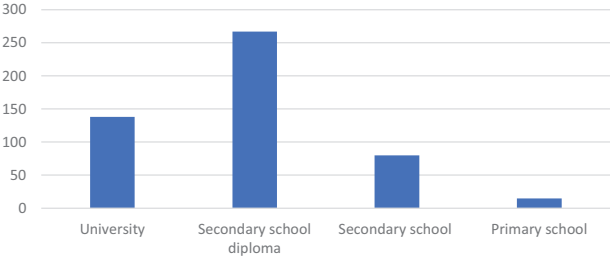


FIGURE 3 | Education. *Source*: Own processing.

The survey also included a question that looked at the average amount per person spent by respondents during a visit to a restaurant. 281 respondents spent on average 121 – 300 CZK during one visit to a restaurant, 153 respondents 301 – 600 CZK, and only 33 respondents spent up to 120 CZK and also 601 – 1200 CZK; see **Figure 4** below.

According to the survey in the first group (service), the following factors are extremely important to consumers: professional behavior, the empathetic approach of the staff, and

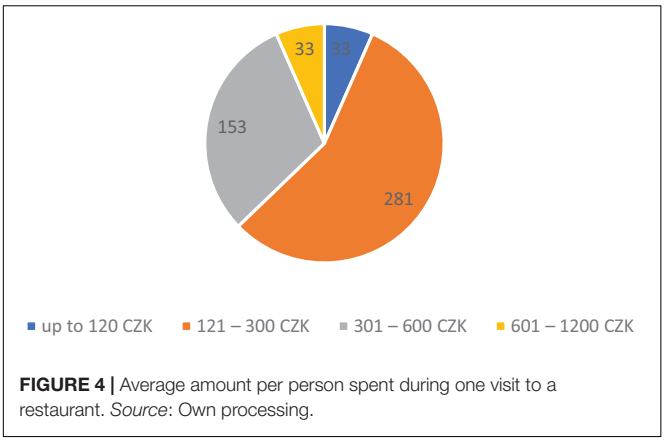


FIGURE 4 | Average amount per person spent during one visit to a restaurant. *Source*: Own processing.

the knowledge and ability to provide as much information as possible. These factors influence the highest number of repeat visits. In the second group dedicated to the environment, it belongs to the most preferred factors influencing repeat visits, for example, cleanliness and tidiness, overall atmosphere of the establishment, lighting and thermal comfort, air cleanliness, and plenty of space.

The last group is dedicated to the issue of the offer factor. Significant factors influencing repeat visits to selected international tourism enterprises as, for example, taste of food, quality of food and ingredients, corresponding ratio of price/quality, good experience, you can see below, **Table 1**.

STATISTICAL EVALUATION OF HYPOTHESES

The following hypotheses are put forward:

Hypotheses Verification 1

In this part of the article, the author deal with the evaluation of selected hypotheses.

Differences in responses obtained in the survey were checked by using the Chi square test.

Subsequently, hypotheses were established:

- Hypothesis H0: Responses according to the gender of the respondents on the availability and location of the facility do not differ.
- Alternative hypothesis H1: Responses according to the gender of the respondents on the availability and location of the facility differ.

The results of Pearson Chi-square are illustrated in the **Table 2**, below.

The value of the test statistic is 6,736.

The corresponding p-value of the test statistic is $p = 0.346$.

Since the p-value is greater than our chosen significance level ($\alpha = 0.05$), H0 cannot be rejected. There is not enough evidence to suggest an association between the gender of the respondents and the location of the facility.

Men and women consider the location of a restaurant equally important to their choice. Zheng (2011) found that the location of the restaurant has a positive effect on the choice of the consumer, because not every restaurant is suitable for every location. The author also agrees with Hanaysha (2016) that the convenient location is a very important factor that can influence consumers' preferences in selecting a restaurant. The location of the restaurant depends on the type of cuisine and the style of the restaurant, and each restaurant must first define the demographic and psychographic factors of the customers.

Hypotheses Verification 2

- Hypothesis H0: The responses according to the education respondents and the discount offers may not matter.
- Alternative hypothesis H1: The responses based on the education respondents and the discount offers may matter.

The results of Pearson Chi-square are illustrated in the **Table 3**, below.

The value of the test statistic is 23,135.

The corresponding p-value of the test statistic is p = 0.006.

Since the p-value is not greater than our chosen significance level ($\alpha = 0.05$), H0 can be rejected. There is enough evidence to suggest an association between the education of the respondents and the discount offers. On the basis of the results, we can state the following. Respondent education plays an important role in repeat visits to restaurants that offer discounts.

High school students respond to restaurant discount offers more than university students. This is largely due to the level of average wages. Even the youngest university graduates earn on average 34% more after graduation than an employee with a high school diploma. The wage gap then widens with increasing age, as salaries of employees with higher education grow more dynamically. This is also related to the amount spent in a restaurant, with university students also willing to spend a higher average amount per person spent during one visit to a restaurant, up to CZK 1,200.

Hypotheses Verification 3

- Hypothesis H0: Younger customers do not prefer music production when making repeat visits to restaurants.
- Alternative hypothesis H1: Younger customers prefer music production when repeating visits to restaurants.

The results of Pearson Chi-square are illustrated in the **Table 4**, below.

The value of the test statistic is 39,397.

The corresponding p-value of the test statistic is $p = 0.025$.

Since the p-value is not greater than our chosen significance level ($\alpha = 0.05$), H0 can be rejected. There is enough evidence to suggest an association between the age of the respondents and the production of music. Based on the results, we can state the following. For younger customers, on repeat visits to the restaurant, music plays an more important role than for older customers.

Business owners take care to select quality music and music streaming because not only younger customers don't just go to

TABLE 1 | Significant factors influencing repeat visits to selected international tourism enterprises based on the responses of customers in Czechia.

Factor:	Extremely important	Not very important	Not important	I have no opinion
Service:	–	–	–	–
Professional behavior	384	106	6	4
Language skills	104	298	79	19
Staff empathetic approach	373	102	17	8
Offer knowledge and the ability to provide as much information as possible	373	105	12	10
Environment:	–	–	–	–
Facility availability and location	250	207	36	7
Parking	204	218	66	12
Attractive interior design	242	221	33	4
Cleanliness and tidiness	456	23	5	16
Plenty of space	314	173	9	4
Music production	98	263	122	17
Overall atmosphere of the establishment	383	94	20	3
The fashionability of the establishment visited	76	212	182	30
Lighting and thermal comfort, air cleanliness	367	108	16	9
Offer:	–	–	–	–
Attractive novelties in offer	103	300	92	5
Seasonal offer	167	273	56	4
Taste of food	446	31	19	4
Quality of food and ingredients	443	30	11	16
The way the food is served	273	198	19	10
A wide range of food and beverages	253	207	36	4
Home cooking	220	207	59	14
A range of world cuisine	143	259	73	25
Regional specialties, dishes	199	236	55	10
Specific dishes (rational diet)	139	210	120	31
Meals for children	146	158	161	35
Wide range of drinks	193	225	63	19
Discount offers	142	203	143	12
Lunch menu	244	187	67	2
Traditional and permanent menu	238	198	49	15
Games and entertainment	41	161	252	46
Promotion of the offer on the Internet	169	193	119	19
Recommendations from friends	267	195	35	3
Good experience	418	66	14	2
Attractive price level	335	131	25	9
Corresponding ratio of price/quality	443	44	5	8

Source: Own processing.

restaurants for the food, but for the overall experience. There is research on music around the world that advises business owners on, for example, how to make a customer feel relaxed in a bar or restaurant and how to put them in a great mood to spend. Few business operators know that they can make more money by making people feel better and more relaxed and that

TABLE 2 | Summarizes the result of the Chi-square test values (respondents gender availability and location of the facility).

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6,736[a]	6	0.346
Likelihood Ratio	6,812	6	0.339
N of Valid Cases	500		

[a]6 cells (50,0%) have expected a count less than 5. The minimum expected count is 0.01.
Source: Own processing.

TABLE 3 | Summarizes the result of the Chi-square test values Chi-Square Tests (respondents education and discount offers).

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23,135a	9	0.006
Likelihood Ratio	23,016	9	0.006
N of Valid Cases	500		

[a]5 cells (31,3%) have expected count less than 5. The minimum expected count is 0.36.
Source: Own processing.

TABLE 4 | Summarizes the result of the Chi-square test values (respondents age and music production).

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	39,397[a]	24	0.025
Likelihood Ratio	35,154	24	0.066
N of Valid Cases	500		

[a]19 cells (52,8%) have expected a count less than 5. The minimum expected count is 0.07.
Source: Own processing.

the whole team will benefit from a relaxed atmosphere with the charm of a smile.

DISCUSSION

The calling card of a good restaurant is above all its regular clientele. However, today's businesses are increasingly demanding more stringent requirements because, according to many gastronomy experts, people have become more choosy, prefer quality over quantity, and expect a comprehensive experience when visiting a restaurant. The quality of the restaurant is also reflected in the level of service, where the waiting time for an order, free drinking water, the ability of the staff to advise on the selection of wines, their speed and responsiveness, the possibility of booking a table via the website and now more than ever, safety and health.

Based on the survey, it has been confirmed that professional behavior, the empathy of the staff, the cleanliness and tidiness of the company premises, the good experience, and the corresponding price/quality ratio belong to significant factors influencing repeat visits to selected international tourism enterprises and confirm previous studies. Individual factors that can influence a customer's repeat visit include not only their expectations, but also, for example, the company's image or the perceived quality of the product offered or service, quality of the human resources, and last but not least the restaurant offer.

Many tourism businesses, not only catering, are currently addressing the issue of COVID-19. As customers worry about contracting COVID-19, more are also having food taken away or delivered to their homes. Buying food on the Internet is becoming more and more common. The advantage of ordering take-away food online for customers is safety and healthy, minimal contact because the COVID-19 pandemic has elevated that preference to a priority, prices are accurate, and there is less room for error when it is time to pay the bill, and increasing customer loyalty can be done, for example, through discounts for online orders or quantity discounts.

Options, how it is possible to eat out safety and healthy, is EU Digital COVID Certificate that helped reopen events, services, travel, etc. The General Digital COVID Certificate is a certificate that can prove that the person has been vaccinated, has had COVID-19 or has a negative AG or PCR test result. Currently in the Czech Republic, only a vaccination certificate or a certificate of having had COVID-19 disease no older than 180 days can be presented. However, restaurateurs did not have to control this obligation. Restaurants were also the only establishments in Czechia where guests could present a self-test for coronavirus. The all measure, which forced businesses to check people's infection-free status and prevented unvaccinated people from using certain services - including visiting restaurants – was in Czechia repealed on 10 February 2022. Each EU country has its own rules, so when using services in different destinations, you need to keep track of the current entry conditions.

Based on the research, three hypotheses were proposed. The first hypothesis was accepted. The decision on repeat visits depends on the gender of the respondents and the facility availability and location do not differ. Customers consider the location of a restaurant equally important to their choice, and the location of the restaurant has a positive effect on their choice because not every restaurant is suitable for all locations. The second hypothesis was rejected. Respondent education plays an important role in repeat visits to restaurants that offer discounts. High school students respond to restaurant discount offers more than university students. This is largely due to the level of average wages. Even the youngest university graduates earn on average 34% more after graduation than an employee with a high school diploma. The last third hypothesis was also rejected. For younger customers, on repeat visits to the restaurant, music plays an more important role than for older customers. Business owners take care to select quality music and music streaming because not only younger customers don't just go to restaurants for the food, but for the overall experience. Music strongly influences buying behavior and even how much customers are willing to pay. The volume of ambient music in a restaurant also influences whether diners choose to eat light and healthy food or heavy and unhealthy food. These are all activities that must be considered by international tourism companies.

CONCLUSION

The aim of this paper was to identify the influence of the different factors on the repeat visits to selected international tourism enterprises based on the responses of customers in Czechia.

In the research, the main factors were divided into three main groups including service, environment, and offer, and each of these groups consisted of other selected factors. The primary data was also analyzed using SPSS software, and three statistical hypotheses were formed, reflecting the difference relationship between the surveyed difference in responses from the customers and selected factors that may affect the repeated visits to selected international tourism enterprises in Czechia.

According to the research in the first group (service) is very significant for customers factors such as professional behavior, staff empathetic approach, offer knowledge and the ability to provide as much information as possible. These factors affect the most the repeat visits to selected international tourism enterprises in Czechia. For a tourism business to become successful, its employees should first of all be able to listen, successfully observe customer reactions, and ask the right questions. In the second group (environment), it was found that the most favorable factors influencing repeat visits to selected international

tourism enterprises in Czechia are cleanliness and tidiness, overall atmosphere of the establishment, lighting and thermal comfort, air cleanliness, and plenty of space. The basis of the success of tourism businesses is the perfect level of service: delicious food and drinks prepared from quality ingredients, served by helpful and smiling staff, in a clean and pleasant environment. Therefore, businesses must pay as much attention to the environment as they do to the quality of the services they provide. The last group factor is connecting with the offer. The most preferred factors for customers in Czechia are the taste of the food, the quality of food and ingredients, corresponding ratio of price/quality, good experience, and attractive price level.

Research results consistent with previous findings, for example, of the author (Manrai and Manrai, 2009; Novotný and Duspiva, 2014; Kajzar, 2021). The factors that influence consumer buying behavior are very important not only for marketing policy because on the basis of these factors, it is possible to better overall corporate policy can be better targeted, irrespective of whether the business is in the tourism sector or outside it. The findings show that marketing and management strategies can act as support and facilitating tools to attract more potential consumers not only in the pandemic era. Restaurants have opened and many of them are trying to solve the dilemma of how to get diners to observe the mandatory distances in a clever yet creative way, so that the restaurant space is as safe as possible for them.

The most important limitations and barriers to the research were the lack of the motivation of respondents. At the time of pandemic COVID-19 to complete any questionnaire, then pandemic COVID-19 also extended the length of the research by several months and the scope of the discussions because this article is compromised in many levels compared to the work of experienced international scholars.

In further research, the author wants to focus on selected trends in tourism both from the perspective of customers and from the perspective of companies and, last but not least, on the innovations in offers that tourism businesses introduced during the COVID-19 pandemic in Central Europe.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The survey was conducted in accordance with the ethical principles of scientific and research work. Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

PK performed the statistical analysis, wrote all of the manuscript, and contributed to manuscript revision, read, and approved the submitted version.

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Research on Consumer Purchasing Channel Choice Based on Product Tolerance: The Mediating Role of Rationalization

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Consumers have subjective psychological expectations of the quality and brand of products before purchasing. There is a certain tolerance for products that do not meet expectations. The discomfort caused by tolerance can be smoothly carried out through "reasonable" self-comfort and explanation mechanisms. Based on the theory of rationalization defense mechanism, a 2 × 2 purchase channel matrix of online and offline purchase, online consultation, and the offline experience was constructed to explore the influence of consumers' tolerance of product quality and brand on their purchase channel choice. The results show that: (1) consumer product tolerance positively influences consumers' online purchasing choice; (2) consumer product tolerance influences purchase channel choice through rationalization; and (3) the sweet lemon mechanism mediates consumer product tolerance on online consultation and online purchase and offline experience, but the sour grapes mechanism does not mediate.

Keywords: rationalization, shopping channel choice, product tolerance, sweet lemon, sour grapes

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INTRODUCTION

Given the differences in product quality, price, and convenience offered by different purchase channels (Neslin et al., 2006; Zhou and Zhang, 2017; Cao and Ding, 2018), consumers get the value and benefits brought by the advantages of that channel (Yang et al., 2021), while they have to bear the risk of suffering losses brought by the shortcomings of that channel, when they buy goods through a certain channel. For example, products in the online channel are inexpensive, but product quality may be problematic. Generally, consumers have expectations of differences in price, quality, and brand of products provided by different channels and tend to shop on suitable product channels according to their product tolerance (Ma, 2016). For example, when an individual buys a cheap product, he may prefer to buy it online instead of going directly to a counter. In contrast, he may prefer to go to a brick-and-mortar store to buy it directly if he wants to buy a high-quality commodity.

Given this phenomenon, this article focuses on two main questions: Does consumers' product tolerance effectively influence their purchase channel choice? How does this effect occur? In other words, what is the mechanism of action by which consumers' product tolerance affects consumers' purchase channel choice? This article uses various research streams, including zone of tolerance (ZoT), product tolerance, rationalization, and purchase channel choice. Drawing from this literature, this article offers two major propositions. First, the study divides product tolerance into quality tolerance and brand tolerance to investigate the influence of product tolerance

on consumers' purchase channel choices. Second, this article suggests that consumers' product tolerance triggers the ego defense mechanism of rationalization, that is, rationalization mediates the effect of consumer product tolerance on purchase channel choice. The first purpose of this research was to enrich the antecedents of consumer purchase channel choice by explaining the relationship between consumer product tolerance, rationalization, and purchase channel choice. The second purpose was to expand the application of rationalization in consumer behavior research.

LITERATURE REVIEW

Research on Consumers' Purchasing Channel Choice

Most consumers are cross-shoppers and tend to shop on suitable product channels because the development of multichannel and omnichannel provides consumers with more prosperous purchase conditions (Ma, 2016). Existing research has focused on three aspects of consumer characteristics, channel characteristics, and consumption environment to explore the factors influencing channel choice. First, the initial studies focused more on the demographic characteristics of consumers, such as gender, age, monthly income, and education level (Susskind, 2004; Jin et al., 2010). However, as for consumers, the choice of purchasing channel mainly depends on the economic factors related to consumer channel choice, such as search cost, delivery time, evaluation cost, and price (Gupta et al., 2004). Price is one of the most important criteria for evaluating purchase channels (Liao and Lv, 2019). For example, consumers buy cheap products on the Internet, but they are more inclined to buy expensive products in offline stores. Nevertheless, if personalization and convenience are important to customers, price is less critical to their choice of purchase channel (Gensler et al., 2017). For example, purchasing convenience offers consumers to buy products with minimum time and effort (Schröder and Zaharia, 2008). Furthermore, consumers' perceived value will also have an impact on online and offline channel purchases (Ding and Wang, 2019). For example, when consumers' perceived value is pleasurable, in-store purchasing channels make them feel more guilty than online purchases (Saintives, 2020). Second, existing research pays attention to the characteristics of purchase channels, such as the service level of channels (Bu et al., 2010), channel benefits (Bauerová and Braciníková, 2021), and channel risks (Falk et al., 2007; Guo et al., 2018). For example, consumers generally believe that online channels offer more product choices than offline channels; meanwhile, they easily obtain a great deal of information about product attributes and availability, so consumers can compare prices and overall value quickly (Cheema and Papatla, 2010; Li, 2016). However, the interaction of online channels is mainly limited to vision and hearing (Petit et al., 2019) and fails to provide consumers with an authentic product experience. In contrast, brick-and-mortar stores allow the consumer to experience the product personally on a multisensory basis and provide the consumer with comprehensive as well as accurate product information (Liu et al., 2017). Therefore, consumers who pay attention to the sense of experience tend to choose offline channels. In hybrid retail, the most popular purchase channel is still the offline channel (Bauerová and Braciníková, 2021). Third, the consumption environment also affects consumers' purchasing choices. The latest research shows that consumers have a noticeable tendency to utilize online and offline channels under the COVID-19 pandemic comprehensively, and the epidemic has enhanced consumers' acceptance of online channels (Liu et al., 2021).

Zone of Tolerance

The concept of ZoT originates from customer perception of service quality (Gronroos, 1990) and was redefined by PZB (Parasuraman et al., 1994), an American Service Management research portfolio. PZB put forward the concept of ideal service expectation and appropriate service expectation. The ideal service level refers to customers' expected service performance, while the appropriate service level refers to the service performance that customers think is acceptable. The area between ideal and appropriate service expectations is defined as the zone of tolerance (ZoT). Customers are satisfied if the service is in ZoT (Parasuraman, 1994; Parasuraman et al., 1994). Customers' satisfaction depends on whether the actual service performance is within the tolerance range (Zolfagharian et al., 2018). Furthermore, PZB found that ZoT is not invariable. Different customers, the same customer in different situations and service experiences, will change ZoT. The appropriate service expectation (the lower limit of ZoT) is more likely to change than the ideal service expectation (the upper limit of ZoT). Initially, PZB obtained the ideal service-level minus the acceptable service level directly to get ZoT. However, as ZoT is based on customers' subjective perceptions, the span of different customers' ZoT is different (Zhang et al., 2015).

Persistent service intensity factors, clear service commitment, experience, and the self-perceived role of customers all affect the width of ZoT (Zeithaml et al., 1993). Luo (2003) analyzed the consumers' purchase involvement and their specific impact on the customer zone of tolerance according to their different characteristics and responses to the service. Guo et al. (2004) distinguished between industry and consumer segmentation characteristics of ZoT. Zhai et al. (2008) combined price and service marketing, and they defined the channel's zone of tolerance based on the analysis framework of fairness and injustice perception and the psychological contract. A new study finds that green brand equity generates a positive effect on customer brand tolerance levels by increasing consumers' performance tolerance, price tolerance, and communication tolerance levels (Sozer, 2020).

Now, ZoT has been applied to many industries, mainly focusing on service quality, service recovery, and service marketing, such as hotel services (Chen, 2014), retail industry (Nadiri, 2011; Pu et al., 2012), banking services (Nadiri et al., 2009), insurance economy (Lobo, 2008), public transportation (Hu et al., 2011), tourism industry (Li et al., 2018; Park and Nicolau, 2019), and library service quality (Kumar and Mahajan, 2019). Since ZoT has proven to be a useful diagnostic tool, it not only can accurately diagnose service performance deficiencies

(Ribeiro and Barbosa, 2017), but also can integrate service performance, different levels of expectation, and customer loyalty (Berry et al., 1991; Walker and Baker, 2000). Furthermore, ZoT can provide information on areas and attributes that need improvement (Cavana et al., 2007). Therefore, ZoT is useful for exploring dynamic aspects of the relationship between service processes and service outputs (Johnston, 1995). By integrating the ZoT framework, practitioners can better identify key service components, assess the service quality they provide, determine where resources can be allocated more accurately, and then deliver them more consistently to customers (Wu and Wang, 2012). For example, Han et al. (2017) constructed a service error prevention model suitable for an online shopping service environment by introducing ZoT.

Rationalization

When psychological resources are insufficient to deal with threats actively, individuals tend to adopt defensive strategies to protect themselves from threats and uncomfortable or even painful emotions and then maintain positive self-esteem (Wullenkord and Reese, 2021). Rationalization is one of the ego defense mechanisms. In psychology, it refers to that individuals coming up with various reasons to forgive themselves for their failure when they encounter setbacks, so as to achieve the effect of self-comfort (Markin, 1979). It, rooted in cognitive distortions (Wu and Chen, 2008), is a psychological process for people to relieve their anxious emotions. It is also a potential behavioral process that promotes individuals' desires and the natural environment, so as to promote their development (Bone, 1975).

Jones (1908) first proposed two forms of rationalization—the so-called sour grapes and sweet lemon mechanisms. The sour grapes mechanism comes from a fox's fable who, unable to reach bunch after bunch of luscious grapes, decided they were sour and not worth eating (Markin, 1979; Lee, 2017). The sweet lemon mechanism is in a sense an extension of the sour grapes, in which individuals believe that what they cannot get is not worth having and that what they already have is remarkably satisfying (Markin, 1979). The sweet lemon mechanism is also a kind of self-deception to obtain psychological comfort and accept the psychology of reality. Furthermore, the sweet lemon mechanism is usually associated with an optimistic attitude, while the sour grapes mechanism is associated with a pessimistic thinking style (Markin, 1979; Kay et al., 2002).

Ego defense mechanisms, such as rationalization, denial, and projection, are commonly used in education (Yu et al., 2008; Dai, 2010; Xia et al., 2022). Meanwhile, recent studies have shown that rationalization is often used to explain behavioral motivations for moral corruption (De Klerk, 2017; Capelos and Demertzis, 2022). People use rationalization to convince themselves that their corrupt behavior is justified and acceptable (Murphy, 2012; Free, 2015). Nevertheless, rationalization also increases the reporting and disclosure of wrongdoing and self-threatening behavior (Latan et al., 2019; Khan et al., 2022). Mercier and Sperber (2011) argues that rationalization can have prudential, hedonic, and interpersonal advantages that may increase happiness and help individuals strategically influence others. At the same time, rationalization can give meaning to behavior, which leads individuals to act more directly in the way they think is right and relieve stress (Markin, 1979; Summers, 2017). However, the process of rationalization can also discourage self-criticism and peer criticism and lead to conceit (Summers, 2017).

First, through the review of the existing research, the research on consumers' purchasing channel choice has been carried out from the perspective of consumers' personal characteristics, channel characteristics, product characteristics, and the change in consumption environment and has obtained abundant research results. Second, although existing researches on tolerance in marketing involve many industries (banking, insurance, aviation, and retail), they only focus on service tolerance or price tolerance, but do not carry out comprehensive and systematic research on the widespread tolerance of consumers in the shopping process. Finally, rationalization as an ego defense mechanism is generally recognized and validated in the psychological literature. Nevertheless, the concept of rationalization has not been afforded much consideration and developed in the field of consumer behavior.

MATERIALS AND METHODS

Model Architecture and Assumptions

This article studies the effect of consumer's product tolerance on consumer's purchase channel choice and innovatively introduces rationalization as a mediator variable. As for independent variables, we divided consumers' product tolerance into quality tolerance and brand tolerance by referring to the concepts of performance tolerance and brand tolerance in Szer (2019). We do not take price tolerance into consideration for many scholars have conducted in-depth studies on consumers' price tolerance (Anderson, 1996; Herrmann et al., 2004; Wang et al., 2004; Vázquez-Casielles et al., 2009; Pandey et al., 2019; Nikhashemi et al., 2020). In terms of the design of purchase channels, in this study, we added the acquisition methods of consumer product information (online consultation and offline experience) into the purchase channels (online purchase and offline purchase) to construct a 2×2 consumer purchase channel choice. Reasons are as follows: first, according to channels' functions, consumption channels can be divided into information search channels and purchase channels (Tu and Zhou, 2011). Information search channels provide consumers with a great deal of information for purchasing decisions while purchasing channels provide consumers with a place to purchase products and complete transactions. In addition, consumers get product information not only through consultation but also through experience. Online channels mainly provide consulting information, while offline channels can provide product or service experience (Dholakia et al., 2010). Finally, the development of omnichannel intensifies the channel migration of consumers. Consumers switch from searching for product information through online channels to purchasing products through offline channels, or consumers switch to purchasing products online after experiencing products in offline stores (Tu and Zhou, 2011). As for rationalization, we draw on the studies of Jones (1908) and Markin (1979), which divide rationalization into "sour grapes"

and "sweet lemon" mechanisms. The research model is shown in **Figure 1**.

Product Tolerance and Purchasing Channel Choice

According to the concept of ZoT, consumers usually have expectations of the product before purchase and they choose a suitable channel to purchase. In addition, the degree of product information asymmetry provided by different channels is different (Zhou and Zhang, 2017), so consumers will have different degrees of tolerance for products provided by different channels. Generally, consumers will consider both online and offline channels before purchasing (Wang C. et al., 2021). Although online channels are convenient for consumers to compare prices and collect product information, consumers still worry about product quality (Park et al., 2021), given the severe information asymmetry between buyers and sellers and the non-contact of products (Dai et al., 2016b). Consumers' perception of product quality is a crucial determinant of online purchases (Silva et al., 2021). Consumers who choose online channels have a higher tolerance for product quality, since there are no direct contact with consumers through online channels and a high probability of quality problems in the products purchased. When the product is expensive (Tu and Zhou, 2012) or may cause safety risks, or its manufacturing process and technology are complex, consumers will avoid online channels and turn to offline channels (Dai et al., 2016a). Offline channels allow consumers to experience products, so they have a good master of quality. Based on this, we propose H1a and H1b.

H1a: Consumers who have a high tolerance for product quality will be highly likely to choose online consultation and online purchase (Quadrant I) and offline experience and online purchase (Quadrant III).

H1b: Consumers who have a low tolerance for product quality will highly likely choose online consultation and offline purchase (Quadrant II) and offline experience and offline purchase (Quadrant IV).

Consumers' tolerance of brands is mainly reflected in their tolerance of fake goods. In 2017, the total loss caused by fake goods in the world reached 1.2 trillion dollars, among which the total 323 billion dollars loss was caused by fake goods sold online, mostly involving luxury brands, such as Armani, Bvlgari, and Cartier. Compared with offline brand counters, the risk of fake goods purchased through online channels is higher (Dong et al., 2005). Consumers' high tolerance for fake online products leads to the rapid development of online fake products (Wang H. Z. et al., 2021). Furthermore, homogenous products of different brands have different degrees of information asymmetry in different channels, resulting in a gap between the product brands purchased by consumers and consumers' expectations. Therefore, only when consumers have a high tolerance for product brands, they will choose to consult and purchase online directly or experience offline and purchase online. When consumers have a low tolerance for product brands, they will choose to acquire information online and purchase offline, or experience offline and purchase offline directly. Based on this, we propose the hypothesis of H2a and H2b.

H2a: Consumers who have a high tolerance for product brands will highly likely choose online consultation and online purchase (Quadrant I) and offline experience and online purchase (Quadrant III).

H2b: Consumers who have a low tolerance for product brands will highly likely choose online consultation and offline purchase (Quadrant II) and offline experience and offline purchase (Quadrant IV).

Product Tolerance and Rationalization

The Dictionary of Psychology defines tolerance as "the ability to bear pressure, burden, pain, and pressure without suffering"

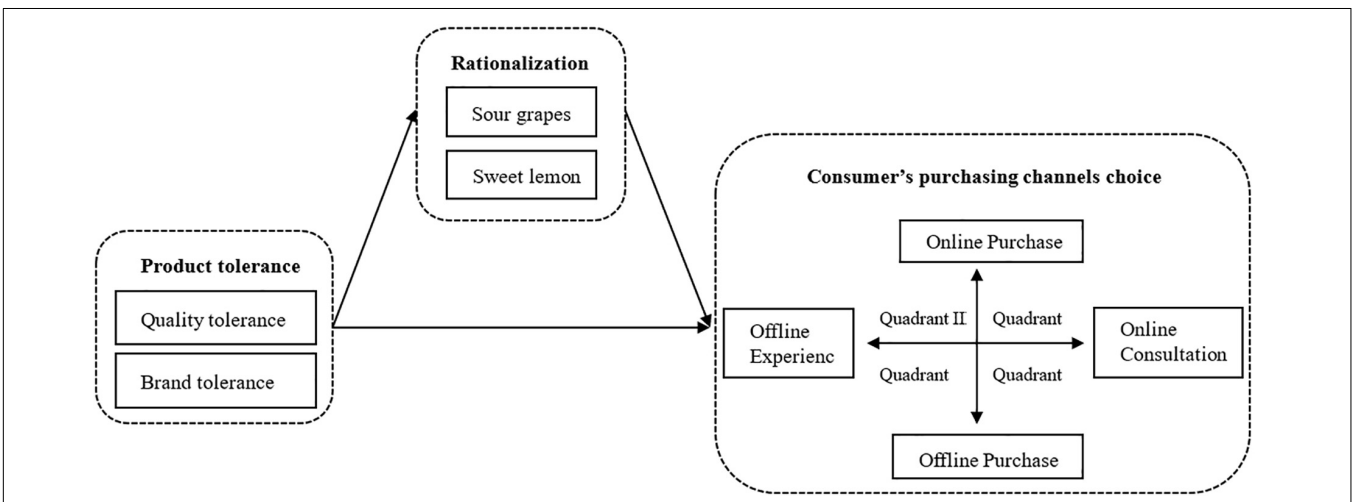


FIGURE 1 | The relationship model between product tolerance, rationalization, and consumer's shopping channels choice.

(Szer, 2019). In the social sciences, tolerance is mainly related to an inherent paradox of accepting something that is not favored or even rejected (Van Doorn, 2012). Therefore, one needs to dislike or disagree with something in a certain way to resolve important differences when tolerance occurs. Consumer's tolerance of a product means that the consumer accepts some product attributes that he or she dislikes, which may lead to anxiety or uneasiness. For example, when products do not meet expectations, consumers generate a product's performance tolerance (Szer, 2019). To relieve the anxiety and even threat caused by product tolerance, rationalization takes into consideration. Rationalization provides appropriate reasons for consumers to comfort themselves (Summers, 2017). For instance, like the fox in Aesop's Fable, consumers may generate the sour grapes mechanism, believing that the quality of products purchased from other channels is not good either. Alternatively, consumers have the sweet lemon psychology, emphasizing their purchase channels to buy products of the same quality as others. When consumers feel more threatened, they will engage in a large number of rationalized behaviors (Markin, 1979). So, we propose H3a and H3b.

H3a: The higher the consumer's tolerance for product quality, the stronger the consumer's rationalization defense mechanism (sour grapes and sweet lemon).

H3b: The higher the tolerance of consumer product brand, the stronger the consumer's rationalization defense mechanism (sour grapes and sweet lemon).

TABLE 1 | Questionnaire items and reliability test.

Variable	Items
Product quality (PQ) Cronbach's α = 0.857 AVE = 0.674; C.R. = 0.860	PQ1: I can barely accept the quality of this product. PQ2: If the quality is worse than the same level of goods purchased before, I will not buy. PQ3: Product quality is the worst I can accept.
Product brands (PB) Cronbach's α = 0.814 AVE = 0.600; C.R. = 0.818	PB1: I can reluctantly accept the brand of this product. PB2: If the brand is inferior to other similar products I purchased, I will not buy. PB3: This brand is the worst brand I can accept.
Sour grape (SGP) Cronbach's α = 0.881 AVE = 0.655; C.R. = 0.844	SGP1: When I buy something, I think I'm getting the highest value. SGP2: If I don't buy good goods, I will think that other goods are bad. SGP3: I get anxious when I can't buy something I like. SGP4: I get into conflict with people because I can't buy satisfactory products.
Sweet lemon (SLP) Cronbach's α = 0.899 AVE = 0.695; C.R. = 0.901	SLP1: When I buy something, I think I'm getting a value that no one else is getting. SLP2: I don't get anxious when I buy something I don't like. SLP3: I will not get into conflict with people because I buy something that I am not satisfied with.
Online consultation and online purchase (OB) Cronbach's α = 0.869 AVE = 0.690; C.R. = 0.870	OB1: More money is spent on online shopping each month. OB2: Generally speaking, I will choose online purchase if there is a purchase demand. OB3: I will choose online consultation if I have purchase demand.
Online consultation and offline purchase (UB) Cronbach's α = 0.841 AVE = 0.646; C.R. = 0.846	UB1: Generally speaking, I will choose to buy offline if there is a purchase demand. UB2: I think offline products are better than online products. UB3: I prefer to consult online before buying offline.
Offline experience and online purchase (OC) Cronbach's α = 0.815 AVE = 0.610; C.R. = 0.823	OC1: More offline consultation time per month. OC2: If I have purchase demand, I will choose to experience offline before purchasing. OC3: I always buy online after experiencing it offline.
Offline experience and offline purchase (UC) Cronbach's α = 0.844 AVE = 0.644; C.R. = 0.845	UC1: Only after the offline experience can I decide whether to buy or not. UC2: I don't particularly appreciate buying products online. UC3: I always make in-store purchases after experiencing them offline.

Rationalization and Purchasing Channel Choice

Rationalization aims to give an explanation for individuals' behavior, even if one knows that his or her behavior is immoral or incorrect (Latan et al., 2019). For example, consumers enhance their intention to purchase pirated products in future by rationalizing past purchases of pirated products (Vida et al., 2012). Consumers can reduce their inner restlessness, anxiety, or threat through rationalization. The more committed a person is to act, the more resistant he or she will be to information that threatens the process (Markin, 1979). Under the research background of this article, we suggest that consumers with higher rationalization psychology have a higher probability of purchasing products through online channels. Generally, products in online channels are mixed with uneven quality, and it is not easy to guarantee the correctness of product information. However, when consumers decide to purchase online, they will resist the information that hinders this behavior from rationalizing their purchase and consumption activities. This resistance can be underestimating what one does not get and what others get (the sour grapes) or overestimating what one does get (the sweet lemon). Therefore, in the process of purchase, the stronger the rationalization psychology, the more consumers will actively avoid some unfavorable information. That is, the more likely consumers are to choose to get information offline, instead of getting it directly online and buying it online. Based on this, hypotheses H4a and H4b are proposed.

H4a: The stronger the rationalization defense mechanism of consumers (sour grapes and sweet lemon), the higher the probability of consumers choosing online consultation and online purchase (Quadrant I) and offline experience and online purchase (Quadrant III).

H4b: The lower the rationalization defense mechanism (sour grapes and sweet lemon), the higher the probability of consumers choosing online consultation and offline purchase (Quadrant II) and offline experience and offline purchase (Quadrant IV).

Mediator Role of Rationalization

Due to the differences in product information, convenience, and experience provided by online and offline channels and

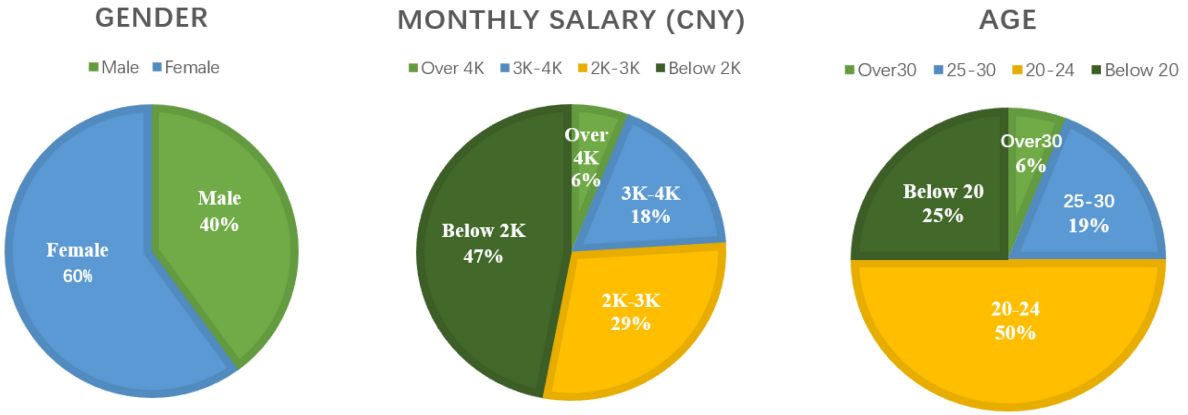


FIGURE 2 | Sample statistical distribution results.

TABLE 2 | Correlation coefficient between variables.

Variable	Mean	*SD*	1	2	3	4	5	6	7	8
PQ	4.474	1.624	1							
PB	4.509	1.555	0.181**	1						
SGP	4.986	1.655	0.395**	0.477**	1					
SLP	4.879	1.613	0.451**	0.352**	0.340**	1				
OB	4.949	1.669	0.409**	0.441**	0.467**	0.430**	1			
UB	4.821	1.566	−0.404**	−0.427**	−0.359**	−0.460**	−0.428**	1		
OC	4.640	1.770	0.428**	0.444**	0.493**	0.458**	0.415**	−0.541**	1	
UC	4.558	1.754	−0.414**	−0.450**	−0.498**	−0.435**	−0.484**	0.521**	−0.562**	1

*The symbol **indicates P < 0.01.*

the expectations of consumers on the product before purchase, consumers will weigh the advantages and disadvantages of each channel before making decisions. Meanwhile, the information asymmetry between buyers and sellers in online channels is high, for example, the price difference of homogeneous products in online channels is significant, and merchants adjust product prices more frequently (Brynjolfsson and Smith, 2000). Furthermore, online products are untouchable, and the quality cannot be guaranteed before receiving the products (Park et al., 2021), and consumers have a high probability of buying fake products through online channels (Dong et al., 2005). Therefore, according to ZoT, only consumers with a high tolerance for product quality and brand, that is, consumers with a low level of expectations, tend to choose online channels to purchase products. However, tolerance means accepting something that is not favored or even rejected (Van Doorn, 2012), which makes consumers feel anxious or uneasy and even produces pressure. Rationalization takes into consideration in this situation. Rationalization is a process of self-justification to protect oneself from the disappointment of unattainable goals (Markin, 1979). Consumers with high product tolerance need rationalization to justify their decisions. Rationalization encourages consumers with high product tolerance to block out unfavorable information. As a result, consumers with a high tolerance will rationalize their defenses and ignore the shortcomings of online channels. Based on this, we propose H5a and H5b.

H5a: The defense mechanism of rationalization (sour grapes and sweet lemon) mediates the effect of consumers' quality tolerance on their shopping channel choice.

H5b: The defense mechanism of rationalization (sour grapes and sweet lemon) mediates the effect of consumers' brand tolerance on their shopping channel choice.

Questionnaire Design and Research Samples

We measured consumers' product quality and brands tolerance using Bai's (2019) seven-item scale. For the rationalization seven-item scale, we use Swan et al. (1991) and Fernandez-Ballesteros et al. (1997). The channel choice questions were designed based on the studies of Gupta et al. (2004) and Liu (2016). The questionnaire used a seven-level Likert scale to estimate each item, with 1 indicating strong disagreement and 7 indicating strong agreement. The questionnaire was distributed through the network for pre-survey before the formal survey to ensure the item's validity. The complete questionnaire is shown in **Table 1**. The measurement terms were purified before factor analysis.

A total of 400 questionnaires were distributed in this article, of which 380 were valid, with a recovery rate of 95%. By analyzing the basic information of the questionnaire sample, the authors obtained the statistical distribution results of gender, age, and monthly salary, as shown in **Figure 2**.

TABLE 3 | Path check of hypothesis.

Item	Hypothesis path	Estimate	*S.E.*	C.R.	*P*	Result
H1a	PQ → OB	0.218	0.071	3.092	0.002	Valid
	PQ → OC	0.187	0.062	3.006	0.003	
H1b	PQ → UB	−0.209	0.069	−3.032	0.002	Valid
	PQ → UC	−0.190	0.071	−2.62	0.008	
H2a	PB → OB	0.250	0.084	2.984	0.003	Valid
	PB → OC	0.219	0.075	2.928	0.003	
H2b	PB → UC	−0.242	0.086	−2.832	0.05	Valid
	PB → UB	−0.277	0.083	−3.330	***	
H3a	PQ → SGP	0.387	0.060	6.448	***	Valid
	PQ → SLP	0.449	0.058	7.742	***	
H3b	PB → SGP	0.576	0.069	8.367	***	Valid
	PB → SLP	0.337	0.060	5.621	***	
H4a	SLP → OB	0.163	0.064	2.558	0.011	Valid
	SGP → OB	0.157	0.064	2.462	0.014	
	SLP → OC	0.182	0.056	3.245	0.001	
	SGP → OC	0.169	0.057	2.979	0.003	
H4b	SGP → UB	0.023	0.062	0.377	0.706	Partially valid
	SLP → UB	−0.231	0.062	−3.716	***	
	SGP → UC	−0.205	0.065	−3.176	0.001	
	SLP → UC	−0.168	0.065	−2.591	0.010	

Fitting index: CMIN/DF = 1.508; CFI = 0.972; TLI = 0.967; RMSEA = 0.037

****Indicates a significant correlation at 0.001.*

RESULTS

Questionnaire Reliability and Validity

It can be seen from **Table 1** that the Cronbach's α values of product quality, product brand, sour grapes, sweet lemon, online consultation online purchase, online consultation offline purchase, offline experience online purchase, and offline experience offline purchase are all greater than 0.7 and CR values are all greater than 0.8, indicating that the reliability of the scale is good. AVE values were all greater than 0.5, and AVE square roots (**Table 1**) were all greater than the correlation coefficients, indicating that the discriminant validity of the model was good. Based on the analysis of model fit degree based on confirmative factors, CMIN/DF is 478.994, GFI, NFI, TLI, IFI, and CFI are all above the standard of 0.9, RMSEA is 0.033 < 0.08, SRMR is 0.032 < 0.08, and AGFI is 0.898 close to 0.9. It shows that the model has good fitness.

TABLE 4 | Mediate effect test of rationalization.

Hypothesis path	Effect	*SE*	LLCI	ULCI	Result
PQ → SGP → OB	0.059	0.019	0.027	0.100	Partial mediation
PQ → SLP → OB	0.067	0.022	0.027	0.112	Partial mediation
PQ → SGP → UB	−0.008	0.016	−0.039	0.024	Invalid
PQ → SLP → UB	−0.090	0.021	−0.134	−0.051	Partial mediation
PQ → SGP → OC	0.068	0.019	0.035	0.110	Partial mediation
PQ → SLP → OC	0.077	0.021	0.038	0.120	Partial mediation
PQ → SGP → UC	−0.069	0.016	−0.107	−0.042	Partial mediation
PQ → SLP → UC	−0.065	0.020	−0.105	−0.027	Partial mediation
PB → SGP → OB	0.078	0.024	0.035	0.129	Partial mediation
PB → SLP → OB	0.047	0.017	0.019	0.085	Partial mediation
PB → SGP → UB	−0.011	0.021	−0.052	0.032	Invalid
PB → SLP → UB	−0.063	0.016	−0.09	−0.034	Partial mediation
PB → SGP → OC	0.089	0.023	0.046	0.139	Partial mediation
PB → SLP → OC	0.054	0.016	0.026	0.090	Partial mediation
PB → SGP → UC	−0.091	0.021	−0.136	−0.053	Partial mediation
PB → SLP → UC	−0.045	0.015	−0.080	−0.019	Partial mediation

Correlation Analysis

Table 2 shows the correlation results: product quality, product brand, sour grapes, sweet lemon psychology, online consultation online purchase, online consultation offline purchase, offline experience online purchase, and offline experience offline purchase all have significant correlation, which preliminarily verifies the hypothesis of this article.

Structural Equation Simulation Analysis

AMOS was used for hypothesis testing. As shown in **Table 3**, the CMIN/DF value of the model is 1.508 < 2.000, RMSEA is 0.037 < 0.050, and CFI > 0.900 reaches the critical value, indicating that the model is generally well adapted.

First, consumers' product quality tolerance positively influences their choice of online consultation online purchase (β = 0.218, P = 0.002) and offline experience online purchase (β = 0.187, P = 0.003). That is, H1a has been verified. In addition, consumers' product brand tolerance negatively influences their choice of online consultation and offline purchase (β = −0.209, P = 0.002) and offline experience and offline purchase (β = −0.190, P = 0.008). That is, H1b has been verified. In addition, consumers' brand tolerance of products positively influences their choice of online consultation and online purchase (β = 0.250, P = 0.003) and offline experience

TABLE 5 | Summary of hypothesis validation.

Item	Hypothesis	Result
H1a	Consumers who have a higher tolerance for product quality will have higher probability of choosing online consultation and online purchase (Quadrant I) and offline experience and online purchase (Quadrant III).	Valid
H1b	Consumers who have a low tolerance for product quality will have a high probability of choosing online consultation and offline purchase (Quadrant II) and offline experience and offline purchase (Quadrant IV).	Valid
H2a	Consumers who have a higher tolerance for product brand will have a high probability of choosing online consultation and offline purchase (Quadrant II) and offline experience and offline purchase (Quadrant IV).	Valid
H2b	Consumers who have a low tolerance for product brand will have a high probability of choosing online consultation and offline purchase (Quadrant II) and offline experience and offline purchase (Quadrant IV).	Valid
H3a	The higher the consumer's tolerance of product quality, the higher the consumer rationalization defense mechanism (sour grapes, sweet lemon).	Valid
H3b	The higher the tolerance of consumer product brands, the higher the consumer rationalization defense mechanism (sour grapes and sweet lemon).	Valid
H4a	The stronger the rationalization defense mechanism of consumers (sour grapes and sweet lemon), the higher the probability of consumers choosing online consultation and online purchase (Quadrant I) and offline experience and online purchase (Quadrant III).	Valid
H4b	The lower the rationalization defense mechanism (sour grapes and sweet lemon), the higher the probability of consumers choosing online consultation and offline purchase (Quadrant II) and offline experience and offline purchase (Quadrant IV).	Partial valid
H5a	The defense mechanism of rationalization (sour grapes and sweet lemon) mediates the effect of consumers' product quality tolerance on their shopping channel choice.	Partial valid
H5b	The defense mechanism of rationalization (sour grapes and sweet lemon) mediates the effect of consumers' product brand tolerance on their shopping channel choice.	Partial valid

and online purchase ($\beta = 0.219$, $P = 0.003$). That is, H2a has been verified. Consumers' brand tolerance of products has a positive influence on their choice of offline experience and offline purchase ($\beta = -0.242$, $P = 0.05$) and online consultation and offline purchase ($\beta = -0.277$, $P < 0.001$) had a negative effect. That is, H2b has been verified.

Second, consumers' tolerance for product quality and brand has a significant positive impact on the rationalization defense mechanism (sour grapes and sweet lemon). That is, H3a and H3b are valid. Finally, sour grapes and sweet lemon in consumers' rationalization defense mechanism significantly positively affect their choice of online consultation and online purchase and offline experience, so H4a is valid. In addition, the consumers' rationalization defense mechanism of sweet lemon negatively affects consumers' choice of online consultation and offline experience and offline purchase. Sour grapes negatively affect consumers' choice of offline experience and offline purchase but do not have a negative effect on online consultation and offline purchase ($\beta = 0.023$, $P = 0.026$). So, part of H4b is true.

Mediating Effect Test

In this article, the bootstrap function in SPSS was used to mediate the model effect, and the confidence interval was set as 95%. The analysis results are shown in **Table 4**. The rationalization defense mechanism plays a mediating role in consumer product quality, brand tolerance, and choice of purchase channels. The rationalization of sweet lemon is valid in online purchase, online consultation, online consulting offline purchase, offline experience online purchase, offline experience offline purchase, and all four types of purchase channels. However, the sour grapes mechanism mediates online consultation online purchase, offline experience online purchase, and offline experience offline purchase except online consultation offline purchase. Therefore, both H5a and H5b are partially valid.

DISCUSSION

Conclusion

Based on ZoT and rationalization defense mechanism theory, this article establishes a structural equation model with the relationship between consumers' tolerance of products and their choice of channels as the main effect, and the rationalization defense mechanism as the mediator. By testing the hypotheses, it can be found that most of the hypotheses are supported. **Table 5** shows the hypothesis verification summary of the empirical research of this study. Most of the assumptions were supported. We assume that one reason why part of H4b has not been verified may vary due to the small number of samples. Another possibility is that whether the consumer has sour grapes or not, he (she) may choose online consultation and offline purchase. Given that the sour grapes mechanism has no negative impact on online consultation and offline purchase, the mediating effects of the sour grapes mechanism in H5a and H5b have not been verified in this path.

Through the research, the work presented the following conclusions. First, consumers' tolerance of products directly influences their shopping channels choice. Consumers who obtain information through online channels do not have a high requirement for information because product information is not intuitive and the information source is complex. In addition, due to the non-contact nature of online products, consumers cannot obtain a high guarantee of product quality and brand. Therefore, when consumers have a high tolerance for products, they will choose to consult and purchase online directly or experience offline and purchase online. Second, we also analyze the mediating effect of rationalization on the relationship between consumers' product tolerance and shopping channels choice. Consumers may generate the sour grapes mechanism or the sweet lemon mechanism when they tolerate products. Meanwhile, the sour grapes mechanism positively promoted consumers' tolerance of product quality and brand on online purchase and offline experience and negatively inhibited consumers' tolerance of product quality and brand on online consultation and offline purchase. The sweet lemon mechanism positively promotes consumers' product tolerance on online consultation online purchase and offline experience online purchase and negatively inhibits consumers' product tolerance

on the choice of offline consultation offline purchase and online consultation offline purchase.

Implications

The research provides some theoretical and practical implications. This article integrates consumer's defense mechanism of product tolerance and rationalization into the research framework of consumer channel choice to carry out interdisciplinary research for the first time, while previous research on consumer channel choice mainly focuses on consumer characteristics (Susskind, 2004; Jin et al., 2010) and channel risk (Dai et al., 2016b; Guo et al., 2018). The study proves that consumers' product tolerance is a factor that affects consumers' purchase channel choice, and the mediating role of rationalization in the relationship between product tolerance and channel choice has never been studied before. In a practical sense, the current results provide valuable suggestions for enterprises to formulate channel strategies. Consumer make trade-off on purchasing channels based on their tolerance of product attributes. If consumers choose online channels, it means they abandon offline channels and vice versa. Therefore, for multichannel or omnichannel enterprises that open both offline and online channels simultaneously, it is necessary to speed up omnichannel construction, deeply integrate online and offline channels (Zha et al., 2021), and optimize the performance of each channel (Cui et al., 2021). For enterprises that only open one of the offline or online channels, such as Huaxizi, a Chinese cosmetics brand, which only opens online purchase channels, the probability of fake products on the Internet should be reduced and the quality of products should be improved.

Limitations and Future Directions

Like all studies, this article also has some limitations. First, consumers' tolerance of products is widespread, but this article only selects product quality and brand for research. However, consumers' tolerance of products may be reflected in communication tolerance (Szer, 2019) and other aspects. Second, this article tries to use the maturity scale in the existing research to modify the situation and use it. However, in the interdisciplinary research, the measurement of the rationalization, especially the dimension measurement of the consumer's tolerance of products in the relevant benefit factors, may have some deficiencies. Finally, our study did not consider demographic factors that might influence the relationship between variables. For example, low-income people may have a higher tolerance for the brand of products, so they are more inclined to buy fake products through online channels (Wang H. Z. et al., 2021).

We will propose the following directions for future research. First, future studies can classify consumers' tolerance of products or services and further explore consumers' tolerance of products in terms of price, channel, and promotion through grounded theory. Second, we hope that future research can expand or enrich the measurement dimension of rationalization and consumer product tolerance in consumer behavior based on the actual situation of the region. Finally, future research can explore the influence of other ego defense mechanisms, such as compensation, denial, projection, and fantasy, on consumer behavior. For example, consumers correct uncomfortable negative feelings through compensatory consumption to address persistent needs and differences between actual and ideal personal states (Koles et al., 2017). Consumers will also buy fake luxury goods by denying responsibility (Koay, 2018).

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

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Encouraging Brand Evangelism Through Failure Attribution and Recovery Justice: The Moderating Role of Emotional Attachment

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Brand evangelism is essential to the profitability of e-shops, but the effects of failure attribution and recovery justice in encouraging brand evangelism in the online service recovery context are not straightforward. Grounded on a framework integrating Attribution theory, Justice theory, and Attachment theory, this study explores whether failure attribution and recovery justice affect brand evangelism through recovery satisfaction with emotional attachment as a moderator. We gathered 400 samples from e-shoppers who encountered a service failure and recovery in the past year to verify the hypotheses using structural equation modeling and multiple-group analysis. Results declare that failure attribution (locus, stability, and controllability) and recovery justice (distributive, procedural, and interactional justice) are significantly related to recovery satisfaction and subsequent brand evangelism. Moreover, failure attribution (locus, stability, and controllability) correlates significantly with recovery justice (distributive, procedural, and interactional justice). In addition, emotional attachment plays a moderating role on the relationships between distributive and procedural justice on recovery satisfaction. This work contributes to brand evangelism research by giving a different perspective (i.e., service recovery) to comprehend what stimulate or deter brand evangelism. In addition, this work develops service recovery research through the combination of the third dimension of attribution (locus) and fourth dimension of justice (informational justice) into a framework, investigating the effect of failure attribution on recovery justice, and revealing the moderating effect of emotional attachment in the recovery process.

Keywords: failure attribution, recovery satisfaction, brand evangelism, emotional attachment, recovery justice

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INTRODUCTION

In a highly competitive service industry, even a tiny mistake in the service delivery process can increase customer switching intention (Wei and Lin, 2020). Due to the unique features of service, service failure is unavoidable (Manu and Sreejesh, 2021; Shamim et al., 2021). Immediate action to perform well-executed recovery can help restore customer satisfaction (Cantor and Li, 2018; Mazhar et al., 2022). Service recovery is a critical factor in gaining

customer satisfaction and positive behavioral intentions (Kima and Baker, 2020; Zhu et al., 2021).

Prior studies use attribution theory to interpret consumer reactions to service failure (Belanche et al., 2020). Attribution is an attempt to explain why a specific failure occurs (Van Vaerenbergh et al., 2014). Attribution theory, stemming from social psychology, is regarded as a critical construct in marketing. It is vital to understand the attribution process both theoretically and practically, because customers are likely to attribute negative outcomes (Xu et al., 2020). Generally, prior studies have only taken into account of two attribution dimensions (stability and controllability; Kim and Cho, 2014). To date, only a handful of studies have looked at the impact of attribution by including locus dimension (Harrisa et al., 2006; Oflac et al., 2021). In fact, the three-dimensional model is superior to the two-dimensional model (Moliner-Velázquez et al., 2015). So it could be interesting to include locus as an independent variable in service failure and recovery research.

Scholars have employed justice theory as an important research frame for analyzing service recovery strategies (McColl-Kennedy and Sparks, 2003). The logical basis of the theory is that customers' perception of recovery justice has a great impact on their mentality and behavior (Akram et al., 2019, 2021; Khan et al., 2021). So it is vital for service providers to have a clear understanding of justice dimensions to work out effective recovery strategies. A large amount of service recovery research just thinks about three justice dimensions (distributive, procedural, and interpersonal justice; Tax et al., 1998; Smith et al., 1999; Chebat and Slusarczyk, 2005; Collier and Bienstock, 2006). Limited research has investigated the influence of recovery justice by including informational justice dimension (Bhatti and Khattak, 2015; Nikbin et al., 2015; Ngahu et al., 2016). Colquitt (2001) stated that the four-dimensional model outstrips the three-dimensional model (Colquitt, 2001). Thus, it is necessary to include informational justice as the fourth justice dimension in the service recovery study.

Scholars have analyzed service recovery from the perspective of failure attribution and recovery justice. However, little is known about the impact of failure attribution on recovery justice. Only few studies have empirically analyzed the influence of customers' failure attribution on their recovery justice (Burton et al., 2014; Schneider and Castillo, 2015). Therefore, we proposed a research model integrating three attribution dimensions (locus, stability, and controllability) with four justice dimensions (distributive justice, procedural justice, interactional justice, and informational justice), and empirically investigate the correlation between failure attribution and recovery justice to fill in the research gap.

Service marketing scholars have pointed out that relationship marketing should be developed to a higher level, not limited to customer loyalty (Fierro et al., 2014; Gohary et al., 2016b; Odoom et al., 2020). Brand evangelism, an amplification of word-of-mouth intention (Nyadzayo et al., 2020), is worth considering as an important concept (Doss, 2014). It should be investigated in the context of service recovery, because understanding how to incentivize customers' evangelism of the brand in service recovery allows firms to turn a crisis into an opportunity. But empirical studies have rarely been conducted, leading to a pressing need for brand evangelism research in the service recovery setting (Abd Rashid et al., 2017). Besides, according to previous studies, failure attribution and recovery justice affect customers' behavioral intentions, such as word-of-mouth and patronage intention (Blodgett et al., 1997; Kim et al., 2009; Harrison-Walker, 2019). But the roles of failure attribution and recovery justice in predicting brand evangelism have not been verified. This study intends to advance our knowledge of brand evangelism literature by exploring the relationships of failure attribution and recovery justice to recovery satisfaction and subsequently to brand evangelism in the context of online service recovery.

Furthermore, the moderating role of emotional attachment, which is very important but relatively under-emphasized in the service recovery literature, was discussed in this study. Customer behaviors are mostly emotion-oriented, and in particular, emotion occupies a vital position in customer attitude and behavior (Río-Lanza et al., 2009; Wen and Chi, 2013; Kima and Baker, 2020; Babin et al., 2021). Emotional attachment is described as the emotional bond that connects a person with a specific purpose (Jimenez and Voss, 2014). It is an essential concept in the marketing literature. Prior studies have supported the direct effect of emotional attachment on recovery satisfaction (Wen and Chi, 2013; Nguyen and Minh, 2018), as well as the mediating role of emotional attachment between service recovery activities and recovery satisfaction (Río-Lanza et al., 2009; Vázquez-Casielles et al., 2012). However, few studies have delved into its moderating role in service recovery (Esen and Sonmezler, 2017; Torres et al., 2020). Joireman et al. (2013) suggested that future research should study how emotion influences customers' assessment of service recovery (Joireman et al., 2013). Hence, this study focused to examine the moderating role of emotional attachment in the context of recovery justice and recovery satisfaction to gain a better understanding of customers' assessment process of service recovery.

The main research purpose of this paper is to narrow gaps in literature through exploring how failure attribution and recovery justice encourage brand evangelism in the online service recovery context. More specifically, this study aims to: (1) verify whether failure attribution is related to recovery justice; (2) investigate whether failure attribution and recovery justice influence recovery satisfaction and subsequent brand evangelism; and (3) examine whether emotional attachment has a moderating effect in the relationship between recovery justice and recovery satisfaction.

This study contributes to service recovery and brand evangelism literature in three ways. First, different from prior research, this study includes the third dimension of attribution (locus) and fourth dimension of justice (informational justice) as independent variables. In particularly, this study ascertains the influence of failure attribution on recovery justice. Second, this study extends brand evangelism to service recovery context by probing into the mechanism through which failure attribution and recovery justice affect brand evangelism. Third, this study sheds light on recovery justice-recovery satisfaction mechanism by examining the moderating effect of emotional attachment,

which provides a useful supplement for previous literature underestimating the moderating effect of emotional attachment. Therefore, this study has developed a more comprehensive framework than prior research to comprehend how to encourage brand evangelism from online service recovery.

LITERATURE REVIEW

Failure Attribution

Attribution theory originated from social psychology theory. It has become a hot research topic in various fields. Researchers pointed out that when a service failure occurs, customers tend to search for the cause of the failure (Folkes, 1984; Bitner et al., 1990; Zhu et al., 2013). Failure attribution is defined as the actual cause of the service failure inferred by dissatisfied consumers (Lee et al., 2020). It has a vital impact on customer behavior (Sukariyah and Assaad, 2015). Failure attribution is often classified into two dimensions: controllability (that is whether the service provider could have prevented service failure) and stability (that is whether the cause of service failure is constant; Weiner, 1979). However, locus (that is who should take responsibility for the failure) also affect recovery expectations (Harrisa et al., 2006) and the justice perceptions in recovery (Oflac et al., 2021). Thus, this study suggests that failure attribution should comprise the following dimensions.

First, locus is whether the service failure is attributable to themselves or the firm (Hess et al., 2003). When dissatisfied customers attribute the failure to themselves, in other words, due to the internal attribution, the service provider takes low responsibility for the loss, and the converse is also true. There are cases that customers blame themselves for the negative experience (Bowling and Michel, 2011). In addition, customers who regard the causes of service failure are because of internal reasons consider the behavior of the service providers to be proper (Bowling and Beehr, 2006). According to previous studies, when consumers think external reasons as causes of service failure, they tend to have negative feelings (Oflac et al., 2021). This study focuses on the service failure that customers attribute to the service provider for the cause of service failure.

Second, stability indicates whether the customer considers the cause of service failure as temporary or constant (Folkes, 1984). Customer will be more dissatisfied if the cause of a potential service failure is more likely to be due to a stable cause rather than an unstable cause (Hess et al., 2003). In other words, if a service failure occurs due to a stable cause, the customer will perceive a sense of injustice, thereby exacerbating customer dissatisfaction. This study focuses on the service failure that customers perceive it to be due to a stable cause.

Third, controllability means whether the cause of failure is within the control of the firm. That is, the degree to which customer perceives the cause as intentional or unintentional (Hess et al., 2003). When customers attribute unsatisfactory service failure experiences to causes that are beyond the service provider's control, they do not think failure is because of intentional behavior (Weiner, 2000). On the contrary, if customers deem that service failure is preventable, they tend to perceive it as an unfair occurrence, which will lead to a dissatisfaction with the service provider. This study focuses on the service failure that customers perceive it as controllable regarding the cause of service failure.

Recovery Justice

Based on social psychology literature and organizational psychology literature, justice theory takes an important place in the theoretical framework of service recovery literature (Wirtz and Mattila, 2004). This study uses justice theory to understand customers' reactions to recovery efforts. Justice theory claims that the fairness of recovery strategy provided by service providers depends on customer's feelings (McColl-Kennedy and Sparks, 2003). Considering that customers evaluate recovery efforts according to the perception of justice, the study on recovery justice is essential.

In general, justice dimensions include distributive, procedural and interactional justice (Blodgett et al., 1997; Tax et al., 1998; Smith et al., 1999; Chebat and Slusarczyk, 2005). But Colquitt (2001) declared that the four-dimensional model which includes informational justice surpasses the three-dimensional model, because the veracity of information plays an important role in service recovery process (Colquitt, 2001). Therefore, this study proposes that recovery justice should be four dimensions, which are connected with financial rewards (distributive justice), systems and policies (procedural justice), complaint settlement efforts (interactional justice), explanations for service failure and recovery (informational justice), respectively.

Scholars reveal that recovery satisfaction and behavioral intention after service recovery vary in accordance with the degree of recovery justice (Lii et al., 2012; Mostafa et al., 2015; Musiiwa et al., 2020; Roy et al., 2022). Service providers should analyze the impacts of justice dimensions on customers' assessment process of service recovery to make successful recovery strategies (Gohary et al., 2016a).

Recovery Satisfaction

Customer satisfaction has been a popular topic of marketing and consumer behavior research (Wei et al., 2021). No company can overlook the significance of delivering the best service to gain customer satisfaction (Rashid and Ahmad, 2014). In general, customer satisfaction is a pleasant state of consumers when their needs and desires are met (Oliver, 1997).

Recovery satisfaction is vital for the firm (Zhu et al., 2020), because if customers are dissatisfied with recovery efforts, they tend to exhibit negative attitudes (Alenazi, 2021). Recovery satisfaction is defined as customers' positive emotions resulting from problem-solving performed by service providers (Kim et al., 2009).

Brand Evangelism

As a stretching of word-of-mouth marketing, brand evangelism is not limited to the behavior of sharing positive words about a specific product or service with other customers, but actively influencing others to consume the same brand and dissuading others from using the competitor's brand

(Doss, 2014). It includes behaviors of the will to protect the brand from negative word-of-mouth, and become an informal spokesperson for a product or service (Becerra and Badrinarayanan, 2013). Word-of-mouth means informally providing consumers with opinions on brand evaluation, while brand evangelism is a method of delivering opinions to consumers with credibility and expertise. The study of brand evangelism is still in its infancy and little attention has been given to encouraging brand evangelism in service recovery (Rashid and Ahmad, 2014). Because brand evangelism is firmly rooted in word-of-mouth, and many service recovery studies reveal recovery satisfaction as an important antecedent of positive word-of-mouth (Maxham and Netemeyer, 2002; Wen and Chi, 2013), this study examines how to encourage brand evangelism through recovery satisfaction from the perspective of failure attribution and recovery justice.

Emotional Attachment

In the marketing literature, emotional attachment is an important relationship-based concept that refers to the emotional bond with a consumption entity, such as brand, person, place or commodity (Park and Macinnis, 2006). This bond influences customer behavior and increases the profitability and productivity of the firm (Thomson et al., 2005).

The construct of emotional attachment was derived from the attachment theory of psychology started by Bowlby (1980). Attachment is an affectional tie with parents acquired by people from babyhood. Later in their lives, people develop attachments to objects (Leets et al., 1995). Marketing studies have demonstrated that attachment can transcend ownership, place, and individual relationships to a store or brand (Kleine and Baker, 2004; Carroll and Ahuvia, 2006). When a consumer purchases a brand reflecting his/her personality, a good experience leads to a positive brand attitude, contributing to brand attachment.

Researchers found that customers can develop an emotional attachment to various objects, such as gifts, brands (Patwardhan and Balasubramanian, 2011). In the past decade, emotional attachment to the brand has got more and more attention in the marketing literature. Extant studies have examined the influence of emotional attachment on recovery satisfaction as an antecedent (Kim et al., 2009; Wen and Chi, 2013; Nguyen and Minh, 2018) or a mediator (Río-Lanza et al., 2009; Vázquez-Casielles et al., 2012). But little attention has been paid to its role as a moderator (Esen and Sonmezler, 2017; Torres et al., 2020), which leads to a need for more work.

CONCEPTUAL MODEL AND HYPOTHESES DEVELOPMENT

Conceptual Model

Based on Attribution theory, Justice theory, and Attachment theory, we propose a sequential framework as illustrated in **Figure 1**, starting from customers' failure attribution and recovery justice, and finally deriving brand evangelism. We combine cognitive and affective factors with behavioral factor in the research model. Failure attribution and recovery justice could be regarded as cognitive factors, while recovery satisfaction as an affective factor, brand evangelism as the behavioral consequence of affective factor. This study hypothesized that failure attribution would have a negative correlation with recovery justice, failure attribution and recovery justice would be significantly associated with recovery satisfaction and subsequent brand evangelism, emotional attachment would moderate the relationship between recovery justice and recovery satisfaction. The reasonableness of this model is obvious. Firstly, customer's failure attribution reduces his/her recovery justice. Secondly, customer's recovery satisfaction is driven by his/her failure attribution and recovery justice. The more recovery satisfaction he/she has, the more likely he/she has brand evangelism. Thirdly, the relationship between recovery justice and recovery satisfaction might be moderated by customer's emotional attachment.

Failure Attribution and Recovery Justice

Attribution theory has been employed to interpret the causal inference about service failure (O'Neill and Mattila, 2004). When service failure occurs, customers are inclined to search for causes of the problem. Thus, failure attribution is a key factor in explaining customers' behavioral responses to service failure. A better understanding of failure attribution can help service providers develop successful recovery strategies.

Failure attribution affects cognitive outcomes. Recovery justice is commonly regarded as a cognitive concept (Kima and Baker, 2020). Based on prior studies, this study classified recovery justice into procedural justice, distributive justice, interactional justice and informational justice (Nikbin et al., 2015). In accordance with social exchange theory, people weigh the benefits against the costs of social relationships. They try to maximize benefits and minimize costs, and compare the benefit-and-cost ratio to decide whether it is fair or worthwhile (Homans, 1958). Therefore, customers who view service failures as attributable to the service provider and the cause of service failures as stable and controllable, have a higher probability of perceived injustice. In spite of the importance of failure attribution, few studies have empirically examined its role on recovery justice. Weiner (2006) highlights that attribution dimensions not only influence emotions and behaviors, but are also crucial to social judgments (Weiner, 2006). Schneider and Castillo (2015) have concluded that internal attribution positively impacts justice while external attribution exerts a negative effect on justice (Schneider and Castillo, 2015). According to a survey of employees, Burton et al. (2014) pointed out that internal attribution positively influences interactional justice while external attribution negatively impacts (Burton et al., 2014). Cole (2008) indicated that internal and external attribution affect justice dimensions. Therefore, the following hypotheses are proposed:

H1: Locus is negatively associated with justice dimensions.

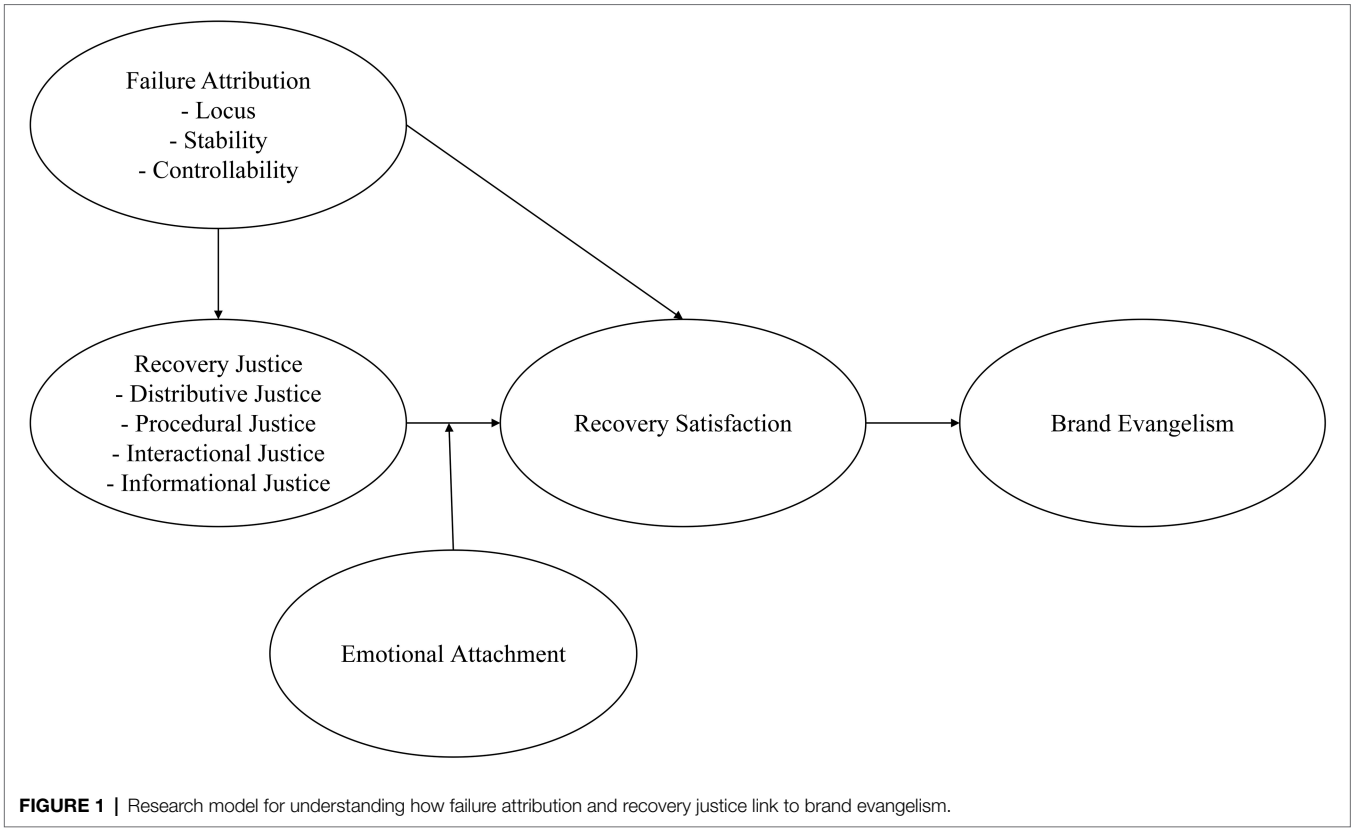


FIGURE 1 | Research model for understanding how failure attribution and recovery justice link to brand evangelism.

H1a: Locus is negatively associated with procedural justice.
H1b: Locus is negatively associated with distributive justice.
H1c: Locus is negatively associated with interactional justice.
H1d: Locus is negatively associated with informational justice.

H2: Stability is negatively associated with justice dimensions.
H2a: Stability is negatively associated with procedural justice.
H2b: Stability is negatively associated with distributive justice.
H2c: Stability is negatively associated with interactional justice.
H2d: Stability is negatively associated with informational justice.

H3: Controllability is negatively associated with justice dimensions.
H3a: Controllability is negatively associated with procedural justice.
H3b: Controllability is negatively associated with distributive justice.
H3c: Controllability is negatively associated with interactional justice.
H3d: Controllability is negatively associated with informational justice.

Failure Attribution and Recovery Satisfaction

Attribution theory has been applied in many fields (Jiang, 2020). When a service failure occurs, customers make causal attributions to search for the cause of the failure. They seek to comprehend why the event has happened (Nikbin et al., 2012). Failure attribution leads to positive and negative outcomes (Malombe and Choudhury, 2020).

Only a small number of studies have delved into the correlation between failure attribution and recovery satisfaction. Based on prior studies, this study classified failure attribution into locus, stability, and controllability (Moliner-Velázquez et al., 2015). Locus refers to whether customers perceive the cause of service failure to be their fault or the firm's fault (Moliner-Velázquez et al., 2015; Weitzl et al., 2018; Matikiti et al., 2019). Given that customers are inclined to blame the firm rather than themselves for the cause of service failure, this study focus on external attribution. If there are inconsistencies between recovery efforts and recovery expectations, it will result in customer dissatisfaction (Swanson and Hsu, 2011). So we assume that there is a negative correlation between locus and recovery satisfaction if the cause of failure lies with the firm.

Stability is defined as whether customers consider the cause of service failure as constant. If the cause of service failure is

perceived as permanent, customers think that the same service failure will repeatedly occur. It increases customer dissatisfaction. In this situation, customers would likely to claim compensation from the service provider (Hess et al., 2003; Van Vaerenbergh et al., 2014; Moliner-Velázquez et al., 2015; Weitzl et al., 2018; Matikiti et al., 2019; Jiang, 2020). Therefore, this study assumes the presence of a negative correlation between stability and recovery satisfaction, if the cause of failure is permanent.

Controllability is defined as whether customers consider the cause of failure be prevented or controlled by the firm. Customers will express dissatisfaction and tend to blame service providers if they believe that the causes of failure can be controlled by the service provider (Nikbin et al., 2014, 2015; Ngahu, 2019; Jiang, 2020; Malombe and Choudhury, 2020; Gidaković and Čater, 2021). So this study assumes the presence of a negative correlation between controllability and recovery satisfaction, if the cause of failure is controllable. Therefore, the following hypotheses are proposed:

H4: Failure attribution is negatively associated with recovery satisfaction.
H4a: Locus is negatively associated with recovery satisfaction.
H4b: Stability is negatively associated with recovery satisfaction.
H4c: Controllability is negatively associated with recovery satisfaction.

Recovery Justice and Recovery Satisfaction

Justice theory has gained extensive attention in interpreting formation of customer satisfaction. A number of studies have revealed the significant impact of recovery justice on recovery satisfaction in the offline context (Cheung and To, 2016; Balaji et al., 2018), this study investigates if the rule applies to the online context.

Distributive justice is defined as the perceived fairness of the outcomes received by a person (Lin et al., 2011; Nikbin et al., 2012). In connection with service recovery measures, customers judge whether the outcomes provided by service providers are fair (Wu et al., 2020). Rashid and Ahmad (2014) stated that the key to distributive justice is the compensation provided to customers for losses and inconveniences caused by a service failure (Rashid and Ahmad, 2014). Noone (2012) and Bambauer-Sachse and Rabeson (2015) highlighted that compensation effectively alleviates customer dissatisfaction after a service failure (Noone, 2012; Bambauer-Sachse and Rabeson, 2015). Compensation includes a refund, exchange, repair, discount, coupon, etc. Prior studies have pointed out that distributive justice positively affects recovery satisfaction (Wen and Chi, 2013; Tsai et al., 2014; Esen and Sonmezler, 2017; Rashid et al., 2017; Azzahro et al., 2020; Gidaković and Čater, 2021). Therefore, we hypothesize:

H5a: Distributive justice is positively associated with recovery satisfaction.

Procedural justice is defined as policies and procedures in dealing with service failure and responding to customer complaints (Nikbin et al., 2012). In other words, it means customer's perception of the recovery process, recovery policy or rules (Ofori et al., 2015). When service providers admit mistakes, try to correct them, and adapt recovery strategies according to customer needs, customers perceive procedural justice of service recovery. Procedural justice is evaluated according to whether customers are free to express their opinions, transparency in the recovery process, and appropriateness of recovery measures (Tax et al., 1998; Smith et al., 1999; Maxham and Netemeyer, 2003). Previous studies have pointed out that procedural justice positively influences recovery satisfaction (Lii et al., 2012; Wen and Chi, 2013; Esen and Sonmezler, 2017; Rashid et al., 2017; Azzahro et al., 2020; ALhawbani et al., 2021; Badawi et al., 2021; Gidaković and Čater, 2021). Therefore, we hypothesize:

H5b: Procedural justice is positively associated with recovery satisfaction.

Interactional justice refers to how fair the customer feels in communicating and coping with service employees after service failure (Kuo and Wu, 2012; Tsai et al., 2014). When service providers demonstrate their politeness, honestness, and empathy in communicating and resolving problems, customers perceive interactional justice of service recovery. Colquitt (2001) found that the expression "I'm sorry" from employees improves recovery satisfaction through interactional justice, because customers use empathy as a criterion for assessing interactional justice (Colquitt, 2001). Interactional justice is also evaluated by credibility, attitude to mistakes, politeness, close attention to solving problems, and a willingness to listen to customer complaints (Smith et al., 1999; Wirtz and Mattila, 2004). Researchers have concluded that interactional justice positively affects recovery satisfaction (Lii et al., 2012; Tsai et al., 2014; Esen and Sonmezler, 2017; Rashid et al., 2017; Azzahro et al., 2020; Olatunde and Nkamnebe, 2021). Therefore, we hypothesize:

H5c: Interactional justice is positively associated with recovery satisfaction.

Informational justice focuses on the description of the information provided by service providers about how the procedures were used or how the outcomes were distributed (Colquitt, 2001). Informational justice conveys credibility by reducing secrecy and dishonesty. Customers' voluntary and favorable evaluation of service recovery and their experiences during service recovery are the leading causes of recovery satisfaction (Bhatti and Khattak, 2015). In terms of informational justice, even when customers experience service failure, they are willing to accept it as fair if they think that the service provider has provided a clear and complete explanation (Bies and Shapiro, 1987). However, informational justice has got little attention in service recovery studies. It is pointed out that customers will perceive more justice if provided with

information that helps them make decisions (Gohary et al., 2016b). Few studies have documented that informational justice positively impacts recovery satisfaction in the physical environment (Ofori et al., 2015; Badawi et al., 2021). Amin and Piaralal (2021) suggested that informational justice positively impacts recovery satisfaction in the open and distant learning environment (Amin and Piaralal, 2021). Therefore, we hypothesize:

H5d: Informational justice is positively associated with recovery satisfaction.

Recovery Satisfaction and Brand Evangelism

Service recovery studies have used justice theory as the main framework. According to justice theory, customers with recovery satisfaction are inclined to spread positive word-of-mouth (Moliner-Velázquez et al., 2015). Although brand evangelism originates from psychology, it is regarded as an advanced form of word-of-mouth by marketing scholars. Customers satisfied with service recovery participate in positive word-of-mouth behavior (De Matos and Vargas Rossi, 2008). Therefore, if consumers are satisfied with service recovery, they would like to share their positive experiences with others and become brand evangelists who voluntarily promote the brand. Few studies have demonstrated that recovery satisfaction positively affects brand evangelism (Rashid and Ahmad, 2014; Rashid et al., 2017). Therefore, we hypothesize:

H6: Recovery satisfaction is positively associated with brand evangelism.

The Moderating Role of Emotional Attachment

In line with Consumer–brand relationships theory, consumers establish brand relationships in a way similar to social relationships (Fournier, 1998). Strong emotional associations between consumers and brands induce the development of emotional attachment to the brands (Thomson et al., 2005). In addition, according to Self-expansion theory (Aron and Aron, 1986), consumers are likely to include brands in themselves to build close relationships, which implies the significance of developing emotional attachment between consumers and brands (Loh et al., 2021).

Although the role of emotional attachment as an antecedent or mediator has been well-documented, little research has been done to scrutinize its moderating role. This study is based on "the love is blind" effect, which was suggested by Gregoire and Fisher (2006). Positive emotion towards a service provider significantly influences the impact of recovery efforts. Customers with close connections with service providers do not want to bring the relationships to an end, so they are more likely to forgive service providers for failures (Gregoire and Fisher, 2006). Esen and Sonmezler (2017) declared that emotional attachment moderates the correlation between perceived justice and recovery satisfaction (Esen and Sonmezler, 2017). So we assume that customers with emotional attachment to service providers trade off the negative influences of service failure to maintain close relationships, and respond more favorably to recovery efforts. Therefore, we hypothesize:

H7: Emotional attachment moderates the correlation between perceived justice and recovery satisfaction.
H7a: Emotional attachment moderates the correlation between procedural justice and recovery satisfaction.
H7b: Emotional attachment moderates the correlation between distributive justice and recovery satisfaction.
H7c: Emotional attachment moderates the correlation between interactional justice and recovery satisfaction.
H7d: Emotional attachment moderates the correlation between informational justice and recovery satisfaction.

METHODOLOGY

Data Collection

From May 6 to 21, 2021, our research team conducted a 15-day face-to-face questionnaire survey to examine the responses of e-shoppers. Data was collected from e-shoppers who have online service failure and recovery experience in the last year. A pilot study was implemented with 35 qualified undergraduate students to ensure the clarity and validity of the questions. During the pilot study, we saw respondents in person and discussed all questions in detail. Data analysis was performed, and the results of analysis were in accordance with expectations on the whole. Besides, most respondents claimed that the questionnaire was readable and understandable. Combined with statistical analysis and interview feedback, a total of 46 questions were ultimately compiled in the officially released questionnaire, of which 43 were related to the constructs. Specifically, failure attribution (locus, stability, and controllability) and perceived justice (distributive, procedural, interactional, and informational justice) have four questions, respectively. While recovery satisfaction, brand evangelism, and emotional attachment have five questions, respectively. The demographic information of each respondent was gathered and processed as control variables, including gender, age, and monthly income (Gong and Yi, 2019).

In order to reduce the amount of recall bias, we picked out participants on the basis of whether they had encountered at least a service failure and subsequently a service recovery in the e-shopping process over the past year. To be specific, respondents should fulfil two criteria: first, they should have e-shopping service failure experience (e.g., out-of-stock, size mismatch, product defect, exaggerated or false advertising, wrong or delayed delivery, and website error) within 1 year. Second, they should subsequently receive some service recovery measures (e.g., compensation, refund, replacement, and apology) provided by e-shops. A screening question was asked at the start of the survey to determine whether the participants are qualified to answer the questionnaire. The participants without e-shopping service failure and recovery experience or had encountered an e-shopping service failure and recovery over a year ago were not qualified, so they had to be excluded from the data collection. Due to no list of e-shoppers

who have service failure and recovery experience, non-probability convenience sampling method was employed. In addition, this method is fast, cost-effective and convenient.

Around 450 questionnaires were distributed, 423 were recollected, and 23 questionnaires with incomplete or suspected unreal answers were excluded. Finally, 400 were effective, representing an 88.9 percent valid response rate. All participants claimed that they had experienced more than one service failure and recovery during e-shopping in the past 1 year. Over half of the participants were female (58.5%), while 41.5% were male. Most respondents were aged 30–39 (34.7%), whereas respondents aged under 29 account for 27% of the total, 24.3% aged 40–49, 14% are older than 50. In addition, 123 (30.8%) of the respondents' average monthly income is 2,501–5,000 yuan, 90 (22.5%) of them earn 5,001–10,000 yuan, 73 (18.3%) of them earn less than 2,500 yuan, 69 (17.2%) of them earn 10,001–15,000 yuan, while 45 (11.2%) of them earn more than 15,001 yuan.

Measures

To increase the reliability and validity of data collection, most of the items in the designed questionnaire were derived from previously used questionnaires but have been modified based on the research purpose. We used 5-point Likert scales to measure constructs, which range from "1" denoting complete agreement, and "5" representing complete disagreement.

Failure Attribution

Failure attribution is defined as cognitive explanations for service failure (Lee and Cranage, 2018). The scale for failure attribution was adapted from Nikbin et al. (2014). Locus is measured by four items: "I perceive that the problem was caused by me (loc1)," "I perceive that the problem was caused by the e-retailer (loc2)," "I perceive that the problem was caused by an e-shop procedure (loc3)," "I perceive that the problem was caused by an e-shop policy (loc4)." Stability is measured by four items: "The cause of the problem is possible to happen very often (sat1)," "The cause of the problem is possible to occur at a future date (sat2)," "The cause of the problem is possible to be temporary (sta3)," "The cause of the problem is possible to remain unchanged over time (sta4)." Controllability is measured by four items: "The e-retailer could have easily guarded against the cause of the problem (con1)," "The cause of the problem was controllable (con2)," "The cause of the problem was avoidable (con3)," "The cause of the problem was preventable (con4)."

Recovery Justice

Distributive justice means the perceived fairness of service recovery's actual results or consequences (Esen and Sonmezler, 2017). The scale for distributive justice was derived from Esen and Sonmezler (2017), and made up of four items: "I believe the e-retailer was very fair when compensating me for the service failure (dis1)," "In consideration of the trouble caused and the time spent, the compensation I obtained from the e-retailer was suitable (dis2)," "The e-retailer's efforts sufficed to provide a satisfactory compensation (dis3)," "The e-retailer took adequate compensation measures to address the issue (dis4)."

Procedural justice means the fairness of formal rules and processes that resolve disputes and allocate resources during the service recovery (Esen and Sonmezler, 2017). The scale for procedural justice was derived from Esen and Sonmezler (2017), and made up of four items: "The e-retailer tried to solve the problem promptly (pro1)," "I believe my problem was solved correctly by the e-retailer (pro2)," "I believe the e-retailer has fair policies in tackling issues (pro3)," "I believe that the e-retailer's complaint handling procedure was adequate (pro4)."

Interactional justice is assessing the degree to which consumers have experienced justice in the interpersonal interactions with employees in the service recovery process (Nikbin et al., 2012). The scale for interactional justice was derived from Gohary et al. (2016a), and composed of four items: "The employees gave a fair amount of concern to my problem (int1)," "The employees listened attentively to my complaint (int2)," "The employees gave me a genuine apology (int3)," "The employees make ample effort to solve my problem (int4)."

Informational justice means the perceived suitability of the information used to explain the cause of the problem during service recovery (Hess et al., 2003). The scale for informational justice was derived from Gohary et al. (2016a), and composed of four items: "The employee explained the procedures thoroughly (inf1)," "The employee's explanations about the procedures were ample (inf2)," "The employee has been honest in (his/her) conversations with me (inf3)," "The employee delineated the details of the service recovery fully and promptly (inf4).".

Recovery Satisfaction

Recovery satisfaction means the degree of satisfaction with a service provider's business-specific service recovery attempt (Esen and Sonmezler, 2017). The scale for recovery satisfaction was adapted from Esen and Sonmezler (2017), and composed of four items: "I am satisfied with the way service failure was solved (rec1)," "It seems to me that the e-retailer offered a satisfactory solution to the problem (rec2)," "I have no regrets about choosing this e-shop (rec3)," "Presently, I develop a more positive attitude to this e-shop (rec4)," "I am satisfied with how my problem was handled and solved (rec5)."

Brand Evangelism

Brand evangelism is defined as a more proactive and devoted way of broadcasting positive word-of-mouth and fervently attempting to advise others to get engaged with the brand (Becerra and Badrinarayanan, 2013). The scale for brand evangelism was adapted from Becerra and Badrinarayanan (2013), and composed of four items: "Soon, I would probably buy from this e-shop (eva1)," "I spread public praise about this e-shop (eva2)," "I suggest this e-shop to my friends (eva3)," "If my friends were searching goods on the Internet, I would tell them to buy from this e-shop (eva4)," "I would

like to tell others that this e-shop is the best in the world (eva5)."

Emotional Attachment

Emotional attachment means the extent of an emotion-laden tie between service providers and consumers (Esen and Sonmezler, 2017). The scale for emotional attachment was adapted from Esen and Sonmezler (2017), and composed of five items: "My feelings toward the e-retailer can be characterized by connection (att1)," "My feelings toward the e-retailer can be characterized by passion (att2)," "My feelings toward the e-retailer can be characterized by affection (att3)," "I have no particular feelings about this e-shop (att4)," "My feelings toward the e-retailer can be characterized by delight (att5)."

ANALYSIS RESULTS AND HYPOTHESIS TESTING

Validity and Reliability of Measurements

Cronbach's alpha was employed to assess the internal consistency of the scales. According to Bagozzi and Yi (1988), reliability scores above 0.60 are adequate (Bagozzi and Yi, 1988). As listed in **Table 1**, emotional attachment has the highest Cronbach's Alpha of 0.894, followed by stability 0.861, brand evangelism 0.836, procedural justice 0.829, recovery satisfaction 0.814, distributive justice 0.796, interactional justice 0.791, locus 0.779, controllability 0.728, and informational justice with the lowest Cronbach's Alpha of 0.717. All items were accepted grounded on Cronbach's Alpha over 0.70, which indicates satisfactory reliability.

To examine the validity, exploratory factor analysis was performed with exogenous variables and endogenous variables. Based on the analysis results, one item of each locus and interactional justice (loc2 and int1) was excluded. The variance, which can be explained with 10 factors, was 63.8%. Moreover, Kaiser-Meyer-Olkin = 0.819, Bartlett = 7009.731, $df = 820$, $p = 0.000$.

This study utilized confirmatory factor analysis to assess unidimensionality. As shown in **Table 2**, stability (sat1), controllability (con1), distributive justice (dis2), procedural justice (pro3), informational justice (inf1), and emotional attachment (emo5) were deleted one item. In contrast, recovery satisfaction (resat1 and resat5) and brand evangelism (evan2 and evan3) were deleted two items. The results indicated that the overall fit index reaches a satisfactory level of fitness: $x^2 = 588.188$ ($p = 0.00$), $df = 389$, GFI = 0.915, AGFI = 0.892, CFI = 0.954, SRMR = 0.048, RMSEA = 0.036.

Hair et al. (2006) put forward that a proposed model should be evaluated based on convergent validity and discriminant validity. The evaluation of convergent validity should be made by investigating the composite reliabilities and the AVE for each construct (Hair et al., 2006). As listed in **Table 2**, all the constructs' composite reliability values surpassed the 0.7 thresholds, and all the values of AVEs exceeded the 0.5 thresholds. Therefore, we can know that the measurement model has an acceptable level of convergent validity, thereby establishing the convergent validity.

Heterotrait Monotrait Ratio (HTMT) method was employed to check the discriminant validity because of its advantage over other methods (Hair et al., 2019). As listed in **Table 3**, HTMT values of each construct are below the threshold of 0.85, implying that all constructs have sufficient discriminant validity.

Common Method Bias Testing

Harman's one-factor test was conducted for assessing the common method bias. We entered all measurement scales into a principal component analysis and interpreted the unrotated factor solution to determine whether the constructs demonstrated common method variance (Podsakoff and Organ, 1986). Results indicated that ten factors emerged with eigenvalues more than 1.0, and the first principal component explained 15.6% of the variance, implying that the possibility of common method bias in this study was low. What's more, we also employed confirmatory factor analysis to further verify the results. Fit indices of the ten-factor model ($x^2/df = 1.512$, GFI = 0.915, AGFI = 0.892, CFI = 0.954, SRMR = 0.048, and RMSEA = 0.036) were significantly better than the single-factor model ($x^2/df = 7.869$, GFI = 0.604, AGFI = 0.547, CFI = 0.314, SRMR = 0.133, and RMSEA = 0.131), demonstrating that common method bias was not serious in this research.

Hypothesis Testing

The data was analyzed by structural equation modeling using AMOS 25.0. According to the results of hypothesis testing displayed in **Table 4**, the overall fit index shows an acceptable level of fitness: $x^2 = 550.221$ ($p = 0.00$), $df = 301$, GFI = 0.907, AGFI = 0.884, CFI = 0.930, RMR = 0.036, RMSEA = 0.046.

The regression results indicated that failure attribution explained 60.2, 54.7, 37.1, and 15.9% of the total variance in distributive justice, procedural justice, interactional justice and informational justice, respectively. The regression analysis results for failure attribution and perceived justice demonstrated that the variables jointly explained 39.6% of the total variance in recovery satisfaction. In addition, recovery satisfaction explained 60.8% of the total variance in brand evangelism.

Table 4 presents the analysis results of the hypotheses testing. Hypotheses H1a, H1b, H1c, and H1d predicted relationships between locus and recovery justice. After accounting for the control variables, locus displayed a significantly negative influence on distributive justice ($\beta = -0.152$, $t = -2.538$, $p < 0.05$), procedural justice ($\beta = -0.143$, $t = -2.943$, $p < 0.01$), interactional justice ($\beta = -0.137$, $t = -2.423$, $p < 0.05$).That is, H1a, H1b, and H1c were validated. On the contrary, there was no significant correlation between locus and informational justice ($\beta = -0.015$, $t = -0.277$, ns). Thus, H1d was rejected.

Moreover, hypotheses H2a, H2b, H2c, and H2d predicted relationships between stability and recovery justice. Stability demonstrated a significant negative influence on distributive justice ($\beta = -0.283$, $t = -6.641$, $p < 0.01$), procedural justice ($\beta = -0.095$, $t = -2.440$, $p < 0.05$), interactional justice ($\beta = -0.140$, $t = -2.733$, $p < 0.01$), but no influence on informational justice ($\beta = -0.086$, $t = -1.495$, ns). These results supported H2a, H2b, H2c but not H2d.

TABLE 1 | Results of reliability and validity analysis.

Constructs	Numbers of initial items	Numbers after reliability analysis	Cronbach'α value	Numbers after exploratory factor analysis	Numbers after confirmatory factor analysis
Locus	4	4	0.779	4	3
Stability	4	4	0.861	3	3
Controllability	4	4	0.728	4	3
Distributive Justice	4	4	0.796	4	3
Procedural Justice	4	4	0.829	4	3
Interactional Justice	4	4	0.791	3	3
Informational Justice	4	4	0.717	4	3
Recovery Satisfaction	5	5	0.814	5	3
Brand Evangelism	5	5	0.836	5	3
Emotional Attachment	5	5	0.894	5	4

TABLE 2 | Results of confirmatory factor analysis.

Variables	Items	Unstandardized loading	S.E.	*t*-value	Standardized loading	CR	AVE
Locus	loc1	1.000	–	–	0.764	0.754	0.506
	loc3	0.880	0.051	17.370	0.717		
	loc4	0.740	0.087	8.524	0.648		
Stability	sta2	1.000	–	–	0.799	0.790	0.560
	sta3	0.736	0.063	11.714	0.627		
	sta4	0.982	0.070	14.025	0.805		
Controllability	con2	0.768	0.099	7.765	0.694	0.784	0.549
	con3	0.792	0.095	8.332	0.726		
	con4	1.000	–	–	0.798		
Distributive Justice	dis1	1.000	–	–	0.777	0.764	0.521
	dis2	0.967	0.075	12.825	0.760		
	dis4	0.723	0.081	8.900	0.618		
Procedural Justice	pro2	1.000	–	–	0.824	0.809	0.588
	pro3	0.945	0.060	15.669	0.797		
	pro4	0.917	0.069	13.234	0.670		
Interactional Justice	int2	0.924	0.085	10.818	0.694	0.818	0.600
	int3	1.000	–	–	0.826		
	int4	0.973	0.097	10.085	0.798		
Informational Justice	inf2	0.745	0.054	13.771	0.707	0.830	0.625
	inf3	1.000	–	–	0.852		
	inf4	0.926	0.062	14.897	0.805		
Recovery Satisfaction	sat2	1.000	–	–	0.748	0.750	0.501
	sat3	0.743	0.069	10.757	0.652		
	sat4	0.890	0.080	11.076	0.720		
Brand Evangelism	eva1	0.924	0.081	11.351	0.726	0.785	0.549
	eva4	1.000	–	–	0.752		
	eva5	0.930	0.078	11.908	0.744		
Emotional Attachment	emo1	1.000	–	–	0.838	0.870	0.626
	emo2	0.791	0.054	14.734	0.697		
	emo3	0.985	0.056	17.485	0.801		
	emo4	0.971	0.054	17.982	0.822		

In addition, hypotheses H3a, H3b, H3c, and H3d predicted relationships between controllability and recovery justice. Controllability negatively affected distributive justice ($\beta = -0.585$, $t = -7.220$, $p < 0.01$), procedural justice ($\beta = -0.826$, $t = -7.763$, $p < 0.01$), interactional justice ($\beta = -0.771$, $t = -6.889$, $p < 0.01$), thus supporting H3a, H3b, and H3c, respectively. Nonetheless, controllability did not have a significant impact on informational justice ($\beta = -0.010$, $t = -0.113$, ns). H3d was not supported.

Furthermore, hypotheses H4a, H4b, and H4c predicted relationships between failure attribution and recovery satisfaction.

TABLE 3 | Discriminant validity (HTMT criteria).

Variables	1	2	3	4	5	6	7	8	9	10
Locus (1)	0.711*									
Stability (2)	0.067**	0.748*								
Controllability (3)	0.275**	0.126**	0.741*							
Distributive Justice (4)	0.384**	0.120**	0.441**	0.722*						
Procedural Justice (5)	0.478**	0.109**	0.364**	0.301**	0.767*					
Interactional Justice (6)	0.419**	0.121**	0.404**	0.354**	0.321**	0.775*				
Informational Justice(7)	0.057**	0.102**	0.089**	0.042**	0.065**	0.011**	0.791*			
Recovery Satisfaction(8)	0.073**	0.118**	0.161**	0.098**	0.075**	0.198**	0.056**	0.708*		
Brand Evangelism (9)	0.127**	0.100**	0.098**	0.068**	0.089**	0.054**	0.107**	0.699**	0.741*	
Emotional Attachment(10)	0.035**	0.151**	0.140**	0.132**	0.093**	0.112**	0.138**	0.153**	0.104**	0.791*

**Values on the diagonal are square root of the AVE; **the off-diagonals are correlations.*

TABLE 4 | Analysis results of hypothesis testing.

Hypothesis	Coefficient	*t*-value	Support
H1a: Locus → Distributive Justice	−0.152	−2.538**	Yes
H1b: Locus → Procedural Justice	−0.143	−2.943*	Yes
H1c: Locus → Interactional Justice	−0.137	−2.423**	Yes
H1d: Locus → Informational Justice	−0.015	−0.277	No
H2a: Stability → Distributive Justice	−0.283	−6.641*	Yes
H2b: Stability → Procedural Justice	−0.095	−2.440**	Yes
H2c: Stability → Interactional Justice	−0.140	−2.733*	Yes
H2d: Stability → Informational Justice	−0.086	−1.495	No
H3a: Controllability → Distributive Justice	−0.585	−7.220*	Yes
H3b: Controllability → Procedural Justice	−0.826	−7.763*	Yes
H3c: Controllability → Interactional Justice	−0.771	−6.889*	Yes
H3d: Controllability → Informational Justice	−0.010	−0.113	No
H4a: Locus → Recovery Satisfaction	−0.337	−5.136*	Yes
H4b: Stability → Recovery Satisfaction	−0.143	−2.307**	Yes
H4c: Controllability → Recovery Satisfaction	−0.492	−2.160**	Yes
H5a: Distributive Justice → Recovery Satisfaction	0.273	2.021**	Yes
H5b: Procedural Justice → Recovery Satisfaction	0.217	1.967**	Yes
H5c: Interactional Justice → Recovery Satisfaction	0.343	2.510**	Yes
H5d: Informational Justice → Recovery Satisfaction	0.062	1.342	No
H6: Recovery Satisfaction → Brand Evangelism	0.745	9.799*	Yes

Goodness-of-fit statistics $\chi^2 = 550.221$ ($p = 0.00$), $df = 301$, GFI = 0.907, AGFI = 0.884. CFI = 0.930, RMR = 0.036, RMSEA = 0.046.
**$p < 0.01$; **$p < 0.05$.*

Locus ($\beta = -0.337$, $t = -5.136$, $p < 0.01$), stability ($\beta = -0.143$, $t = -2.307$, $p < 0.05$), controllability ($\beta = -0.492$, $t = -2.160$, $p < 0.05$) were significantly related to recovery satisfaction in a negative way. Thus, H4a, H4b, and H4c were statistically supported as hypothesized.

Besides, hypotheses H5a, H5b, H5c, and H5d predicted relationships between recovery justice and recovery satisfaction. Distributive justice ($\beta = 0.273$, $t = 2.021$, $p < 0.05$), procedural justice ($\beta = 0.217$, $t = 1.967$, $p < 0.05$), interactional justice ($\beta = 0.343$, $t = 2.510$, $p < 0.05$) exerted significant and positive relationships with recovery satisfaction. But the influence of informational justice on recovery satisfaction was not significant ($\beta = 0.062$, $t = 1.342$, ns). These results supported H5a, H5b, H5c but not H5d.

Also, the hypothesized relationship between recovery satisfaction and brand evangelism was significant ($\beta = 0.745$, $t = 9.799$, $p < 0.01$), thereby supporting H6.

Moderating Effect Testing

In the second phase, we conducted a multiple-group analysis to examine the moderating role of emotional attachment in the correlation between justice dimensions and recovery satisfaction (H7a, H7b, H7c, and H7d). To conduct the multiple-group analysis, we created two subsamples—high emotional and low emotional attachment- based on the emotional attachment scale by Esen and Sonmezler (2017). The total sample was segmented into two data sets on the basis of the median value. The low emotional attachment group had 214 respondents, while the high emotional attachment group had 186 respondents.

Table 5 presents the analysis results of the moderating role of emotional attachment. It is thought that if the constrained model's variation of the difference of the chi-square values is statistically significant to a higher degree than the chi-square criteria threshold, the hypothesis is supported (Stone and Hollenbeck, 1989). When analyzing the impact of distributive

justice on recovery satisfaction, the analysis result displayed that the constrained model was $\chi^2 = 931.809$ ($df = 603$), while the free model was $\chi^2 = 927.214$ ($df = 602$). The constrained model's variation of the difference of the chi-square values with one degree of freedom $\Delta\chi^2$ (1) was 4.594 ($p = 0.032$). The result was deemed statistically significant, thereby supporting H7a.

Concerning the impact of procedural justice on recovery satisfaction, according to the result of examining the difference of the chi-square values between the free and constrained model, the constrained model was $\chi^2 = 935.946$ ($df = 603$). In contrast, the free model was $\chi^2 = 927.214$ ($df = 602$). The constrained model's variation of the difference of the chi-square values with one degree of freedom $\Delta\chi^2(1)$ was 8.731 ($p = 0.003$). The result was considered to be statistically significant, thereby supporting H7b.

As for the impact of interactional justice on recovery satisfaction, the analysis result revealed that the constrained model was $\chi^2 = 928.279$ ($df = 603$), whereas the free model was $\chi^2 = 7927.214$ ($df = 602$). The Chi-square difference with one degree of freedom between the free and constrained model was statistically insignificant ($\Delta\chi^2(1) = 1.065$, $p = 0.302$), meaning that the two groups have similar path coefficients over the conceptual model. It provided evidence for no moderating effect of emotional attachment across the two groups, leading to the rejection of H7c.

Based on the structural model results, informational justice was not related to recovery satisfaction; therefore, the moderating effect of emotional attachment in the correlation between informational justice and recovery satisfaction was not significant. That is, H7d was not supported.

TABLE 5 | Analysis results of the moderating role of emotional attachment.

Hypothesis	Δdf	The chi-square difference
H7a: Distributive Justice → Recovery Satisfaction	$\Delta df = 1$	$\Delta\chi^2 = 4.594$ ($p = 0.032$)
H7b: Procedural Justice → Recovery Satisfaction	$\Delta df = 1$	$\Delta\chi^2 = 8.731$ ($p = 0.003$)
H7c: Interactional Justice → Recovery Satisfaction	$\Delta df = 1$	$\Delta\chi^2 = 1.065$ ($p = 0.302$)

DISCUSSION

Findings

To test how failure attribution and recovery justice affect brand evangelism from the perspective of e-shoppers, we utilized the Attribution theory, Justice theory and Attachment theory to develop a conceptual frame in which failure attribution (namely, locus, stability, and controllability) and recovery justice (namely, distributive, procedural, interactional, and informational justice) influence brand evangelism through recovery satisfaction with emotional attachment as a moderator. Results show that three attribution dimensions (locus, stability, and controllability) negatively affect recovery satisfaction, while three justice dimensions (distributive, procedural, and interactional justice) positively affect recovery satisfaction, which is further positively correlated with brand evangelism. As for the relationship between two antecedents, three attribution dimensions (locus, stability, and controllability) negatively affect three justice dimensions (distributive, procedural, and interactional justice). In addition, emotional attachment moderates the relationship between distributive justice-recovery satisfaction and procedural justice-recovery satisfaction. To sum up, research results firmly support the assertion that failure attribution and recovery justice promote brand evangelism by improving recovery satisfaction.

Implications for Theory

This research makes contributions to previous literature in three aspects. First, prior research of service failure and recovery has only considered two attribution dimensions (namely, stability, and controllability) and three justice dimensions (namely, distributive, procedural, and interactional). Little recent research has empirically examined the influence of failure attribution by including locus as an independent variable (Oflac et al., 2021), and only a minority of studies have empirically investigated the effect of informational justice as an independent variable (Nikbin et al., 2015; Ngahu et al., 2016). Furthermore, empirical studies exploring the impact of failure attribution on recovery justice have rarely been conducted (Burton et al., 2014; Schneider and Castillo, 2015). Our study has made a contribution to service recovery literature by empirically verifying a research model including the third dimension of attribution (locus) and fourth dimension of justice (informational justice), as well as exploring how failure attribution influences recovery justice to demystify the process.

Second, although there is some theoretical research on brand evangelism, empirical studies of brand evangelism are still inadequate (Hsu, 2019; Kang et al., 2020). In particular, brand evangelism is still unexplored in the context of service recovery. Our study has contributed to brand evangelism literature by exploring the ways in which brand evangelism is stimulated or deterred in the process of online service recovery. This study enhances our comprehension of brand evangelism by ascertaining that failure attribution and recovery justice influence brand evangelism by inducing recovery satisfaction.

Third, although many scholars have highlighted the effect of emotional attachment as an independent variable (Wen and Chi, 2013; Nguyen and Minh, 2018) or mediator (Río-Lanza et al., 2009; Vázquez-Casielles et al., 2012), little attention has been paid to the moderating role of emotional attachment (Esen and Sonmezler, 2017). Our study has made a contribution to service recovery literature by considering emotional attachment moderating the relationship between recovery justice and recovery satisfaction, thereby emphasizing the pivotal role of emotional attachment. We offer a precise mechanism of how recovery justice improves customers' recovery satisfaction with the moderating effect of emotional attachment.

Implications for Practice

Our study gives some important suggestions for practitioners in implementing effective service recovery in the e-retailing

industry. The research findings could be served as a guide for e-retailers to comprehend e-shoppers' behavior, enhance customer satisfaction and stimulate brand evangelism.

First, failure attribution (locus, stability, and controllability) was found to have a negative effect on recovery justice (distributive, procedural, and interactional justice). In other words, e-shoppers' recovery justice perceptions are influenced by the attributions they make for the service failures. Specifically, locus was turned out to negatively affect distributive, procedural and interactional justice. Hence, it is of great importance for e-retailers to clearly comprehend the locus of failure from e-shoppers' perspective. If e-shoppers believe that the problem was caused by e-retailers, their perceptions of recovery justice decrease. Therefore, e-retailers should also take locus of attribution into consideration of service recovery management. When service failure occurs, the first step should be failure detection to find out the root cause of the problems (Zhu and Zolkiewski, 2015). By doing so, e-retailers can detect the shortcomings in business operations and prioritize the works that are in need of improvement, so that it will be possible to monitor and control future service failures (Oflac et al., 2021). In addition, stability was proved to negatively impact distributive, procedural and interactional justice. It means that e-shoppers will be more likely to perceive justice if they think the cause of a service failure as unstable. Therefore, e-retailers should emphasize that service failure is a temporary phenomenon, and develop effective strategies for prevention of recurrence of service failure. Moreover, controllability was concluded to negatively influence distributive, procedural and interactional justice, meaning that it is crucial for e-retailers to avoid service failure controlled by e-shops to guarantee justice to customers. If a customer perceives service failure as controllable, the customer's image of the e-shop is likely to deteriorate. So it is necessary to emphasize that service failure was not controllable by e-retailer. To provide high quality service, e-retailers should identify the types of service failure that can be caused by controllable and stable causes, and prepare countermeasures thoroughly in advance.

Second, failure attribution (locus of causality, stability, and controllability) and recovery justice (distributive, procedural, and interactional justice) were demonstrated to influence recovery satisfaction, which in turn impacts brand evangelism. More specifically, failure attribution (locus, stability, and controllability) was discovered to have a negative impact on recovery satisfaction, while recovery justice (distributive, procedural, and interactional justice) was proved to positively impact recovery satisfaction. It means that if e-shoppers do not place blame on e-retailers and consider the cause of service failure as unstable and uncontrollable, or if they consider service recovery efforts as fair, they will be likely to have more recovery satisfaction. Therefore, it is crucial that e-retailers should know the likelihood of service failure in advance and provide strategies to prevent controllable and stable service failure (generated by their own fault) occurs. After a service failure, e-retailers should mitigate the negative impact of service failure by providing appropriate complaint-handling efforts to improve customers' recovery satisfaction (Mazhar et al., 2022). E-retailers should hire kind and polite employees, and also give training and guidance continuously and systematically to ensure service standards during service recovery operations. In addition, it is also essential to compensate customers for the loss or inconvenience caused by a service failure. Compensation is an effective way to guarantee distributive justice and mitigate customer dissatisfaction after a service failure, no matter it is provided in monetary or non-monetary form. Also, procedures or policies of service failure are important in the guarantee of procedural justice. If e-retailers perform effective recovery measures, customer satisfaction will be improved. Furthermore, recovery satisfaction was discovered to positively affect brand evangelism. In other words, recovery satisfaction is a key determinant of brand evangelism. Customers who experience high recovery satisfaction after service failure will show higher brand evangelism than customers who experience low recovery satisfaction. This conclusion aligns with the studies of Rashid and Ahmad (2014) and Rashid et al. (2017). E-retailers should realize that recovery satisfaction could alleviate and balance customers' dissatisfaction with the service failure (Magnini et al., 2007). Consumers tend to behave positively toward the brands they are satisfied with, while they tend to showcase anti-brand behavior toward the brands they are dissatisfied with. Therefore, even after service failures, there is a high probability to change service failures into experience-rewriting instruments. E-retailers with appropriate failure attribution and recovery justice management will be able to turn the dissatisfied e-shoppers into satisfied ones and even brand evangelists.

Third, the significant moderating effects of the emotional attachment on the correlations between distributive and procedural justice on recovery satisfaction imply that the higher the emotional attachment, the stronger the positive correlations between distributive and procedural justice on recovery satisfaction. If the emotional attachment is low, it will be challenging for e-retailers to earn a high level of recovery satisfaction even with service recovery efforts (Wei, 2021). Therefore, e-retailers should prioritize increasing customers' emotional attachment. If customers develop emotional attachments to the e-shop, they are inclined to forgive service failure and respond more favorably to e-retailers' recovery efforts. A strong emotional attachment serves as a protecting net for e-shops when a service fails (Torres et al., 2020). Hence, investment in building emotional attachment with customers is a sensible strategy from service recovery perspective.

LIMITATIONS AND FUTURE RESEARCH

Despite the interesting results yielded by the research, limitations were also encountered. Firstly, since this study collected data from one service sector (e-retailing industry), some problems may be entailed with the generalization of research findings. Future research should expand to other industries. Secondly, it was challenging to obtain generalized results suitable for a standardized situation by conducting a questionnaire survey. The major event method or scenario method should be used in future research to overcome the inherent deficiencies of questionnaire survey. Finally, this study may be meaningful because informational justice

was added to justice dimensions. But the impact of failure attribution on informational justice and the influence of informational justice on recovery satisfaction were not significant in this study. It might be because of this research's setting. In the e-retailing sector, service failures are so common that explanations may not work (Wang and Mattila, 2011). Therefore, it will be necessary to retest whether the same results are obtained in other sectors.

CONCLUSION

The purpose of the study was to determine whether failure attribution and recovery justice are related with brand evangelism in the context of online service recovery and whether emotional attachment moderates the effects. The results suggest that three attribution dimensions (locus, stability, and controllability) negatively affect recovery satisfaction, while three justice dimensions (distributive, procedural, and interactional justice) positively influence recovery satisfaction, which in turn positively impact brand evangelism. As for the correlation between two antecedents, three attribution dimensions (locus, stability, and controllability) negatively affect three justice dimensions (distributive, procedural, and interactional justice). Moreover, emotional attachment moderates the correlation between recovery justice and recovery satisfaction in terms of distributive and procedural justice. Research findings provide empirical evidence that both failure attribution and recovery justice are vital to encourage brand evangelism. This study builds a more comprehensive framework than previous studies by incorporating the third dimension of failure attribution (locus) and the fourth dimension of recovery justice (informational justice), and offers insights into the impact of failure attribution on recovery justice. Moreover, this study expands brand evangelism to service recovery context by examining how brand evangelism is stimulated among e-shoppers and advances our comprehension of brand evangelism by finding the way in which failure attribution and recovery justice contribute to brand evangelism *via* recovery satisfaction. Furthermore, the research finding concerning the moderating effect of emotional attachment bridges a gap in the existing literature which focuses on the effect of emotional attachment as an antecedent or mediator. This study offers valuable guidance for those e-retailers wishing to develop successful strategies for encouraging brand evangelism from service recovery.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

TZ contributed to the conceptualization, funding acquisition, and investigation. SP contributed to the conceptualization, formal analysis, and methodology. All authors contributed to the article and approved the submitted version.

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Consumer Online Knowledge-Sharing: Motivations and Outcome

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As a new form of online reviews, Q&A reviews have been recently used by many e-commerce platforms to compensate for the weaknesses and problems related to trust and helpfulness found in traditional online reviews. This research documents what motivates people to share products or purchasing knowledge with others through Q&A reviews and why e-commerce platforms should place an emphasis on Q&A reviews. Importantly, our results provide evidence that, when receiving feedback (i.e., comments and likes), people are more likely willing to share knowledge with others and will have a higher level of loyalty. We believe that this study contributes to knowledge sharing and the e-commerce literature, and also has practical implications.

Keywords: online Q&A reviews, consumer knowledge-sharing, motivations, loyalty, feedback, e-commerce

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INTRODUCTION

To ensure the quality of online shopping, consumers often make judgments and decisions through online reviews on e-commerce platforms (Reimer and Benkenstein, 2016). As the main form of electronic word of mouth (eWOM), online reviews can provide consumers with information about products or brands, affect consumers' frequency of use of e-commerce platforms (Wang et al., 2016) and influence consumers' attitudes and purchasing behaviors (Kim and Hanssens, 2017).

Online reviews have many advantages; however, they also have some disadvantages. First, online reviews are anonymous and thus less trustworthy. The readers do not know the specific source of reviews and cannot use past experience to judge their quality (King et al., 2014). Moreover, those less reliable review may induce the boomerang effect, which make negative reviews increase consumers' purchase intentions, but positive reviews reduce these intentions (Reimer and Benkenstein, 2016). Secondly, a review which is useful to one consumer may be useless to others (Genc-Nayebi and Abran, 2017). Online reviews cannot realize the direct interaction between consumers and in turn may not satisfy every individuals' needs. On the other hand, when there are a large number of product reviews, consumers may be exposed to the problem of overloading and unable to access all the relevant information (Krishnamoorthy, 2015).

To compensate the shortcomings of traditional online reviews, large-scale shopping websites (such as Amazon in the United States, Taobao in China, etc.) have recently launched a

new form of online reviews called question-and-answer reviews (i.e., Q&A reviews). In Q&A reviews, potential consumers can ask customized questions on target products to those already-purchased consumers. Q&A reviews featured with social Q&A provide direct interactions (Lee and Brusilovsky, 2017), which in turn can enhance consumers' trust to e-commerce platforms (Nadeem et al., 2020) and perceived usefulness (Guan et al., 2018).

However, although Q&A reviews have the mentioned merits, engagement in Q&A reviews is still not active enough. For example, the answering rate of iPhone 13 pro in JD.com (a popular e-commerce platform in China) was only around 50% by the time we finished this paper. Q&A reviews are totally voluntary and non-mandatory, no party can guarantee that every question will have a corresponding answer (Guan et al., 2018; Fang and Zhang, 2019). Consumers are generally social loafers rather than contributors, thus most of them are not likely to post reviews online (Yan et al., 2018). To increase consumers' intention to Q&A reviews and boost consumer engagement, we must comprehend what motivates this intention. Understanding consumers' motivations to share Q&A reviews, not only contributes to the researches of eWOM and consumer engagement, but also can help practitioners encourage consumer's online knowledge sharing, which in turn can affect consumers' loyalty or commitment to platforms (Dessart et al., 2019).

Q&A reviews not only involve the information of target products, but other extensive matters (e.g., comparisons of substitutes, etc.). Therefore, according to the contents and functions of Q&A reviews, we regard consumers' intention to answering in Q&A reviews as consumer knowledge-sharing intention. But unfortunately, to our knowledge, there is no research examining online reviews from the perspectives of social Q&A or knowledge-sharing intentions. Generally, social Q&A is mostly discussed in the context of online communities (Neshati et al., 2017), whereas knowledge-sharing are discussed in corporate organizations (e.g., Matsuo and Aihara, 2022; Nguyen et al., 2022). Even studies on eWOM, little research have empirically investigated the motivations for consumers to write online reviews in e-commerce (Nam et al., 2020). Previous studies generally focus on relationships between specific variables and eWOM, such as satisfaction (Thakur, 2019; Singh and Söderlund, 2020), brand love (Bairrada et al., 2018), brand attitude (Izogo and Mpinganjira, 2021) and financial incentives (Qiao et al., 2020), or focus on the motivations to read eWOM (e.g., Teng et al., 2017; Ismagilova et al., 2020; Mainolfi et al., 2022). Q&A reviews and their motivations still lack empirical studies. Besides, although Q&A reviews involve two parties (i.e., questioners and answerers), we only discuss knowledge-sharing intention from the perspective of answerers, since questioners' motivations are relatively obvious.

This study starts with the fundamentals of social Q&A and eWOM to specify the concepts of Q&A reviews and consumer knowledge-sharing intention. Then, based on self-determination theory, we explore the motivations to consumers' knowledge-sharing intention. Moreover, this study also discusses the outcomes of consumer knowledge-sharing and the moderation role of feedback (i.e., comments and likes). In this study, we define feedback as a post-replying behavior, i.e., behavior of responding to the answers. Feedback is a key function and an important social interaction indicator in Q&A reviews, but currently few studies have examined this topic (Fang et al., 2018). Finally, according to the results of empirical tests, this study provides some suggestions for future research on knowledge-sharing and social Q&A and shed light on practices of e-commerce platforms.

LITERATURE REVIEW

Q&A Reviews and Consumer Knowledge-Sharing

Although Q&A review is a special type of online reviews, it more attributes to social Q&A when considering its design features. For example, potential consumers can ask questions related to target products in Q&A reviews. Then those already-purchased consumers will receive invitations, which randomly sent by e-commerce platform systems, and decide whether or not to answer the questions. Finally, other consumers can give feedback (e.g., likes or comments) to those answers. Therefore, in this study we use consumer knowledge-sharing intention to reflect consumers' answering intention in Q&A reviews.

Q&A reviews generally have the following advantages. First, Q&A reviews can help consumers to improve efficiency (Shah and Kitzie, 2012). Information on the internet is always overloading and disordered. Traditionally, consumers have to spend extra time in reading numerous sources of information and finding answers on online reviews, but in Q&A reviews potential consumers can access this demanding through direct interaction. The cognitive pressure from information integration also can be reduced (Bleda et al., 2021). Second, Q&A reviews can help consumers to improve the perception of credibility and usefulness. Q&A reviews that provide accurate information reduce perceived uncertainty (Reimer and Benkenstein, 2016). For example, potential consumers can ask already-purchased consumers about specific and individual questions. Moreover, in traditional online reviews, any consumers can provide their evaluations. But as the rules of Q&A reviews, when questioners post their questions, e-commerce platforms will send random invitations to some of the consumers who have already purchased the products. Then those eligible consumers can give their answers voluntarily. In this sense, some unfairly negative reviews can be filtered, and certain perceived risks can be reduced. Third, Q&A reviews realize direct interaction between consumers and thereby satisfy their social needs (Jin et al., 2015). Not only can questioners receive responses from answerers, but answerers can get feedbacks (e.g., comments and likes) from other consumers.

Motivations

Internal Motivations

The participation rate in Q&A reviews is relatively low. It is necessary to analyze consumers' motivations to increase their participation intention (Hajli and Lin, 2016), since motivation is an important factor that drives individual behaviors. However,

little research have investigated the factors motivating consumers to write eWOM (Nam et al., 2020). Due to the fact that Q&A reviews are featured with social Q&A and are different to traditional online reviews, this research examines the consumers' motivations to answer questions in Q&A reviews not only from the perspective of eWOM, but also from social Q&A and online knowledge sharing.

Several studies on online knowledge sharing (e.g., Chen et al., 2019b; Kang, 2022) show that the theoretical framework of self-determination theory is useful in explaining motivations. In self-determination theory, motivations can be divided into internal motivations and external motivations. Internal motivations refer to the motivations in which behaviors are driven by individuals' own interests or pleasures, without caring whether there are rewards or not (Deci and Ryan, 1990).

Altruistic motivation is one key internal motivation that drives individuals to share knowledge (Ismagilova et al., 2021). Altruistic behavior is voluntary and performed by the individuals with clear awareness and those behaviors must be beneficial to others, however, the conductors can only receive a feeling of internal self-reward (e.g., "a feeling of doing good"), without expecting any spiritual or material returns (Trivers, 1971; Bar-Tal, 1986). From human nature, people intrinsically have the altruistic motivation to help others without return (Wasko and Faraj, 2005). Especially after purchasing, consumers are always willing to share their experiences to help others to make decisions (Ismagilova et al., 2021). Previous literature has highlighted the important role of altruistic motivations in knowledge sharing. For example, in the context of social Q&A, Fang and Zhang (2019) found the answerers in a social Q&A platform had altruistic motivations to give their answers. Yuan and Liu (2017) found altruistic motivations have significant positive influence on persistent sharing willingness. Similar results were also found in eWOM (e.g., Hu and Kim, 2018; Liu et al., 2020; Chai et al., 2022).

Therefore, we predict that the altruistic motivation of helping others is one motivation to make consumers would like to share knowledge in Q&A reviews:

> H1: *Consumers' altruistic motivations positively influence consumers' knowledge-sharing intention.*

Self-determination theory suggests three fundamental needs: autonomy, competence and relatedness—that are "the basis for self-motivation and personality integration, as well as for the conditions that foster those positive processes" (Ryan and Deci, 2000, p. 68). When satisfied with three fundamental needs, individuals can perceive enjoyment (Reinecke et al., 2014) and be driven to engage in knowledge sharing. The design features in Q&A reviews are closely related to these three needs. For example, as Q&A reviews allow consumers answer questions voluntarily, the need for autonomy would be enhanced. Furthermore, consumers may be challenged by questions or others' feedback in Q&A reviews. However, when they solve those questions and get positive feedback, they may perceive the need for competence (Cui and Ji, 2019). Finally, Feedback is an important social interaction indicator (Fang et al., 2018). In Q&A reviews, the answers can get others' feedback, such as comments or likes, may perceive the need for relatedness.

Therefore, we posit that consumers would be motivated by hedonism to share knowledge in Q&A reviews. Past studies (e.g., Jin et al., 2013; Zhao et al., 2016) have indicated that the reasons for consumers to produce word-of-mouth (WOM) are always sentimental (Kähr et al., 2016). Generally, consumers are willing to share their knowledge about brands, products or other consumption experiences to support their favorite brands. For example, through systematic review, Rosario et al. (2020) identified hedonic motivations are important for consumers to create eWOM. Empirical evidence from Nam et al. (2020) indicated that hedonic motivations significantly predicted in both positive and negative eWOM. Similar results are also provided by research on social Q&A and knowledge sharing. For example, both Zhao and Detlor (2021) and Wang et al. (2022) found users were intrinsically motivated by hedonism to share knowledge in online communities. In social Q&A, Zhao et al. (2016) also conducted a study to prove that the enjoyment in helping others is the main reason for users to share their knowledge. To sum up, consumers can feel enjoyment when they share their knowledge (Yun et al., 2007):

> H2: *Consumers' hedonic motivation positively influence consumers' knowledge-sharing intention.*

On the contrary, people are driven by external motivations for separable outcomes, such as gaining some external rewards, avoiding certain punishments or reducing certain pressures (Ryan and Deci, 2000). When motivated externally, individuals tend to obtain instrumental value from participating, rather than enjoying the activity itself. However, due to some reasons of self-regulations, external motivations can be internalized into internal motivations (Mitchell et al., 2020).

Since online communities vary in platform characteristics and affordances, there is a need to explore different factors in affecting eWOM creation (Rosario et al., 2020). In Q&A reviews, after someone ask a question, the e-commerce platform system will randomly send invitations to consumers who have already purchased the products. Besides, if those invited consumers choose to answer, they will gain certain point rewards. Therefore, according to self-determination theory and the design features and rules of Q&A reviews, we predicted that the consumers' external motivations for knowledge-sharing are perceived pressure and external rewards.

Perceived Pressure

Individuals generally perceive pressure from social subjective norms, which refers to that when people find someone are important to them, they may thus be influenced to perform certain behaviors (Choi et al., 2020) or motivated to comply others' opinions (Ham et al., 2015). Invitations are core operation mechanism of Q&A reviews. E-commerce platform systems randomly send invitations to already-purchased consumers. Consumers may find other potential consumers are in need of help, and thus perceive pressure to share their knowledge on products. Moreover, Guan et al. (2018) indicated that in social Q&A, when individuals turn to others for help or get help from

others, they are constrained by norms and perceive pressure from reciprocity to share knowledge. Therefore, it is necessary to investigate the role of perceived pressure in motivating consumers to answer questions.

Although little research has studied the influence of perceived pressure on knowledge sharing intentions in both eWOM and social Q&A, research in online knowledge sharing has provided some evidence. For example, Zhou (2021) found users in online health communities are motivated by social subjective norms to share knowledge. Choi et al. (2020) compared two different online mobile platforms and found subjective norms significantly influenced users' intention to share knowledge in both platforms. Therefore, in this study we hypothesized:

> H3: *Consumers' perceived pressure positively influence consumers' knowledge-sharing intention.*

External Rewards

Generally, in the context of eWOM, external rewards are generally related to economic incentives, such as bonus gifts or airline miles for upgrades, which can motivate consumers to generate eWOM (Yoo et al., 2013). However, in online communities, there is no economic incentives systems, but platforms often use community points/badges/rankings instead to motivate users' knowledge sharing intentions (Zhang et al., 2017).

Some research suggests the positive relationship between virtual rewards and knowledge sharing. For instance, Zhao et al. (2016) found virtual rewards can incentive inactive users to share knowledge in social Q&A sites. Wang et al. (2022) further indicate virtual rewards have strong positive influence on explicit knowledge sharing. In terms of Q&A reviews, people can get points through answering questions. The points not only reflect an individual's social status or reputation but can help people to obtain exclusive discounts when their points reach a certain level. Therefore, in this study we hypothesized:

> H4: *External rewards positively influence consumers' knowledge-sharing intention.*

Loyalty to Platform

In this article, we regard loyalty to platform as a consumer's intention to repeat visiting an e-commerce platform (Cyr et al., 2005). Loyalty to platform reflect the level of consumer preference for a certain e-commerce platform (Jones and Taylor, 2012). Yao et al. (2015) conducted a field survey of 222 online community members and found knowledge-sharing was positively related to members loyalty. Similar conclusion was presented by Swanson et al. (2020), although they discussed the topic within organizations.

In this study, we predicted that consumers' knowledge-sharing intention will positively affect consumers' loyalty to platform based on the following reasons: First, the process of Q&A reviews contains social capital, and social capital can affect consumer loyalty (Jones and Taylor, 2012). The knowledge shared by consumers can be regarded as representing the utilitarian values (i.e., social capital) of e-commerce platforms and thus lead to higher loyalty to the platforms (Wang and Fesenmaier, 2004a). Second, social interaction will directly or indirectly affect consumer loyalty to platforms (Koh and Kim, 2004). Consumers' knowledge-sharing is a kind of direct social interaction between consumers. These interactions can induce consumers' social sentiments and make them feel as they are talking to real people in person. Moreover, consumers also tend to deem the platform as an enthusiastic, generous and social place, and are more willing to maintain the relationship with the platform (Nadeem et al., 2020). Finally, after sharing knowledge, consumers will have a sense of responsibility and ownership toward the platform, and in turn induce a higher level of loyalty (Yao et al., 2015). Therefore, in this study we hypothesized:

> H5: *Consumers' knowledge-sharing intention positively influence consumers' loyalty to platform.*

In addition, we also take an initial step on assessing the moderator role of feedback between variables. In this study, we define feedback as a post-replying behavior, i.e., behavior of responding to the answers. Feedback is a key function and an important social interaction indicator in Q&A reviews, but currently few studies have examined this topic (Fang et al., 2018). Traditionally, consumers who write online reviews cannot obtain feedback from others, but in Q&A reviews, other consumers or sellers can express their opinions to answerers using the "like" or "reply" functions. This feedback mechanism can further deepen the degree of social interaction on e-commerce platforms and increase consumer engagement and loyalty (Jin et al., 2015; Guan et al., 2018).

In this study we predicted that feedback (i.e., likes and comments) can moderate the relationship between consumers' motivations and knowledge-sharing intention. Firstly, Q&A reviews are actually a form of social interaction. If consumers are motivated to share knowledge, it means that they have a need for social interaction. Feedback is a key indicator of social dynamics (Bateman et al., 2011) and can be regarded as a dynamic communication process between consumers. Therefore, we believe that feedback can satisfy consumers' social interaction needs and thus promote higher levels of participation (Stavrositu and Sundar, 2012). Secondly, feedback not only can enhance the willingness of people to share knowledge (e.g., Brzozowski et al., 2009), but also is a form of motivational affordance, which may affect consumers' intrinsic motivations (e.g., Fong et al., 2019). Even more, Chen et al. (2019a) explored the interaction effect of two motivational affordances (i.e., votes and comments) and found the number of comments (which can be seen as feedback) moderated the relationship between usefulness voting and knowledge contribution.

In Q&A reviews, feedback usually takes the form of a "like" or a "comment." As a positive form of feedback, likes can satisfy consumers' self-competence needs and improve their level of intrinsic motivations (Fong et al., 2019), whereas comments are a direct means of social communication that can increase perceived involvement and perceived social presence, and further lead to a higher level of affective experience (Fortin and Dholakia, 2005), which in turn can influence consumers' internal motivations and promote them to induce continuous intentions on knowledge-sharing. However, in terms of the external motivations in Q&A reviews, they mainly come from the pressure of potential

consumers (or sellers), or from the rewards provided by the platform. External elements will not change along with the number of feedback responses. Therefore, we hypothesized that:

> H6a: *Feedback moderate the relationship between an altruistic motivation and knowledge-sharing intention. The influence of an altruistic motivation on knowledge-sharing intention is stronger under conditions in which feedback is received (vs. non-feedback conditions).*

> H6b: *Feedback moderate the relationship between a hedonic motivation and knowledge-sharing intention. The influence of a hedonic motivation on knowledge-sharing intention is stronger under the conditions in which feedback is received (vs. non-feedback conditions).*

Moreover, in this study we propose that feedback can also moderate the relationship between consumers' knowledge-sharing intention and loyalty to platform. Consumers who participate in knowledge-sharing can perceive utilitarian value, hedonic value, and social value through receiving feedback (Wang and Fesenmaier, 2004b). Those values may result in the sense of mutual benefit and consumers are thus more willing to use the e-commerce platform. For example, as a positive feedback, a "like" can enable answerers to confirm their values and make them feel social support and a sense of belonging (Chiu et al., 2006). Consumers may be more willing to participate in platform activities (Guan et al., 2018). On the other hand, the social interaction involved in feedback can increase consumers' perceived intimacy toward the platform (Hassanein and Head, 2007), and additionally, consumers may also perceive social capital in the feedback they receive (Son et al., 2016). The content of the comments (i.e., feedback) generally supplements the incomplete information provided by original answerers or provides further discussion of the question. Comments can expand the level of knowledge and make the answerers perceive utilitarian values.

Therefore, these values may make consumers who participate in knowledge-sharing more likely to have positive attitudes toward the platform (Chung and Buhalis, 2008) and increase loyalty to platform. Thus, we hypothesized:

> H6c: *Feedback may moderate the relationship between knowledge-sharing intention and loyalty to platform. The influence of knowledge-sharing intention on loyalty to platform is stronger under conditions in which feedback is received (vs. non-feedback conditions).*

The hypothesized model is illustrated in **Figure 1**.

METHODOLOGY

To test our hypotheses, we recruited participants on a research data platform[1] to collect data in exchange for monetary compensation. The questionnaires were randomly distributed to consumer panel by the platform system.

Taobao is one of the biggest e-commerce platforms with a considerable number of consumers (or users) in China. It was among the first e-commerce platforms to launch Q&A reviews to help consumers solve their pre-purchase decision-making problems through direct interaction in the year 2015. The mechanism of the Q&A reviews in Taobao has developed over time, attaining a relatively more mature status in recent years. Therefore, we asked participants if they ever shared knowledge in Q&A reviews in Taobao and excluded the data who did not have the knowledge-sharing experiences.

In order to avoid common method biases, this study involved prior controls in the process of the questionnaire setting,

[1]http://credamo.com

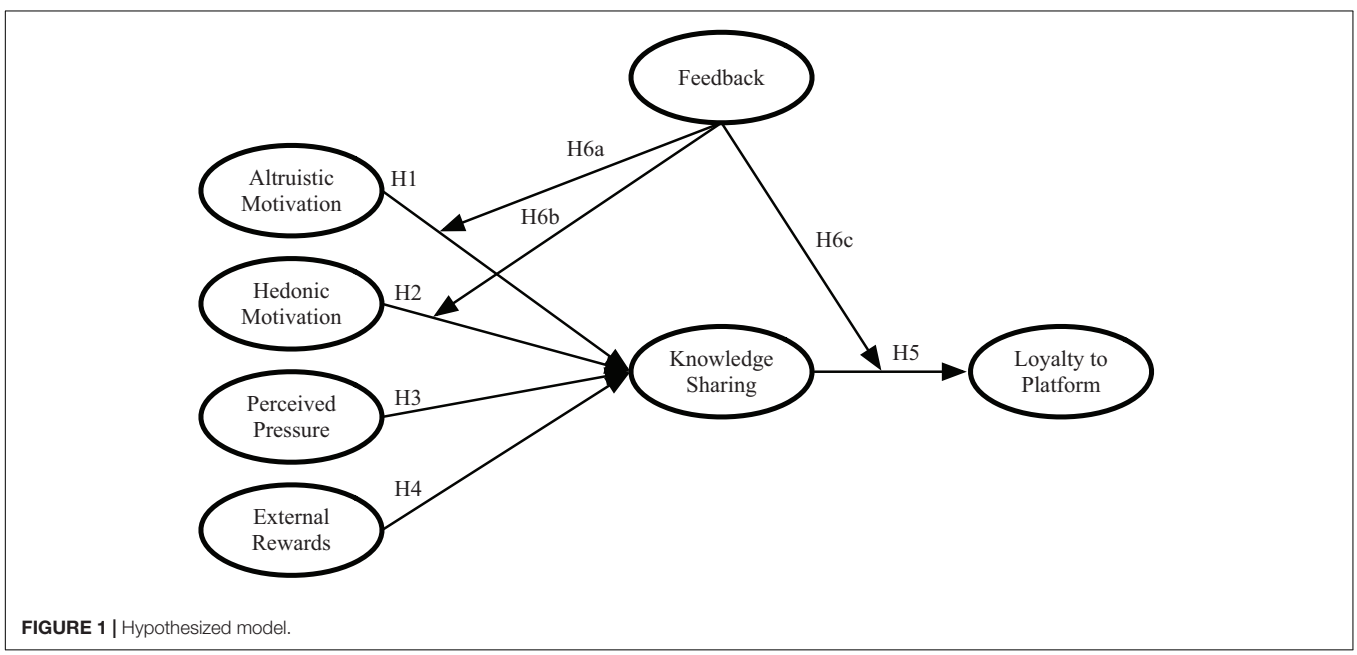


FIGURE 1 | Hypothesized model.

according to Podsakoff et al. (2003). First of all, the scales in this research were adapted from the extant scales and were rated on 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). For example, the altruistic motivation scale was adapted from Hennig-Thurau et al. (2004), Yoo et al. (2013) and Munar and Jacobsen (2014); the hedonic motivation scale was adapted from Childers et al. (2001), containing two reverse-coded items; the perceived stress scale was adapted from Picazo-Vela et al. (2010); the external rewards scale was adapted from Hennig-Thurau et al. (2004); Yoo et al. (2013); the analysis of consumers' online knowledge-sharing intention was adapted from Lai and Chen (2014); and the loyalty to platform scale was adapted from Kim and Ahn (2017). The specific items are provided in the appendix. Feedback, as a moderating variable, was measured as a binary variable (1 = feedback-received; 0 = non-feedback). Specifically, participants were asked whether they had received replies or likes after answering the questions. Secondly, all the arranged items and constructs were presented in a random order. Finally, we instructed the participants that the survey was anonymous and private, and all the answers were correct in order to diminish some considerations.

As a result, we collected a sample of 255 data. A total of 112 were males and 143 were females. The majority of the sample (118 persons, 46.27%) were aged between 26 and 30, 56 (21.96%) participants were younger than 25, 72 (28.24%) were aged between 31 and 40, and 9 (3.53%) were older than 41 years.

RESULTS

Following the two-steps approach recommended by Anderson and Gerbing (1988), we analyzed the data using R SEM package lavaan (Rosseel, 2012). Though the data were not multivariate normal distributed, we still used maximum likelihood estimation because previous research suggests this method is robust even when the multivariate normality assumption is violated (Bollen, 1989; Diamantopoulos et al., 2000). We first report the measurement model results, and then we report the structural model results. In order to test the moderating role of feedback, we did an additional multigroup analysis.

Measurement Model Evaluation

Although the measurement model yielded a significant chi-square ($\chi^2 = 536.95$, $df = 260$, $p < 0.05$), the ratio of chi-square to degree of freedom ($\chi^2/df = 2.07$) was with the acceptable range of 2–5 (Marsh and Hocevar, 1985). Other fit statistics were also acceptable (GFI = 0.90, CFI = 0.92, AGFI = 0.90, TLI = 0.91, NNFI = 0.91, RMSEA = 0.06, SRMR = 0.05). This evidence set the foundation for the evaluations of the psychometric properties of the measurements.

In **Table 1**, we report the psychometric properties of the measurement model. We used several criteria to assess reliability and convergent validity. First, all Cronbach's alphas of the measures for the latent constructs were larger than 0.70, indicating sound internal consistency reliability. Second, we calculated composite reliability using formula suggested by Fornell and Larcker (1981). The values of composite reliability ranged from 0.76 to 0.91, all were larger than 0.60, provided additional evidence for reliability (Bagozzi and Yi, 1988). Then, we calculated average variance extracted, the value ranged from 0.51 to 0.68, all were larger than 0.50, representing stricter evidence for convergence and reliability (Fornell and Larcker, 1981; Bagozzi and Yi, 1988). Finally, the factor loadings were assessed. All factor loadings were significant, and nearly all R^2 were larger than 0.50, representing an indication for convergent validity (Bagozzi et al., 1991).

We tested discriminant validity using method suggested by Fornell and Larcker (1981) that a scale possesses discriminant validity if the square root of average variance extracted by the underlying construct is larger than the correlations with other latent constructs. As shown in **Table 2**, each square roots of average variance extracted of latent constructs were larger than the correlations between possible pairs of latent constructs, thus provided supports for discriminant validity between the measures of the constructs.

In addition, we used Harman's single-factor test to check for potential common method biases. All the indicators of the constructs were incorporated in the unrotated exploratory factor analysis. The result revealed that a single-factor only explained 34% of the variance, indicating no "general" factor in the data thus common method biases was not a big concern (Podsakoff and Organ, 1986).

In summary, the measurement model results demonstrated satisfactory psychometric properties required to proceed to the structural model evaluation and hypotheses testing.

Hypotheses Testing

We first tested our hypothesized conceptual model without incorporating the moderating variable. The path model revealed an acceptable fit despite of a significant chi-square ($\chi^2 = 602.22$, $df = 264$, $p < 0.05$; $\chi^2/df = 2.28$; GFI = 0.90, CFI = 0.90, AGFI = 0.90, TLI = 0.90, NNFI = 0.90, RMSEA = 0.06, SRMR = 0.05).

Figure 2 illustrates the standardized path coefficients of our proposed relationships. The results revealed that altruistic motivation ($\beta = 0.33$, $p < 0.01$), hedonic motivation ($\beta = 0.24$, $p < 0.01$), perceived stress ($\beta = 0.22$, $p < 0.01$), and external rewards ($\beta = 0.15$, $p < 0.01$) had significant positive effects on consumers' knowledge-sharing intention. H1–H4 were all supported. H5, postulating a positive relationship between knowledge-sharing intention and loyalty to platform, was also supported ($\beta = 0.56$, $p < 0.01$).

To test the hypotheses of the moderating role of feedback, we split the sample to two groups according whether the respondents reported they got feedback or not after they provided answers to user generated questions ($N_{feedback} = 213$; $N_{no\text{-}feedback} = 42$). We then compared three multigroup confirmative factor models to ensure the multigroup measurement invariance. For the first model, the same factor structure was imposed on all groups without constraining the factor loadings and intercepts to be equal across groups ($\chi^2 = 1{,}028.57$, $df = 520$); for the second

TABLE 1 | Items, factors loadings, and reliability estimates.

Latent variables	Items	St. Factor Loadings	Cronbach's α	AVE	CR
Altruistic Motivation	I want to help others find a great product through Q&A reviews.	0.73	0.86	0.51	0.86
	I want to point out a good offer to others through Q&A reviews.	0.72			
	I like to help others with advice through Q&A reviews.	0.73			
	I want to support an online shop or brand that I like through Q&A reviews.	0.69			
	I really like the product or shop and want to contribute to its success through Q&A reviews.	0.76			
	I look forward to the product and want to reward the online shop or the brand through Q&A reviews.	0.68			
Hedonic Motivation	Sharing knowledge on Q&A reviews would make me feel good.	0.79	0.91	0.61	0.91
	Sharing knowledge on Q&A reviews would be boring.	0.74			
	Sharing knowledge on Q&A reviews would involve me in the shopping process.	0.80			
	Sharing knowledge on Q&A reviews would be exciting.	0.78			
	Sharing knowledge on Q&A reviews would be enjoyable.	0.86			
	Sharing knowledge on Q&A reviews would be uncomfortable.	0.73			
	Sharing knowledge on Q&A reviews would be interesting.	0.72			
Perceived Pressure	I feel pressure from intermediary (e.g., Taobao) to share knowledge on Q&A reviews	0.65	0.76	0.52	0.76
	Sellers expect that I share knowledge on Q&A reviews	0.76			
	Future potential customers anticipate that I share knowledge on Q&A reviews	0.75			
External Rewards	I want to get points through Q&A reviews.	0.77	0.83	0.62	0.83
	I want to get a discount through Q&A reviews.	0.81			
	I can save money on my next purchase through Q&A reviews.	0.79			
Knowledge-sharing Intention	If I had some knowledge about a topic, I would consider posting it on Q&A reviews	0.85	0.80	0.68	0.80
	If I had some knowledge regarding a question someone asked, I would share this knowledge with others	0.80			
Loyalty to platform	The intermediary (e.g., Taobao) where I provide Q&A reviews is always my first choice to shop.	0.77	0.87	0.68	0.87
	I always visit the intermediary (e.g., Taobao) where I provide Q&A reviews.	0.83			
	I usually consume on the intermediary (e.g., Taobao) where I provide Q&A reviews.	0.77			
	Overall, I am loyal to the intermediary (e.g., Taobao) where I provide Q&A reviews.	0.81			

model, not only the factor structure, but also the factor loadings were constrained to be equal across (χ^2 = 1,052.99, df = 539); for the third model, the factor structure, the factor loadings, and the intercepts were all constrained to be equal across groups (χ^2 = 1,081.09, df = 558). Chi-square difference test indicated that there was no significant difference between the first model and the second model ($\Delta\chi^2$ = 24.42, Δdf = 19, p = 0.18), and there was no significant difference between the second model and the third model ($\Delta\chi^2$ = 28.10, Δdf = 19, p = 0.08), indicating strong evidence for measurement invariance across groups in terms of both metric invariance and scalar invariance (Putnick and Bornstein, 2016). Thus, measurement invariance across groups enables us to test the moderating role of feedback using multigroup path analysis.

Following procedures used in Homburg et al. (2005), we tested each of the moderated paths one by one by comparing two models, one model constrained all paths to be equal across groups (no-moderation model), and the other constrained all other paths to be equal except for the one hypothesized moderated path. We relied on chi-square difference test to

TABLE 2 | Descriptive statistics, correlations and discriminant validity statistics.

	Altruistic motivation	Hedonic motivation	External reward	Perceived pressure	Knowledge sharing intention	Loyalty to platform
Altruistic Motivation	**0.71**					
Hedonic Motivation	0.58	**0.78**				
External Reward	0.36	0.30	**0.79**			
Perceived Pressure	0.57	0.49	0.45	**0.72**		
Knowledge Sharing Intention	0.57	0.55	0.41	0.53	**0.82**	
Loyalty to Platform	0.64	0.41	0.30	0.60	0.44	**0.82**
Mean	5.67	5.26	5.30	5.0	5.85	5.55
SD	1.06	1.24	1.33	1.42	1.07	1.21

The diagonal line is the square root of AVE of each construct; the lower triangle is the correlation coefficients between constructs; $p < 0.01$.

examine whether the latter model was significantly better than the former model. If the chi-square improvement for the latter model is significant, that is evidence for the moderating hypothesis. As **Table 3** shows, H6a and H6c were supported, H6b was not supported.

GENERAL DISCUSSION

Although eWOM and traditional online reviews are important for consumer decisions, they may also have some shortcomings (e.g., perceived problems with their trustworthiness or usefulness). On the contrary, with direct social interactions, Q&A reviews are probably capable of conquering those regrets and benefiting consumer loyalty. However, little research empirically investigates the motivations to provide eWOM (Nam et al., 2020). Especially, there is no research examining online reviews from the perspectives of social Q&A or knowledge-sharing intentions. We are the very first research to explore Q&A reviews, and related antecedences and consequences. Understanding consumers' knowledge-sharing intentions in Q&A reviews has important theoretical and practical implications.

Theoretical Implications

Q&A reviews are different to traditional online reviews. They are featured with social Q&A. Therefore, we examined Q&A reviews not from the perspective of eWOM, but also from social Q&A and knowledge sharing. Prior research on social Q&A are mostly in the context of online communities (Neshati et al., 2017), whereas knowledge-sharing are discussed in corporate organizations (e.g., Matsuo and Aihara, 2022; Nguyen et al., 2022). Our results extend the research perspectives of eWOM and contribute multidisciplinary to both eWOM and social Q&A.

Firstly, based on self-determined theory and the results of our empirical research, we found that consumers' motivations for knowledge-sharing intention in Q&A reviews consist of altruistic motivations, hedonic motivations, perceived pressure, and external rewards. Among these, the former two motivations are internal, and the latter two are external. Previous studies seldom examine consumers' motivations to write eWOM, but generally focus on relationships between specific variables and eWOM, such as satisfaction (Thakur, 2019; Singh and Söderlund, 2020), brand love (Bairrada et al., 2018), brand attitude (Izogo and Mpinganjira, 2021) and financial incentives (Qiao et al., 2020), or merely focus on the motivations to read eWOM (e.g., Teng et al., 2017; Ismagilova et al., 2020; Mainolfi et al., 2022).

Secondly, previous studies discussed the relationship between knowledge-sharing intention and loyalty either in the context of online communities (e.g., Yao et al., 2015) or organizations (e.g., Swanson et al., 2020). However, our results firstly shed light on the influence of consumers' knowledge-sharing intention on consumers' loyalty to platform in the context of e-commerce. Since Q&A reviews attribute to social Q&A, consumers may perceive a greater social presence, social interactions, and higher level of ownership from platforms, and thus perform higher level of loyalty.

Thirdly, we also highlight the moderation role of feedback. We define feedback as a post-replying behavior, i.e., behavior of responding to the answers. Feedback is a key mechanism of Q&A reviews. Our empirical results show that when feedback is received, consumers' altruistic motivations have a stronger influence on knowledge-sharing intention and their knowledge-sharing intentions have a stronger influence on loyalty to platform. Although feedback did not significantly moderate the relationship between hedonic motivations and knowledge sharing intention, the evidence presented in this research still provides a new perspective of feedback, since seldom studies have examined it (Fang et al., 2018).

Managerial Implications

According to the results of our research, we found altruistic motivations, hedonic motivations, perceived pressure, and external rewards significantly influence consumers' knowledge sharing intentions. Due to the fact that altruistic motivation is more related to personality characteristics, we suggest managers to stimulate other three motivations. For instance, practitioners can stimulate consumers' hedonic motivations through gamify Q&A reviews. Hamari and Koivisto (2015) has pointed out that the hedonic value is the key value that consumers can perceive from gamified products or services. Gamification is more often used in a marketing context. Therefore, adding gamification elements may improve consumers' hedonic motivations to participate in knowledge-sharing.

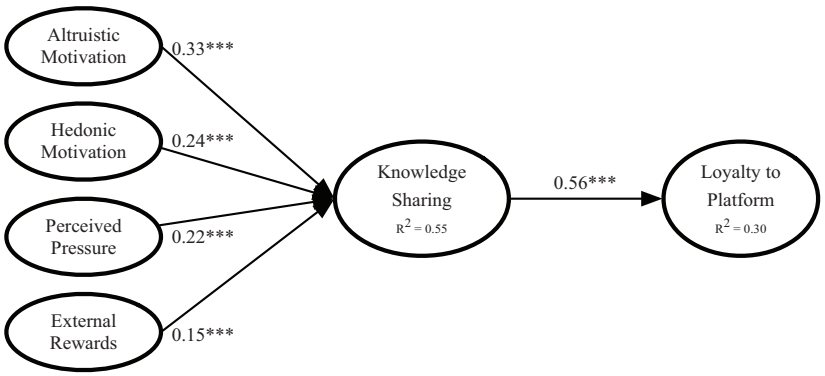


FIGURE 2 | Path coefficients of the structural model. ***Denotes $p < 0.01$.

Besides, as perceived pressure derived from social norms, managers need to present consumers' values and others' active participation intentions in knowledge sharing (Zhou, 2021). Moreover, past studies suggested that external motivations can be internalized *via* gamification (Bittner and Schipper, 2014; Kuo and Chuang, 2016). Managers may thus gamify external rewards to realize internalization and increase the impact of extant motivations. For example, Kim and Ahn (2017) found that internal motivation has a strong positive relationship with consumer engagement and external motivation can be internalized by applying game elements to increase consumer engagement. Therefore, after consumers share their knowledge, practitioners may present some games (e.g., lottery, competitions, etc.) not only to make them gain some rewards, but also to satisfy their hedonic needs.

On the other hand, we found that feedback has a significant moderating effect. When receiving feedback, consumers' altruistic motivations may have stronger influences on knowledge-sharing and in turn has a stronger influence on their loyalty to platform. Managers may set notification function of feedback, or use virtual external rewards (e.g., points, badges) to encourage consumers to provide more feedback and thus enhance social dynamism of e-commerce platforms.

Limitations and Future Research Directions

Due to the limitation of time, we only collected data of 42 respondents who did not get feedback. The sample size problem might be the reason why some of the paths were not significant. Future studies may collect more data of people who did not get feedback and test the moderation effect of the relationship between internal motivation and knowledge sharing intentions.

Moreover, Future studies can further explore other motivations behind consumers' knowledge-sharing intention. For example, social recognition is another possible motivation. Research in organizations has shown that the purpose of employees in contributing knowledge is to gain recognition from other colleagues (Constant et al., 1996); furthermore, in the context of social Q&A, research (e.g., Rui and Whinston, 2012) indicates that users expect to gain the attention of others by sharing knowledge, and they may even write comments that cater to other users' interests to gain more social recognition (Fang et al., 2018). Therefore, in the context of e-commerce, consumers may also have expectations of winning social recognition from others, and this can be regarded as one motivation.

Finally, future research may place more of a focus on feedback. In this study, feedback referred to the behavior of providing comments or likes. Although responding behavior is an important social interaction indicator and feedback is also an important mechanism in Q&A reviews, there is still a lack of studies discussing this topic (Fang et al., 2018). In this research, we highlight the moderation role of feedback. However, in Q&A reviews, feedback from consumers is also spontaneous and voluntary. Hence, to exploit the critical impacts of feedback, future studies may further discuss its antecedents. Finally, in terms of outcome variables, as loyalty to platform reflects consumers' willingness to repurchase on e-commerce platforms, second-hand data can be used in future studies to further discuss

TABLE 3 | Results of multigroup analysis.

Hypothesized moderated paths	Feedback		$\Delta\chi^2$ ($\Delta df = 1$)
	Yes	No	
H6a: Altruistic Motivation - > Knowledge Sharing Intention	0.54*	$-0.07^{n.s.}$	9.87*
H6b: Hedonic Motivation - > Knowledge Sharing Intention	0.40*	0.19*	$1.42^{n.s.}$
H6c: Knowledge Sharing Intention - > Loyalty to Platform	0.71*	$-0.10^{n.s.}$	10.39*
No-moderation model: $\chi^2 = 1134.71$, $df = 533$			

**Denotes $p < 0.01$; n.s. denotes non-significance.*

the relationship between consumer knowledge-sharing intention and repurchase frequency or other related variables.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

All authors contributed to literature review, methodology, survey, data analysis, writing, and have read and agreed to the published version of the manuscript.

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Do Internet Search Data Help Forecast Air Passenger Demand? Evidence From China's Airports

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Before making travel plans, people often use the Internet to collect relevant information to help themselves make better decisions. Among the numerous information search channels, Internet search engine is used by the vast number of travelers because of its low cost and high efficiency. To a large extent, Internet search behavior is the external manifestation of users' psychological activities, reflecting their concerns, needs and preferences. Therefore, Internet search data can reflect the air passenger demand information to a certain extent. In this manuscript, a novel decomposition ensemble model is proposed to discuss the role of Internet search data in air passenger demand forecasting. In the empirical study, the relevant data of Shanghai Pudong International Airport and Beijing Capital International Airport are taken as samples. The results show that the proposed forecasting model can integrate the advantages of decomposition-ensemble strategy and deep learning algorithm, and achieve more accurate and reliable prediction results than all benchmark models. This further indicates that adding Internet search data into the forecasting model can effectively improve the prediction performance of air passenger demand, and can provide scientific and reliable decision support for air transport management.

Keywords: air passenger demand, Internet search data, multivariate empirical mode decomposition, deep learning algorithm, time series analysis

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INTRODUCTION

In the global scope, the frequent trade activities between countries and regions and the rapid development of tourism industry have led to the development of various transport modes. In particular, air travel has become more and more popular in middle-distance and long-distance tourism in recent years due to its safety, comfort, convenience and acceptable fares, which has greatly promoted the development of air transport industry. According to statistics from the Civil Aviation Administration of China (CAAC), in 2019, China's air passenger turnover reached 1,170.51 billion passenger-kilometers, up 9.3% year on year. Meanwhile, China's civil aviation airports handled a passenger throughput of 1.352 billion, up 6.9% year on year. The increasing air passenger demand poses challenges to air transport management. Therefore, it is of great significance to accurately forecast air passenger demand, which is helpful for the rapid and efficient management of the air transport industry, and can provide reference for the scientific

and effective decision-making of relevant government departments and civil aviation enterprises (Xie et al., 2014).

In the past decades, scholars have done a lot of research on air passenger demand forecasting. However, the previous studies are almost based on the statistical data that are drawn from the historical observation records, with traditional data sources. These studies use historical data to predict the future, which cannot accurately reflect the uncertainty of the future and cannot help predict the future mutations. Hence the prediction result is not accurate enough for the prediction of structural changes. With the rapid development and increasing popularity of the Internet, people tend to use the Internet to collect relevant information before making travel plans and then help themselves make better decisions. Given the important role of sensory cues in consumption (Wang W. et al., 2022), it is worth studying whether the rich Internet search data can be applied to the field of air passenger demand prediction to make up for the deficiency of using only historical statistical data. However, few studies have discussed the role of Internet search data in air passenger demand forecasting. There are several issues worthy of in-depth analysis and discussion in practical application, such as whether there is a relationship between Internet search behavior and air passenger demand, how to choose the appropriate Internet search data, and how to establish a high-precision model for air passenger demand forecasting accordingly.

In addition, the air passenger demand data is seasonal, random and nonlinear, which makes the simple models commonly used in the past can only extract a small amount of information. In recent years, deep learning models have been widely used in the field of prediction due to their excellent ability to capture nonlinear sequence features, which gives us some enlightenment. Meanwhile, as the prediction results of single models are not stable, scholars tend to use hybrid models for prediction, among which decomposition-ensemble prediction is the current mainstream strategy. Previous studies have shown that the prediction performance of the model can be significantly improved by using the "decomposition-ensemble prediction" strategy, which provides a reference for air passenger demand forecasting.

In this manuscript, we aim to build a hybrid forecasting model combining Internet search data and deep learning algorithms. The main contributions of this manuscript include: (1) We introduce the Internet search data into the forecast of air passenger demand, and propose a method for screening Internet search data based on the maximum information coefficient (MIC) analysis. The empirical results show that the screened Internet search data is helpful to improve the forecast accuracy of air passenger demand; (2) Based on the "decomposition-ensemble prediction" strategy and deep learning algorithm, this manuscript establishes a novel forecasting framework for air passenger demand considering the Internet search data, which can fully extract the data features and obtain accurate prediction results.

The rest of this manuscript is organized as follows. "Literature Review" section provides an academic foundation. "Correlation Mechanism Analysis" section analyzes the correlation mechanism between Internet search behavior and air passenger demand. "Materials and Methods" section describes the overall framework of the proposed model and the basic principle of the algorithms used in this manuscript. In "Results" section, an empirical analysis is conducted to verify the prediction performance of the proposed model. Then, the results are discussed in "Discussion" section. Finally, "Conclusion" section summarizes the manuscript with conclusions.

LITERATURE REVIEW

Prosperity of big data has brought new vitality to different academic fields, such as mental health research (Hassani et al., 2022; Liang et al., 2022), buying behavior research (Ma and Liao, 2022; Wang J. et al., 2022), and so on. Among them, Internet search data is widely used with the advantage of easy access. There is no doubt that web search is a technology that almost everyone is familiar with and willing to use nowadays. More specifically, among the numerous information search channels, Internet search engine is used by the vast number of travelers because of its low cost and high efficiency. To a large extent, Internet search, a behavior that can alleviate the harm of knowledge hiding (Zhao et al., 2019), is the external manifestation of users' psychological activities, reflecting their concerns, needs, and preferences.

In recent years, to make up for the deficiency of using only traditional data for prediction and capture the latest trend better, more and more scholars have applied Internet search data to prediction. Sun et al. (2019) proposed a prediction framework combining the KELM method and Internet search data, and based on the prediction experiment of Beijing tourist volume, concluded that adding Internet search data into the prediction model could significantly improve the prediction performance. Tang et al. (2020) proposed a multi-scale prediction model considering Internet search data for oil price, aiming at the different influences of Internet search data on oil price at different time scales. The empirical results show that the proposed model has better prediction performance than the benchmark models. Zhang et al. (2020) adopted Baidu search index to reflect investors' concerns, thus establishing a novel volatility prediction model considering investors' concerns. The empirical analysis shows that investors' concerns reflected by Internet search data have a strong ability to explain and predict the stock market. In these studies, it was found that the performance of the prediction models showed significant improvement with the addition of Internet search data. However, it is necessary to further explore the method of applying Internet search data to air passenger demand forecasting.

The development of accurate air passenger demand forecasting models is a critical issue, which plays a positive role in promoting progress in international air transport industry. To this end, many such single models have been proposed. They can be broadly divided into two categories, i.e., econometric models (such as SARIMA, Holt-Winters, VAR, etc.) (Fildes et al., 2011; Tsui et al., 2014; Xu et al., 2019) and artificial intelligence models (such as SVR, KELM, etc.) (Liang et al., 2017; Jin et al., 2020). In the last decade, with the continuous improvement of computer performance, artificial

intelligence models have been rapidly developed and widely applied in various fields, among which deep learning algorithms have been widely used in prediction research due to their unique advantages in data mining and analysis. For example, Kulshrestha et al. (2020) proposed a deep learning model named Bayesian bidirectional long short-term memory neural network (BBiLSTM), and conducted an empirical research with the tourism dataset of Singapore as a sample. The results show that the prediction effect of the proposed model is better than that of the benchmark models. Shen et al. (2020) combined the LSTM network with convolutional neural network (CNN) to form a dynamic time series prediction model, and proved that the proposed model has high prediction accuracy and robustness. Nevertheless, how to apply deep learning algorithms to air passenger demand forecasting remains to be further studied.

Although deep learning prediction models fill in many shortcomings of traditional prediction models, a single model can always fail to meet the high requirements of air passenger demand series prediction. Based on this, the "decomposition-ensemble prediction" strategy has gradually become an effective and satisfactory method for the scholars in the field of prediction. In general, the basic idea of this strategy is to decompose the original series into several components at the first step, and then model and predict each component, respectively. Finally, the prediction results of each component are integrated to obtain the final predicted values. Many prediction studies have fully demonstrated the effectiveness of this strategy and provided a lot of empirical reference for air passenger demand forecasting. For instance, Li et al. (2022) constructed a decomposition and integration model of ship motion prediction based on empirical mode decomposition (EMD) algorithm, and the empirical results proved the superiority of the proposed model. Huang et al. (2021) proposed a prediction model combining EMD and gated recurrent unit neural network (EMD-GRU) for non-stationary sequences (PM 2.5 concentration), and the results showed that the error of EMD-GRU model was significantly reduced compared with the single GRU model. Based on the above analysis, this manuscript proposes a novel decomposition-ensemble model based on Internet search data and deep learning algorithm, to discuss the role of Internet search data in air passenger demand forecasting.

CORRELATION MECHANISM ANALYSIS

As an important channel for people to obtain information in daily life, search engine can generate Internet search data, which objectively and exhaustively record users' search behaviors and the searched information, making it possible to study the rules of human psychology and behavior with the help of digital trace data from search engines (Wilson et al., 2012). Internet search data perform well in reflecting what people pay attention to, so they are applicable to predict the behaviors of the general public (Lai et al., 2017).

People are significantly affected by the social environment around them (Li et al., 2018), and gradually choose consumption patterns more rationally and actively under the influence of the development of the Internet (Yang et al., 2022). When the travel demand arises, people tend to collect relevant information from the Internet, including travel time, expenses, convenience, comfortability and so on, to help them make better travel plans. **Figure 1** shows the correlation mechanism between Internet search behavior and travel decision-making. When considering whether to choose an airport as a destination, the search area is narrowed down to the information related to the airport, such as its flights, the distance and mode of transportation between the airport and urban areas and surrounding cities, hotels around the airport, and duty-free shops at the airport, etc. To a certain extent, this information contributes to the final decisions of the travelers, which will be further reflected in the changes of airport passenger flow. Among the numerous information search channels, Internet search engine is adopted by the vast number of travelers because of its low cost and high efficiency. Each search by the user will be recorded by the search engine, and the search index of the search term will be generated based on the search volume in days. The search index will perform as a recorder of users' emotions, psychology and behavior and a tool to predict their travel decisions. Therefore, search engine data can reflect part of the air passenger demand information, which has a certain explanatory ability for air passenger demand forecasting.

However, search engine data often show the current trends of people's demand and concerns about something, while traditional statistical data are better at reflecting long-term trends. Therefore, using search engine data alone to predict air passenger demand may not be very appropriate. Better prediction effect can be achieved by combining these two kinds of data to build a prediction model.

MATERIALS AND METHODS

Multivariate Empirical Mode Decomposition

Empirical mode decomposition (EMD) is a technique to decompose nonlinear and non-stationary sequences into several intrinsic mode functions (IMFs) and a residual sequence, which has been widely used because of its obvious advantages in terms of self-adaptation. All signals can extract several IMF components with the frequencies from high to low in turn. That is to say, the IMF_1 component extracted first has the highest frequency, and the IMF_n component extracted last has the lowest frequency (n is the number of IMF components). Physically, if the instantaneous frequencies are to be meaningful, then the corresponding IMFs must be symmetric, with a local mean of zero, and with the same number of zero crossing points and extreme points. However, EMD can only deal with 1-dimensional data. In order to process multi-dimensional data that often appears in the real-world, an emerging technique named multivariate empirical mode decomposition (MEMD) was proposed by Rehman and Mandic (2010). In this method, multi-dimensional envelopes can be obtained by projection operation of the multivariate signals. Then, we can get the local mean estimation of the multivariate signals through an averaging calculation. Furthermore, following the standard EMD procedure, the multivariate signals are

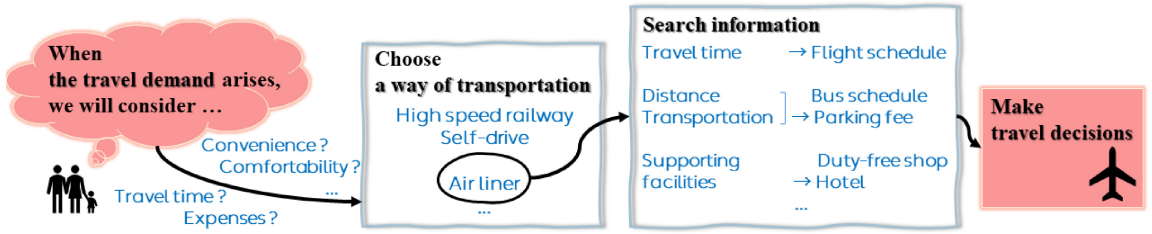


FIGURE 1 | Correlation mechanism between information search and travel decision-making.

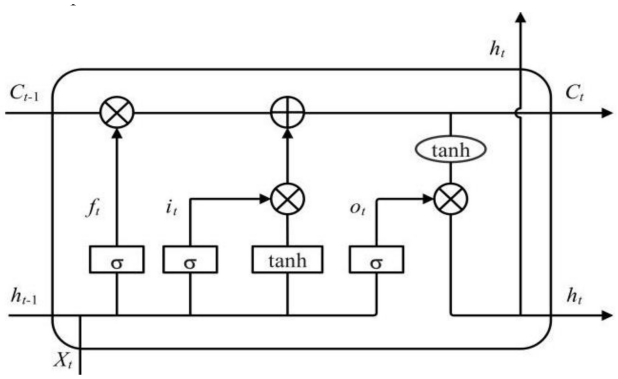


FIGURE 2 | Structure of an long short-term memory (LSTM) memory cell.

decomposed into a set of multivariate sub-sequences from high frequency to low frequency (IMFis, i = 1, 2, 3, …) and multivariate residuals (Rs). The detailed steps of MEMD algorithm are as follows (Tang et al., 2020):

(1) Calculate the direction vectors $x_{\theta k}(k = 1, \ldots, K)$, Where K is the number of direction vectors.
(2) Get the projections $p_{\theta k}(t)$ of multivariate signals $s(t)$ along the direction vectors $x_{\theta\, k}$.
(3) Find the maximum value of the projection signal $p_{\theta k}(t)$ corresponding to the time node $\{t^i_{\theta\, k}\}$.
(4) Use the method of interpolation to achieve the multivariate envelope curves $e_{\theta k}(t)$ based on point $\{t^i_{\theta t}, s(t^i_{\theta\, t})\}$.
(5) Calculate the mean of the envelope curves $m(t) = \frac{1}{K}\sum_{k=1}^{K} e_{\theta\, k}\,(t)$.
(6) Extract the remaining ingredients $h(t) = s(t) - m(t)$. If $h(t)$ meets the criteria for the multiple IMF, defined as an IMF. If else, it will be repeated as the original multiple sequence in steps (2) to (5) until surface a $h(t)$ meets the conditions of IMF.
(7) Repeat steps (2) to (6) with the remainder $r(t) = s(t) - h(t)$ as the original signal until the IMF cannot be disassembled or certain ending-conditions are met.

Finally, MEMD decomposes multivariate data into several IMF groups and a residual group, with each channel containing the same number of IMFs. Moreover, it can effectively identify the common factors from interrelated multivariate data at similar timescales. Using univariate EMD to decompose each single sequence separately cannot achieve such a strict mode alignment.

Bidirectional Long Short-Term Memory

Long short-term memory (LSTM) network is a modified version of recurrent neural network (RNN), which is used to solve the problem about the long-term dependence of data (Kulshrestha et al., 2020). A typical LSTM consists of an input layer, an output layer, and one or more hidden layers, and the hidden layer is composed of multiple memory cells. As shown in **Figure 2**, each memory cell contains three gates including an input gate i_t, a forget gate f_t and an output gate o_t, which can selectively retain or forget the relevant contextual information (Du et al., 2020). The input gate is used to control the input of information, the forget gate determines how much information should be transferred to the next cell, and the output gate is used to control the output of the information. Because of the existence of these gate structures, LSTM can make information affect the state of each moment selectively. The following equations are used to express LSTM:

$$f_t = \sigma(W_f \cdot [h_{t-1}, X_t] + b_f) \tag{1}$$

$$i_t = \sigma(W_i \cdot [h_{t-1}, X_t] + b_i) \tag{2}$$

$$o_t = \sigma(W_o \cdot [h_{t-1}, X_t] + b_o) \tag{3}$$

$$C_t = f_t \odot C_{t-1} + i_t \odot \tanh(W_C \cdot [h_{t-1}, X_t] + b_C) \tag{4}$$

$$h_t = o_t \odot \tanh(C_t) \tag{5}$$

where X_t is the input vector at time t; h_t is the state of the hidden layer at time t; f, i, o, are the forgotten gate, input gate and output gate, respectively; C is the state of the unit; W_f, W_i, W_o, and W_C represent the corresponding weight coefficient matrices; b_f, b_i, b_o, and b_C represent the corresponding bias values; $\sigma(\cdot)$ represents the sigmoid activation function; $\tanh(\cdot)$ represents the hyperbolic tangent activation function; $\odot$ represents a dot multiplication operation.

Because of its special structure, LSTM not only has advantages in dealing with time series, but also can solve the problem of gradient vanishing in RNN. Generally, the information in an LSTM network is one-way transmission. BiLSTM combines forward and backward LSTM to obtain two hidden layers in different directions, thus obtaining more comprehensive information (Wang et al., 2019). The BiLSTM hidden layer states include the forward propagation states $\overrightarrow{h}_t$ and the backward propagation states $\overleftarrow{h}_t$ from H_t :

$$\overrightarrow{h}_t = \overrightarrow{LSTM}(h_{t-1}, X_t, C_{t-1})t \in [1, n] \quad (6)$$

$$\overleftarrow{h}_t = \overleftarrow{LSTM}(h_{t-1}, X_t, C_{t-1})t \in [n, 1] \quad (7)$$

$$H_t = [\overrightarrow{h}_t, \overleftarrow{h}_t] \quad (8)$$

where n is the number of nodes in the hidden layer.

Overall Framework of the Proposed Model

Based on the influence of Internet search behavior on air passenger demand, combined with the basic principle of the above models, this manuscript presents a framework for air passenger demand forecasting. The framework makes full use of Internet search data and deep learning algorithms, which is noted as MIC_MEMD_BiLSTM. This framework takes a single airport as the research object, which is divided into two parts: data preprocessing and prediction, and its basic process is shown in **Figure 3**.

(1) Data preprocessing. Firstly, the keyword database is established by using relevant search recommendation and long tail keyword expansion method according to the core keywords. Next, the possible outlier values are identified and interpolated to get the initial search data. Then, in order to reduce the redundancy and avoid the influence of irrelevant variables on the prediction performance of the model, the Internet search data are filtered according to the maximum information coefficient (MIC) method (Reshef et al., 2011) to obtain the search data with high correlation to airport passenger demand. Compared with the traditional distance-based correlation measurement method, MIC method cannot only measure the linear and nonlinear relationship between variables in a large number of data, but also extensively mine the non-functional dependence relationship between variables, so the measurement of the interaction relationship between variables is more accurate. Finally, the data is divided into training set and test set.

(2) Prediction of airport passenger volume. MEMD is used to decompose airport passenger volume data and Internet

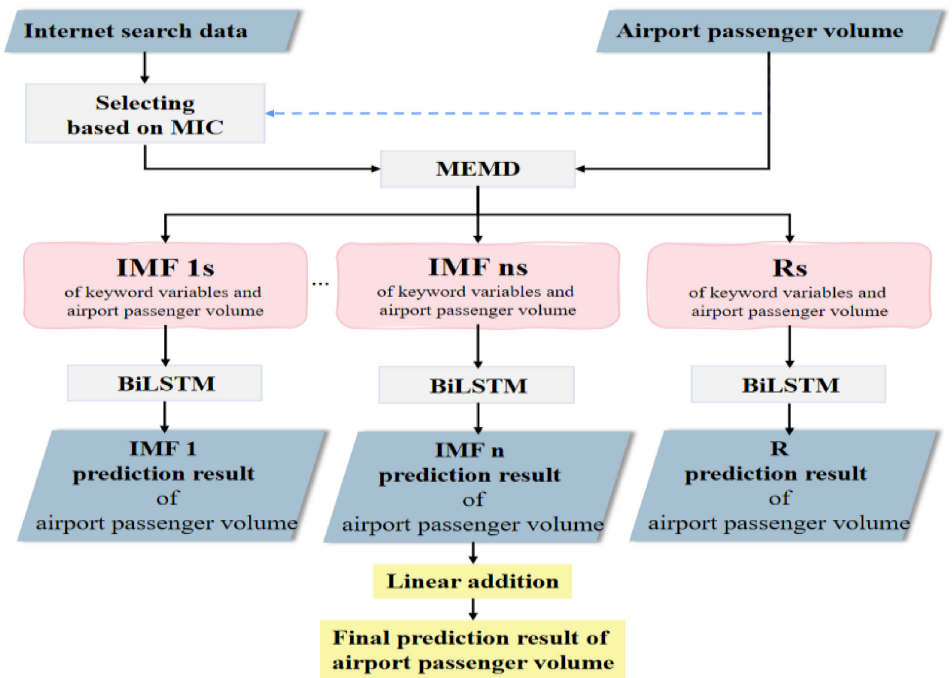


FIGURE 3 | Structure of MIC_MEMD_BiLSTM prediction model.

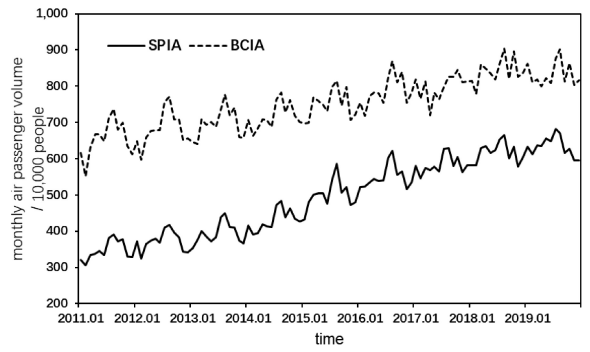


FIGURE 4 | Air passenger volume of two airports from January 2011 to December 2019.

search data simultaneously, and the corresponding sub-sequence groups are obtained. For each group of sub-sequences, BiLSTM model is established to predict the corresponding airport passenger volume sub-sequence. Finally, the prediction result of the airport passenger volume is obtained by summing the prediction results of each sub-sequence.

RESULTS

Data Description

To verify the validity of the proposed prediction framework, Shanghai Pudong International Airport (SPIA) and Beijing Capital International Airport (BCIA) are selected as the research objects for empirical analysis. As shown in **Figure 4**, the highest data frequency available for the air passenger volume of the two airports is monthly, with each sample covering the period from January 2011 to December 2019 and containing 108 observations. The data were obtained from Wind database. For each sample, 96 observations from January 2011 to December 2018 are used as training set for model training. Twelve observations in 2019 are used as test set to test the prediction effect of the model.

A number of search engines are available on the Internet, where Baidu search engine has the highest user number and market share in China compared with other search engines (Xiang and Lu, 2019). In terms of Internet search data, as the research objects of this manuscript are Chinese airports, we adopt Baidu search index as Internet search data, which are taken from Baidu Index platform. In order to be consistent with the data frequency of the series to be predicted (air passenger volume), the daily data of keyword search volume from January 2011 to December 2019 were converted into monthly data.

Processing and Screening of Internet Search Data

In this manuscript, the Internet search data used comes from the Baidu search index provided by Baidu Index platform, which is based on the search volume of Internet users in Baidu search engine and takes keywords as the statistical object. In other words, Baidu search index is the weighted sum of search frequency of each keyword in Baidu web search, which is obtained through scientific analysis and calculation. Taking the dataset of Shanghai Pudong International Airport as an example, the steps of obtaining and screening Internet search data in this manuscript are as follows:

Build a Word Library

First of all, several core keywords are screened according to the object to be predicted. Then we search these core keywords in Baidu search engine, and through relevant search recommendation and long tail keyword expansion method to expand the keywords, forming the corresponding keyword selection library. Finally, the keywords with less search volume will be removed. The keyword selection of Shanghai Pudong International Airport is shown in **Table 1**.

Variable Selection

In order to obtain the keyword sequences with greater "contribution" to the forecast of airport passenger volume, we screen the keyword variables according to the MIC method. **Figure 5** shows the MIC values between each keyword variable of Shanghai Pudong International Airport and its passenger volume. It can be seen that the MIC values of the first two keyword variables are significantly higher than that of other variables. For the purpose of reducing the computational complexity of the prediction model, only these two keyword variables are selected as exogenous input variables of the prediction model in the search engine data.

Prediction Process

First, we use MEMD algorithm to decompose the airport passenger volume sequence and the selected keyword sequences

TABLE 1 | Keyword selection of Shanghai Pudong International Airport.

No.	Keywords	No.	Keywords	No.	Keywords
1	Shanghai Pudong Airport	8	Shanghai Pudong Airport map	15	Pudong Airport bus schedule
2	Shanghai Pudong International Airport	9	Shanghai Pudong Airport parking fee	16	Pudong Airport duty-free shop
3	Shanghai Pudong Airport bus	10	Shanghai Pudong Airport duty-free shop	17	Pudong Airport parking fee
4	Shanghai Pudong Airport bus schedule	11	Shanghai Pudong Airport tel	18	Pudong Airport Terminal 2
5	Shanghai Pudong Airport to Hangzhou	12	Pudong International Airport	19	Pudong Airport to Hongqiao Airport
6	Shanghai Pudong Airport hotel	13	Pudong Airport	20	Pudong Airport to Shanghai Hongqiao Railway Station
7	Shanghai Pudong Airport near hotel	14	Pudong Airport flight enquiries		

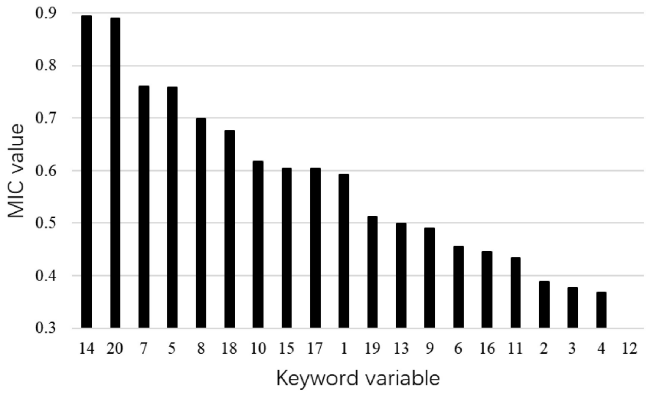


FIGURE 5 | Maximum information coefficient (MIC) values between each keyword variable and passenger volume of Shanghai Pudong International Airport.

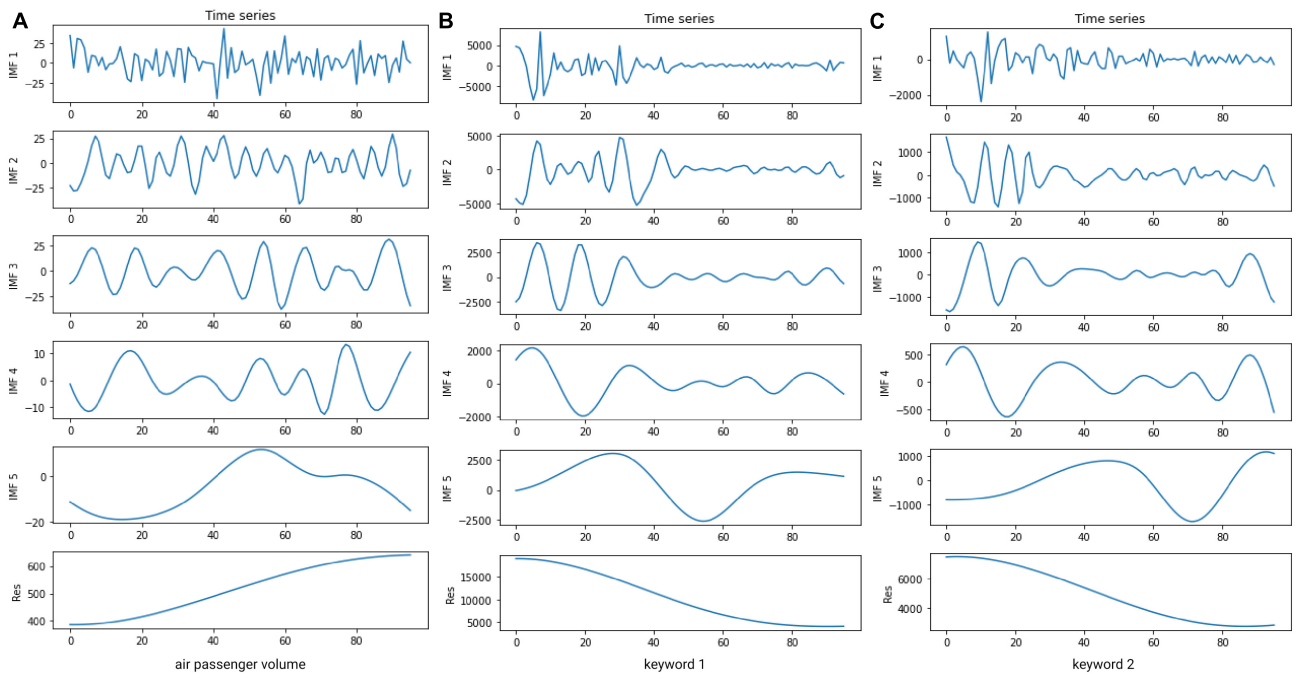


FIGURE 6 | Decomposition results of air passenger volume of Shanghai Pudong International Airport and the corresponding two keyword sequences.

simultaneously, so as to fully extract the data characteristics of each sequence. **Figure 6** shows the sub-sequences of air passenger volume of Shanghai Pudong International Airport and the corresponding two keyword sequences obtained by MEMD decomposition. As can be seen from **Figure 6**, the three sequences are decomposed into the same number of IMF components, and the components with the same index have similar time scales. From IMF_1 component to the residual sequence, the frequency of fluctuation gradually decreases, realizing pattern correspondence. Accordingly, the IMF components with the same index are formed into corresponding sub-sequence groups for the following prediction.

Then, for each sub-sequence group obtained in the previous step, a BiLSTM model is established to predict the corresponding sub-sequence of airport passenger volume. In the process of modeling, the input data includes historical data of airport passenger volume and the corresponding historical values of Internet search data, while the output data is only related to airport passenger volume. Because the air passenger volume data has a significant periodicity, with a 12-month cycle, showing similar changes every year, we set the input time dimension as 12 and the output time dimension as 3. That is to say, the historical data of the previous 12 months are used to predict the air passenger volume of the next 3 months.

TABLE 2 | Hyperparameter selection of Bayesian bidirectional long short-term memory neural network (BiLSTM) model.

Parameter	Value
Activation function	{"sigmoid", "tanh", "relu", "linear"}
Number of neurons in the hidden layer	6
Number of iterations	{500, 1,000, 1,500, 2,000}
Learning rate	{0.1, 0.01, 0.001}
Batch size	1/2 of the number of training samples
Objective function	Mean square error (MSE)
Optimization algorithm	Adam

TABLE 3 | Comparison of prediction results of all the models.

Model	SPIA			BCIA		
	MAE	MAPE (%)	RMSE	MAE	MAPE (%)	RMSE
① MIC_MEMD_BiLSTM	10.31	1.62	11.73	12.20	1.46	14.21
② EEMD_BiLSTM	11.93	1.88	14.20	13.60	1.61	17.06
③ MIC_BiLSTM	11.56	1.84	12.77	14.41	1.71	21.22
④ BiLSTM	13.92	2.21	15.52	20.18	2.41	24.46
⑤ SARIMA	16.38	2.62	20.57	23.72	2.88	27.30
⑥ HW	15.83	2.49	20.34	18.50	2.25	23.41

Finally, the prediction results of all component sequences are summed up to obtain the final prediction result of airport passenger volume.

Parameter Setting

In this manuscript, all models are implemented by Python software. Except for the BiLSTM model, other models are all adaptive models, which do not require parameter adjustment. The hyperparameters of the BiLSTM model are determined by the grid search method, and the parameter types and parameter selection are shown in **Table 2**.

Prediction Performance Evaluation

Evaluation Index of Prediction Error

From the two perspectives of absolute error and relative error, we select three indicators, including root mean square error (RMSE), mean absolute error (MAE), and mean absolute percentage error (MAPE), to measure the prediction performance of the prediction model. The calculation formulas are as follows:

$$\mathrm{RMSE} = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2} \tag{9}$$

$$\mathrm{MAE} = \frac{1}{n}\sum_{i=1}^{n}\left|y_i - \hat{y}_i\right| \tag{10}$$

$$\mathrm{MAPE} = \frac{1}{n}\sum_{i=1}^{n}\left|\frac{y_i - \hat{y}_i}{y_i}\right| * 100\% \tag{11}$$

where y_i and $\hat{y}_i$ represent the actual and predicted values of the original time series, respectively.

Diebold-Mariano Test

In this manuscript, we use Diebold-Mariano (DM) (Diebold and Mariano, 2002) statistic to compare the prediction performance of different models from statistical significance. The null hypothesis of the DM test is that there is no significant difference between the prediction performance of the test model (i.e., target model) and that of the comparison model (i.e., benchmark model). If the test result rejects the null hypothesis at a certain level of significance, it indicates that the test model is significantly better than the comparison model. Assuming that model A and model B are the two prediction models whose predictive effects need to be compared, the DM statistic can be defined as follows:

$$S_{DM} = \frac{\bar{g}}{(\widehat{V}_{\bar{g}}/N)^{1/2}} \tag{12}$$

where $\bar{g} = \frac{1}{N}\sum_{t=1}^{N} g_t$, $g_t = (x_t - \widehat{x}_{A,t})^2 - (x_t - \widehat{x}_{B,t})^2$, $\widehat{V}_{\bar{g}} = \gamma_0 + 2\sum_{l=1}^{\infty}\gamma_l$, and $\gamma_l = cov(g_t, g_{t-l})$; $\widehat{x}_{A,t}$ and $\widehat{x}_{B,t}$ are the predicted values of model A and model B at time t, respectively; x_t is the actual value of the original time series at time t; $cov(\,)$ represents an operator, which produces the covariance of two variables; N is the size of the test set. The DM statistic approximately follows the standard normal distribution. In this manuscript, the mean square error (MSE) is used as the loss function.

DISCUSSION

In this manuscript, in order to verify the effectiveness and superiority of the proposed model (i.e., model ① MIC_MEMD_BiLSTM), the comparison models are selected for experiments from the following three aspects:

(1) In order to verify that adding Internet search data can improve the accuracy of the prediction model, two sets of comparative experiments are set up, respectively. In the case of using the decomposition-ensemble strategy, the model that adds Internet search data (i.e., model ①) is compared with the model that does not add Internet search data (i.e., model ② EEMD_BiLSTM). In the case of using a single prediction model, the model that adds Internet search data (i.e., model ③ MIC_BiLSTM) is compared with the model that does not add Internet search data (i.e., model ④ BiLSTM).
(2) In order to verify the rationality and effectiveness of the decomposition-ensemble strategy, two sets of comparative experiments are set up, respectively. In the case of adding Internet search data, the model using the decomposition-ensemble strategy (i.e., model ①) is compared with the model using a single prediction model (i.e., model ③). In the case of not adding Internet search data, the model using the decomposition-ensemble strategy (i.e., model ②) is compared with the model using a single prediction model (i.e., model ④).
(3) In order to further verify the comprehensive advantages of the proposed model that combines Internet search

TABLE 4 | Diebold-Mariano (DM) test results of different models for Shanghai Pudong International Airport (SPIA) dataset.

Target model	Benchmark model				
	② EEMD_BiLSTM	③ MIC_BiLSTM	④ BiLSTM	⑤ SARIMA	⑥ HW
① MIC_MEMD_BiLSTM	−0.9602 (0.1685)	−1.5926 (0.0556)	−1.5049 (0.0662)	−1.9787 (0.0239)	−1.3772 (0.0842)
② EEMD_BiLSTM		−0.0209 (0.4917)	−0.5669 (0.2854)	−1.2978 (0.0972)	−0.9495 (0.1712)
③ MIC_BiLSTM			−0.4872 (0.3130)	−1.6397 (0.0505)	−1.0040 (0.1577)
④ BiLSTM				−1.2994 (0.0969)	−0.8143 (0.2077)
⑤ SARIMA					0.0613 (0.5244)

The numbers in the table without ◯ are DM statistics, and the numbers in () are corresponding p-values.

TABLE 5 | Diebold-Mariano test results of different models for Beijing Capital International Airport (BCIA) dataset.

Target model	Benchmark model				
	② EEMD_BiLSTM	③ MIC_BiLSTM	④ BiLSTM	⑤ SARIMA	⑥ HW
① MIC_MEMD_BiLSTM	−08176 (0.2068)	−1.2720 (0.1017)	−1.9235 (0.0272)	−2.2517 (0.0122)	−1.5769 (0.0574)
② EEMD_BiLSTM		−0.7079 (0.2395)	−1.2356 (0.1083)	−1.7265 (0.0421)	−1.1504 (0.1250)
③ MIC_BiLSTM			−1.6093 (0.0538)	−0.8516 (0.1972)	−0.4483 (0.3270)
④ BiLSTM				−0.463 (0.3217)	−0.0422 (0.4832)
⑤ SARIMA					1.5877 (0.9438)

The numbers in the table without ◯ are DM statistics, and the numbers in () are corresponding p-values.

data, decomposition-ensemble strategy, and deep learning algorithm, we compare the proposed model with the deep learning method (i.e., model ④ BiLSTM) and the traditional econometric models. Taking into account the strong periodicity of the data, in order to better demonstrate the advantages of the proposed model, two models ⑤ SARIMA and ⑥ HW, which are good at modeling seasonal data, are selected as the representative of the econometric models, and compared with the proposed model.

The prediction results of all the above models for airport passenger volume are shown in **Table 3**.

Based on the analysis of **Table 3**, the following conclusions can be drawn:

(1) In the case of using the decomposition-ensemble strategy, the prediction performance of the proposed model with Internet search data (i.e., model ①) is better than that of the model without Internet search data (i.e., model ②). For instance, the MAE of model ① was reduced by 15.7% compared to model ② on the SPIA dataset, and by 11.5% on the BCIA dataset. Meanwhile, in the case of using the single prediction model BiLSTM, the performance of the model with Internet search data (i.e., model ③) is better than that of the model without Internet search data (i.e., model ④). For example, the MAE of model ③ was reduced by 20.4% compared to model ④ on the SPIA dataset, and by 40.0% on the BCIA dataset. The comparison results show that adding Internet search data can improve the performance of air passenger demand forecasting model. Whether or not the data is decomposed, in either data set, scientifically filtered Internet search data can well compensate for the rigidity of structural historical statistics. It has been fully proved that Internet search data with reasonable selection and processing can reflect the travel intention of passengers, so as to express the corresponding demand for air passenger transport in advance.

(2) In the case of adding Internet search data, the prediction performance of the model using the decomposition-ensemble strategy (i.e., model ①) is better than that of the model using a single prediction model (i.e., model ③). For instance, the MAE of model ① was reduced by 12.1% compared to model ③ on the SPIA dataset, and by 18.1% on the BCIA dataset. In the case of not adding Internet search data, the prediction performance of the model using the decomposition-ensemble strategy (i.e., model ②) is also better than that of the model using a single prediction model (i.e., model ④). For example, the MAE of model ② was reduced by 16.7% compared to model ④ on the SPIA dataset, and by 48.4% on the BCIA dataset. The comparison results show that using the decomposition-ensemble strategy can effectively improve the prediction performance of the model. In other words, this strategy can indeed help the prediction model to capture and learn more effective information at different time scales, so as to improve the prediction accuracy.

(3) By comparing the prediction results of model ① with the deep learning algorithm (i.e., model ④ BiLSTM) and traditional econometric models (i.e., model ⑤ and ⑥), it can be found that the prediction performance of model ① has been greatly improved, which reflects the comprehensive advantages of combining Internet search data, decomposition-ensemble strategy, and deep learning

algorithm. Moreover, in most cases, the prediction effects of traditional econometric models are worse than that of other comparison models. This is because the econometric models are good at describing the linear characteristics of the sequences, but for the sequences with nonlinear and non-stationary characteristics (such as the air passenger volume sequences), they have limitations in describing the characteristics of the sequences.

In this manuscript, in order to evaluate the superiority of the proposed model from a statistical point of view, the prediction results of all models are compared in pairs, and the corresponding DM statistics and p-values are calculated, respectively. The calculation results for SPIA and BCIA datasets are shown in **Tables 4**, **5**, respectively. It can be seen from the tables that at a confidence level of 10%, the proposed model (i.e., model ①) is significantly superior to most comparison models, indicating its statistical validity.

Based on the above analysis, it can be seen that the proposed model (i.e., MIC_MEMD_BiLSTM) can obtain effective and stable prediction results, and has higher prediction accuracy than the benchmark models.

CONCLUSION

From the perspective of broadening data sources and improving forecasting methods, this manuscript proposes an air passenger demand forecasting model that combines Internet search data, decomposition-ensemble strategy and deep learning algorithm. Based on the empirical analysis of Shanghai Pudong International Airport and Beijing Capital International Airport, it can be found that because of the addition of Internet search data as a new form of input data, and the advantages of decomposition-ensemble strategy and deep learning algorithm, the proposed model can fully extract the complex features of the original time series with different scales, and obtain more accurate and reliable prediction results than the benchmark models. This also further illustrates that adding appropriate Internet search data into the air passenger demand forecasting model can effectively improve the forecasting accuracy.

In addition, although the proposed model has achieved good prediction results, it still has some limitations. For example, the proposed model only includes Baidu search index as a representative of Internet search data. In future research, other types of Internet data (such as Google Trends) and other air passenger demand impact factors (such as GDP) can also be considered to enrich the number of input variables for the prediction model.

DATA AVAILABILITY STATEMENT

Publicly available datasets were analyzed in this study. This data can be found here: https://github.com/QingZ96/Air-Passenger-Demand-Forecasting.

AUTHOR CONTRIBUTIONS

XL devised the study and collected the data. QZ and CH analyzed the data. MY wrote the manuscript. WN helped with writing and editing the manuscript. All authors contributed to the article and approved the submitted version.

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Are virtual anime endorsers a new type of endorser? Examining product involvement as a moderating role

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Virtual anime endorsement has been prevalent as an advertising strategy, and many companies invest massive amounts of money into virtual endorsements. While previous studies have found that endorser-product congruence is related to consumer brand attitude and purchase intention, it is not known whether moderate incongruence between a virtual anime endorser and a product has a positive influence on brand attitude and purchase intention. This study developed a 1×2 experiment to investigate the influences of virtual anime endorser–product congruence and moderate the endorser–product incongruence on consumer brand attitude and purchase intention. Product involvement played a key moderating role in the relationships of virtual anime endorser–product congruence and the endorser–product incongruence with consumer attitudes. A total of 919 participants were recruited from animation-related venues and stores in Taiwan. The findings of this study validated the interaction effects of virtual anime endorser-product congruence and incongruence on these two consumer responses, i.e., brand attitude and purchase intention. This study further investigated the moderating effect of product involvement in the relationships of virtual anime endorser–product congruence and moderate the endorser–product incongruence with consumer responses. The findings of this study provide a valuable reference regarding endorsers and product patterns through which enterprises can maximize their value.

KEYWORDS

virtual anime endorser, product involvement, brand attitude, elaboration likelihood model, endorser credibility

Introduction

Many marketing studies have focused on endorser–product congruence and the match-up hypothesis (Albert et al., 2017; Liang and Lin, 2018; Schouten et al., 2020). Most companies rely on suitable endorsers to promote their products and invest considerable capital to gain endorsements from celebrities in various public places and the media. Prior studies indicate that many companies have forgone celebrity endorsers in favor of using "virtual anime endorsers" to promote and market their brands and

products (Tamaki, 2019; Lin et al., 2021). For instance, the company of the 2020 Tokyo Olympics selected the anime character Son Goku as the ambassador of this event. Jin and Bolebruch (2009) reported that virtual endorsers can enhance consumers' perceived value and positive brand attitude toward a company's product offerings. Anime products have experienced considerable growth and increasing profits through social media platforms, such as YouTube. In 2020, the gross market size of anime-related products was USD 24.80 billion (Market Analysis Report, 2021). In addition, Statista Research Department (2021) declared that the Japanese animation industry had reached a revenue of almost 1.24 trillion Japanese yen in 2020. Therefore, the use of virtual anime endorsers in corporate image roles may become a more popular alternative for companies than the use of celebrity endorsers. The animation industry has become an economic lifeline that cannot be overlooked.

Virtual anime endorsers, such as Ronald McDonald, are created using computer-generated graphics and have already replaced some celebrity endorsers (Hsu et al., 2018) and are developed by virtual anime characters and cartoon-like endorsers, such as the Mermaid and Michelin Man. Virtual anime endorsers attract consumer interest and increase purchase intention even though they may not match perfectly with the characteristics of the endorsed product (Aggarwa and McGill, 2007). Endorsements based on an endorser's attractiveness or personal character are only persuasive for certain products (Schouten et al., 2020). With the popularity of online advertising and marketing, the role of electronically created virtual endorsers is gradually expanding on social media, and their influence on marketing is growing (Hsu et al., 2018). The imagery of these representative characters is skillfully used by companies and corporate brands as a vital method of transmitting messages (Keng et al., 2011). Because virtual characters never undergo aging or changes in appearance, these characters can forever occupy a space in the hearts and minds of consumers and have the capacity to attract the attention of numerous age groups (Hsu et al., 2018). Holzwarth et al. (2006) stated that virtual characters increase customer satisfaction with the retailer, product attitude, and purchase intention. However, few studies have focused on the manner in which virtual anime endorsers endorse products and influence consumer purchasing behaviors and attitudes toward a brand. Virtual endorsers may not be completely beneficial for companies and brand users; therefore, the aforementioned knowledge gaps and their practical implications warrant research.

To judge endorsers and product information, consumers consider the match-up between products and endorsers (Hsu et al., 2018). According to the elaboration likelihood model (ELM; Petty and Cacioppo, 1984), consumers with high levels of product involvement carefully judge product information in relation to product quality. Conversely, those with low-level product involvement are often influenced by outside factors during information processing. Specifically, when congruence is achieved between the appearance of an endorser and an endorsed product, consumers with low levels of product involvement are still easily affected by peripheral clues (e.g., the attraction of source); however, those with a high level of product involvement are unaffected by peripheral clues of no relevance to the product quality. Therefore, this research conducted a literature review within the framework of the ELM in order to provide valuable insight into the aforementioned topic.

This study had three main goals: (1) to examine the interaction effects of virtual endorser–product congruence and virtual endorser–product incongruence on consumers' purchase intention and attitude toward a brand, (2) to examine the moderating role of the cognitive condition of consumers' product involvement in the relationships of virtual endorser–product congruence and virtual endorser–product incongruence with consumers' attitudes toward a brand, and (3) to contribute to the literature on endorser–product endorsement by identifying its main contributing factors. This study may enhance the understanding of endorsement fields.

Theoretical background and hypotheses

Elaboration likelihood model

According to the ELM (Petty et al., 1981), consumer ideas about goods are influenced by various external and internal factors. External factors alter consumers' opinions through central and peripheral channels, whereas internal factors refer to the degree of an individual's deliberation, during which consumers consider subjective ideas and experiences when interpreting messages as part of their thought processes. Consumers exhibiting a high degree of scrutiny are cautiously review the content of information; therefore, the content of a message is the central processing route. On the contrary, consumers who choose the peripheral processing route and who have a low degree of scrutiny often lack the motivation and ability for thoughtful consideration (Tang et al., 2012).

In the ELM, the central route refers to consumers' attitudes toward products that are easily affected by product information. This route emphasizes the processing of persuasive messages in a rational and objective manner as well as the investment of individuals into the content of messages (Lee and Koo, 2016). Consumers' cognitive process or their evaluation of products is primarily a result of their ideas. Liu et al. (2007) report that consumers' attitudes are informed by the relevant information disclosed about a product, such as its practical suitability. In addition, when the peripheral route is used by consumers who lack a buying motive or when their purchasing power is not sufficiently strong to elicit evaluative ability, attitude changes may be achieved through the peripheral route. These consumers do pay attention to the product information but rather focus on numerous other

factors that satisfy their present cognitive understanding. Consumers who adopt the peripheral route do not wish to spend much time or energy analyzing product information and are thus more easily convinced by surface features (Tang et al., 2012).

Celebrity endorser and virtual anime endorser

Products endorsed by a celebrity endorser may generate the most profit and advertising effectiveness for the company (Till and Busler, 2000; Lee and Koo, 2016). Prior research reported that consistency between an endorser's celebrity image and the nature of the endorsed product affects consumers' purchase intention (Liang et al., 2011). The higher a celebrity endorser's profile, the more they are received and trusted by the audience, which in turn affects the audience's buying attitude (Sheu, 2010). Therefore, companies may create maximum advertising effectiveness by selecting a celebrity endorser related to the company's products within the confines of their budget (Bower and Landreth, 2001; Koernig and Boyd, 2009). Corporations spend astronomical capital on endorsement fees to acquire celebrity endorsers and prime-time media advertisements. If an endorser's moral fiber is considered lacking, the endorsed company's reputation may be damaged, which may adversely affect its product sales and corporate earnings (Zhou and Whitla, 2013). Unlike celebrity endorsers and movie stars, virtual endorsers rarely display negative publicity (e.g., scandals) or engage in negative behaviors (e.g., crimes; Garretson and Niedrich, 2004). Thus, the use of virtual endorsers to endorse products or brands is increasing (Hsu et al., 2018).

Virtual anime endorsers, such as Ronald McDonald and the Poppin' Fresh Pillsbury Doughboy, are created using computer-generated graphics and have already replaced some celebrity endorsers and become popular media figures (Hosany et al., 2013; Hsu et al., 2018). A growing number of companies have developed virtual anime characters and cartoon-like endorsers, such as One Piece (manga and anime), the Mermaid, and Michelin Man. These endorser characters have created strong company, brand identification, and remind brand impressions of community. Prior studies have indicated that a virtual or an anime character acting as an endorser is attractive to consumers and strengthens product word-of-mouth and brand image (Hsu et al., 2018; Schouten et al., 2020). When company characters are recognizable, virtual endorsers draw the attention of potential consumers and create strong brand identification. Thus, virtual anime endorsers are increasingly used by numerous international brands, in advertisements, and at physical events. For instance, the 2020 Tokyo Olympics committee selected Son Goku as its ambassador (Tamaki, 2019). Modern advertisers also use virtual characters as alternatives to celebrity endorsers because private behaviors need not be managed in the case of these characters (Till and Busler, 2000; Hsu et al., 2018).

Credibility effect of virtual anime endorser–product congruence and consumer attitudes

Although theorical research and empirical phenomena have revealed the effectiveness of celebrity endorsements, several factors may alter the effectiveness of such endorsements on consumer's attitude toward a brand and purchase intentions. First, an incongruence between a celebrity endorser and the endorsed product may negatively affect the effectiveness of the endorsement. Similarly, Schouten et al. (2020) indicated that congruence between a celebrity endorser and product leads to favorable attitude toward a brand and high purchase intentions toward the product. Second, an anime or virtual character endorser rarely occurs scandals and crimes that can adversely affect consumers' attitude toward a brand and purchase intentions. Zhou et al. (2021) indicated that the characteristics of anime endorsers positively induce advertisement effects. However, celebrity endorsers may behave negatively in public or be marred by negative gossip, which results in less favorable attitudes toward brands and decreased purchase intentions. Therefore, the effectiveness of source credibility in endorsement may be associated with the congruence between an endorser and a product.

Product promotion using endorsers as a marketing method can promote product exposure and increase consumer purchase intention (Fink et al., 2004; Schouten et al., 2020). MacKenzie and Spreng (1992) demonstrated that consumers' attitude toward a brand and ideas about a product affect their purchase behavior. Attitude toward a brand is a factor used by consumers to evaluate products. Lutz et al. (1983) identified that three attitudes influence consumer purchase behavior: cognitive, affective, and constitutive attitudes. Cognitive factor refers to the knowledge and perception that consumers have about products, and affective attitude indicates consumers' emotional responses to a product. When consumers are confronted with various products, they may analyze a wide variety of information, which leads to them forming positive or negative opinions about various brands. Prior studies have reported that the majority of consumer purchasing behavior is attributable to consumers' cognition toward a virtual character and endorsers because these factors affect consumers' purchase-related decision-making and purchasing behavior (Aaker and Keller, 1990; Lin et al., 2021). Therefore, the following hypotheses are proposed:

> *Hypothesis 1*: Congruence of a virtual anime endorser-product and endorser celebrity (CEPEC) has a positive influence on consumers' consistency brand attitude (CBA).
>
> *Hypothesis 2*: Congruence of a virtual anime endorser-product and endorser celebrity (CEPEC) has a positive influence on consumers' consistency purchase intention (CPI).

Credibility effect of virtual anime endorser–product incongruence and consumer attitudes

Peripheral route constitutes a potential persuasion strategy for low elaboration likelihood and weak arguments (Petty and Cacioppo, 1986). Consumers adopting the peripheral route may form attitudes through a simple linkage of persuasion factors, such as attractive endorsers. The conditions under which moderate incongruence generates more attractive outcomes than congruence is an interesting topic. The moderate incongruence is defined as a moderate level, which is between high and low endorser-produce incongruence and is a peripheral route (Desarbo and Harshamn, 1985). Liang and Lin (2018) investigated the incongruence between a celebrity endorser and a sport product and determined that this incongruence positively influenced consumers' attitude toward a brand and purchase intention. Therefore, consumers may perceive many situations as "interesting and attractive" because of the curiosity induced by a moderate degree of suddenness, which results in the enhancement of consumers' attention brand attitudes and purchase intention (Lee and Thorson, 2008; Tang et al., 2012). The positive consequences of moderately incongruent matching have been discussed in consumer psychology literature (e.g., Germelmann et al., 2020). On the basis of the aforementioned discussion, the following hypotheses are proposed:

> *Hypothesis 3*: Moderate incongruence between a virtual anime endorser and a product has a positive influence on consumers' inconsistency brand attitude (IBA).
>
> *Hypothesis 4*: Moderate incongruence between a virtual anime endorser and a product has a positive influence on consumers' inconsistency purchase intention (IPI).

Moderating role of product involvement

Involvement is defined as a perception of consumers' interest, attention, and personal relevance induced by a given situation (Skallerud et al., 2021). With regard to products, involvement affects whether consumers are more active or passive before, during, and after the moment of consumption. Consumers who choose the central route with a high level of product involvement exhibit strong self-motivation to seek and compare other relevant product information before purchasing a product (Liang and Lin, 2018). Less involved consumers utilize the peripheral route to process product messages and focus on convincing clues in certain contexts, such as the product endorser. For individuals with low involvement, an endorser with similarities to the consumers can produce high levels of advertising effectiveness (Albert et al., 2017).

When consumers have a high degree of involvement with products, they tend to adopt a central approach to process information and make decisions after careful consideration based on the content of product information. Therefore, consumers may alter their beliefs and attitudes because of changes in thought, which eventually lead to changes in consumers' purchase behavior (Skallerud et al., 2021) and brand attitude (Leclerc et al., 1994). By contrast, when consumer have a low degree of involvement, decisions tend to be based on the peripheral information and external clues for a product. Therefore, when the perception of low product involvement changes, changes in purchase intention and brand attitude follow. Prior research reported that product involvement has a major moderating effect on the relationship between consumers' perceived value and behavior (Gong, 2021). On the basis of the findings of the aforementioned studies, this study speculates that the higher involvement a consumer has toward a product that exhibits congruence or moderate incongruence with its virtual endorser, the higher is the consumer's attitude toward the brand and purchase intention. This study analyzed the moderating effect of product involvement through the following hypotheses:

> *Hypothesis 5a*: Product involvement moderates the relationships among endorser–product congruence, the virtual anime endorser, and attitude toward a brand such that the linkages are stronger when product involvement is higher.
> *Hypothesis 5b*: Product involvement moderates the relationships among moderate endorser–product incongruence, the virtual anime endorser, and attitude toward a brand such that the linkages are stronger when product involvement is higher.
>
> *Hypothesis 6a*: Product involvement moderates the relationships among endorser–product congruence, endorser credibility, and purchase intention such that the linkages are stronger when product involvement is higher.
> *Hypothesis 6b*: Product involvement moderates the relationships among moderate endorser–product incongruence, the virtual endorser, and purchase intention such that the linkages are stronger when product involvement is higher.

Materials and methods

Pretest

This study mainly examined the influence of the congruence between a virtual anime endorser and a product on consumers' attitude toward the brand and purchase intention. This study first distinguished virtual anime products and general products. The researchers used the pretest questionnaire method to select five well-known anime characters, 10 game products, and 10 general products. A total of 100 participants who were college students in Taiwan were

invited at random to evaluate the level of congruence between a virtual anime endorser and the selected products by using a 7-point semantic differential scale ranging from 1 for *strongly disagree* to 7 for *strongly agree*. On the basis of the study of Rifon et al. (2004), the current study employed a three-item scale for congruence. This scale comprised the following items: not compatible/compatible, not a good fit/a good fit, and not congruent/congruent. In addition, participants were asked to rate credibility by using the nine-item scale of Ohanian (1991). Finally, two combinations (i.e., one virtual anime endorser and two product types) were presented to the participants to evaluate their congruence. The formal questionnaire for the main test was designed based on the information obtained in the pretest. According to the results of the experiments conducted with 100 consumers of animation and animation products, Hatsune Miku (33%) created by Yamaha company was selected as the virtual anime endorser for the "Mobile Games - Girl Brand" product. Moreover, "Instruments - an electric piano" was selected as this character's endorsed product (32%) in the pretest (Table 1). The pretest results identified Hatsune Miku as the most credible figure and congruent source within Mobile Games - Girl Brand, whereas Hatsune Miku was also rated as the least credible and most incongruent source with Instruments - an electric piano. Detailed results of the pretest are indicated in Table 1.

Formal experiment

In this study, Hatsune Miku was the most popular anime endorser in the pretests. This character was paired with two product types (virtual game products and nonvirtual general products) in the formal questionnaire. The questionnaires of this study contained two endorser–product congruence levels: The Mobile Games - Girl Brand endorsed by Hatsune Miku in the framework of endorser–product congruence and Instrument – an electric piano endorsed by Hatsune Miku in the framework of endorser–product incongruence. The questionnaires of this study were divided into paper questionnaires and online e-questionnaires. Participants were randomly selected from crowds at animation-related events and in animation product stores in Taiwan. A total of 1,002 questionnaires were distributed to participants in the experiment, who accepted them voluntarily and were asked to complete all survey questionnaires. This study distributed 602 questionnaires and presented participants with a small gift (approximately US$2). A total of 400 e-questionnaires were distributed to animation members by LINE in the association. After the exclusion of 83 incomplete questionnaires (8%) from e-questionnaires, a total of 919 valid questionnaires were included in the analysis (92%).

Measures

Endorser–product congruence and incongruence

The scale used for measuring the congruence between the image of the endorser and the product was based on the scale of Lee and Thorson (2008). A 7-point semantic differential scale ranging from 1 for *strongly disagree* to 7 for *strongly agree* was used to assess the following three items: compatible/not compatible, a good fit/not a good fit, and congruent/not congruent. For this study, the Cronbach's alpha (α) was 0.81.

Endorser credibility

This scale was developed by Ohanian (1991) to measure respondents' assessment of the effectiveness of purchased products on a 7-point scale ranging from 1 for *strongly disagree* to 7 for *strongly agree*. The participants were asked to evaluate the following items: attractive/unattractive, classy/not classy, beautiful/ugly, elegant/plain, sexy/not sexy, dependable/undependable, honest/dishonest, reliable/unreliable, sincere/insincere, trustworthy/untrustworthy, expert/not an expert, experienced/inexperienced, knowledgeable/unknowledgeable, qualified/unqualified, and skilled/unskilled ($\alpha = 0.92$). Many studies have empirically validated the aforementioned scale (e.g., Lee and Koo, 2016).

Product involvement

This scale developed by Zaichkowsky (1985) was used to examine product involvement on a four-item (e.g., unimportant/important) with 7-point semantic differential scale ranging from 1 for *strongly disagree* to 7 for *strongly agree*. The higher the obtained score, the higher was the product

TABLE 1 Pretest results.

	Virtual amine endorser-product congruence				Endorser credibility			
	Mobile Games – Girl Brand		Instrument – an electric piano		Mobile Games – Girl Brand		Instrument – an electric piano	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Virtual amine celebrity (Hatsune Miku)	6.23	0.95	2.95	1.46	5.43	1.14	3.28	1.22

M = average of 7-point scale items; SD, Standard deviation.

involvement (i.e., The Mobile Games - Girl Brand and Instrument – an electric piano). The Cronbach's alpha (α) of this study was 0.95.

Attitude toward the brand

According to the research of Leclerc et al. (1994) on brand attitudes, three items were used to measure the degree of consumer attention to brand attitudes on a 7-point Likert scale ranging from 1 for *strongly disagree* to 7 for *strongly agree*. The higher the obtained score, the higher was the emphasis on the attitude toward the brand. For this study, the Cronbach's alpha (α) was 0.96.

Purchase intention

The scale developed by Yi (1990) was used to examine purchase intention. A 7-point semantic differential scale ranging from 1 for *strongly disagree* to 7 for *strongly agree* was used to rate the following items: very likely/very unlikely, probable/improbable, and possible/impossible. The Cronbach's alpha (α) of this study was 0.92.

Control variables

This study controlled for sex, age, marriage status, income, education, and employment status to reduce any potential influence of demographic characteristics on the results (Turnley and Feldman, 1999). Problems in achieving generalizability can be reduced by controlling for demographic variables (Tomprou et al., 2012). Age was assessed using open-ended items.

Results

Manipulation check

This study conducted one-way ANOVA to analyze whether the two operationalized levels of virtual anime endorser–product congruence differed significantly from each other. The average ratings for virtual anime endorser–product congruence (i.e., Mobile Games - Girl Brand) and virtual anime endorser–product incongruence (i.e., Instrument - an electric piano) were 6.23 and 2.95, respectively. The difference between high and low congruence was significant ($F = 3.64$, $p < 0.01$). The average value of endorser credibility (i.e., Hatsune Miku) was 5.43.

Main effects

The correlation coefficients presented in Table 2 indicate the positive correlations between congruence of endorser-product and endorser celebrity (CEPEC) and consistency brand attitude (CBA), which is H1 ($r = 0.41$, $p < 0.05$) and incongruence of endorser-product and endorser celebrity (IEPEC) and inconsistency brand attitude (IBA), which is H3 ($r = 0.11$, $p < 0.01$). CEPEC significantly influenced consistency purchase intention (CPI), which is H2 ($r = 0.47$, $p < 0.01$), whereas IEPEC had a nonsignificant effect on inconsistency purchase intention (IPI), which is H4 ($r = 0.09$, $p < 0.05$).

Multivariate analysis of variance

A multivariate analysis of variance (MANOVA) was conducted with two independent variables, namely the virtual anime celebrity and virtual anime endorser–product congruence, and two dependent variables, namely attitude toward the brand and purchase intention. The two-way MANOVA interaction between the virtual endorser and virtual endorser–product congruence was significant [Wilks' lambda (λ) = 0.47; $F = 2.99$, $p < 0.01$], which allowed ANOVAs to be performed for the two dependent variables with the protection of the Type 1 error rate. MANOVA was also performed using the virtual anime endorser and virtual endorser–product incongruence as independent variables and attitude toward the brand and purchase intention as dependent variables. The results of the two-way MANOVA interactions between the virtual endorser and virtual endorser–product incongruence were significant [Wilks' lambda (λ) = 0.53; $F = 3.16$, $p < 0.01$], which allowed ANOVAs to be performed for the two dependent variables with the protection of the Type 1 error rate.

The results indicated that the congruence between a virtual anime endorser and a product significantly influenced attitude toward the brand [$F(1, 117) = 3.22$, $p < 0.01$]; thus, Hypothesis 1 is supported. The congruence between a virtual anime endorser and a product significantly influenced purchase intention [$F(1, 117) = 2.58$, $p < 0.01$]; thus, Hypothesis 2 is supported. Moreover, the interaction of virtual endorser–product incongruence with the endorser significantly influenced attitude toward the brand [$F(1, 95) = 4.11$, $p < 0.01$]; thus, Hypothesis 3 is supported. Finally, the interaction of virtual endorser–product incongruence with the endorser significantly influenced purchase intention [$F(1, 95) = 2.77$, $p < 0.01$]; thus, Hypothesis 4 is supported.

Regression analysis

The regression analysis verified Hypotheses 1–6b in this study. The control variables were input in the first step, the main effects were input in the second and third steps, and the moderating variable was input in the final step. The total effect and magnitude of the results in this study demonstrated the significant effects of the interaction in the moderation model. The following text indicates the key findings regarding the effects of endorser–product congruence and endorser–product incongruence on attitude toward the brand and purchase intention in the regression analysis.

TABLE 2 Means, standard deviations, Cronbach's alpha, and intercorrelations among study.

Variables	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Sex	1.41	0.49	(–)													
2. Age	2.13	0.95	−0.25**	(–)												
3. Marriage	1.98	0.25	0.01	−0.27**	(–)											
4. Income	1.49	0.82	−0.29**	0.55**	−0.23**	(–)										
5. Education	2.21	1.04	−0.11**	0.55**	−0.52**	−0.09**	(–)									
6. Vocation	5.71	2.05	0.25**	−0.11**	0.10**	−0.08*	−0.09**	(–)								
7. CEPEC	5.43	1.46	0.09**	0.11**	−0.02	−0.02	−0.08*	0.01	(0.81)							
8. IEPEC	2.96	1.14	−0.03	−0.01	−0.03	−0.11**	−0.02	−0.04	0.11**	(0.81)						
9. EC	6.23	0.95	−0.05	−0.13*	−0.07*	−0.11**	−0.12**	−0.03	0.28**	0.16**	(0.92)					
10. PI	5.10	1.31	0.04	−0.07*	−0.06	−0.12**	−0.11**	−0.01	0.55**	0.09**	0.36	(0.95)				
11. CPI	5.31	1.40	0.08*	−0.04	−0.06	−0.11**	−0.12**	−0.01	0.47**	0.08*	0.42**	0.76**	(0.92)			
12. ICPI	5.23	1.41	0.05	−0.02	0.04	0.06	−0.06	−0.02	0.20**	0.09*	0.29**	0.42**	0.48**	(0.92)		
13. CBA	5.66	1.14	−0.04	−0.04	−0.02	−0.12**	−0.12**	−0.02	0.41**	0.13**	0.55**	0.62**	0.66**	0.40**	(0.96)	
14. IBA	5.79	1.10	−0.03	−0.05	−0.08*	0.03	−0.07*	−0.04	0.17**	0.11**	0.43**	0.35**	0.39**	0.62**	0.50**	(0.96)

Coefficient alphas are in parentheses on the diagonal. CEPEC, Congruence of endorser-product and endorser celebrity; IEPEC, Incongruence of endorser-product and endorser celebrity; EC, Endorser credibility; PI, Product involvement; CPI, Consistency purchase intention; ICPI, Inconsistency purchase intention; CBA, Consistency brand attitude; IBA, Inconsistency brand attitude. *$p < 0.05$ and **$p < 0.01$.

First, as presented in Table 3, the results of the hierarchical multiple regression analyses indicate that virtual anime endorser–product congruence had a positive influence on attitude toward the brand [$\beta = 0.11$, $p < 0.01$]; thus, Hypothesis 1 is supported. The results of step 4 listed in Table 3 indicate that product involvement moderated the relationship between virtual anime endorser–product congruence and attitude toward the brand ($\beta = 0.37$, $p < 0.01$; $F = 3.68$, $p < 0.05$); thus, Hypothesis 5a is supported. In addition, this study employed PROCESS macro for SPSS 22.0 with 10,000 bootstrap samples to examine H5a. Table 4 shows that the effect of virtual anime endorser–product congruence on consistency brand attitude whether the degree of product involvement was high or low. Particularly, the direct effect is strengthened when the consumers have higher product involvement (low = 1.10, mean = 0.21, and high = 0.58).

TABLE 3 Results of product involvement as a moderating role between virtual anime endorser-product congruence and attitude toward the brand.

	Consistency brand attitude (β)			
Predictors	**Step 1**	**Step 2**	**Step 3**	**Step 4**
Gender	−0.02	−0.02	−0.02	−0.01
Age	0.10	0.11*	0.11**	0.12*
Marriage	−0.03	−0.02	−0.02	−0.02
Salary	−0.11**	−0.11**	−0.11*	−0.11*
Education	−0.04	−0.04	−0.04	−0.04
Vocation	−0.05	−0.05	−0.05	−0.05
Product involvement		0.25**	0.22**	0.21**
Interaction of CEPEC			0.11**	0.09*
CEPEC * Product involvement				0.37**
R^2	0.01	0.02	0.02	0.03
Adjusted R^2	0.01	0.01	0.01	0.02
F	2.12*	0.74	7.30**	3.68*

CEPEC, Congruence of endorser-product and endorser celebrity. *$p < 0.05$ and **$p < 0.01$.

TABLE 4 Results for the effect of CPEC on consistency brand attitude across levels of product involvement.

Moderator variable	Effect size	*SE*	LL 95% CI	UL 95% CI
Low product involvement	1.10	0.43	0.26	1.94
Middle product involvement	0.21	0.07	0.07	0.34
High product involvement	0.58	0.10	0.38	0.77
Index	0.16	0.06	0.03	0.31

Bootstrap samples = 10,000. SE, Standard error; LL, Lower limit; UL, Upper limit; CI, Confidence interval; CPEC, Congruence of endorser-product and endorser celebrity.

As presented in Table 5, the analysis results also support Hypothesis 2, which states that virtual anime endorser–product congruence has a positive influence on consumers' purchase intention ($\beta = 0.19$, $p < 0.01$). The results of step 4 presented in Table 5 indicate that product involvement moderated the relationship between virtual anime endorser–product congruence and purchase intention ($\beta = 0.52$, $F = 7.41$, $p < 0.01$); thus, Hypothesis 6a is supported. In addition, this study employed PROCESS macro for SPSS 22.0 with 10,000 bootstrap samples to examine H6a. Table 6 shows that the effect of virtual anime endorser–product congruence on consistency purchase intention whether the degree of product involvement was high or low. Particularly, the direct effect is strengthened when the consumers have higher product involvement (low = 0.91, mean = 0.08, and high = 0.79).

Second, as presented in Table 7, moderate virtual anime endorser–product incongruence had a positive influence on attitude toward the brand ($\beta = 0.19$, $p < 0.01$); thus, Hypothesis 3 is supported. The results of step 4 presented in Table 7 indicate that product involvement moderated the relationship between virtual anime endorser–product incongruence and attitude toward the brand ($\beta = 0.61$, $F = 15.39$, $p < 0.01$); thus, Hypothesis 5b is supported. In addition, this study employed PROCESS macro for SPSS 22.0 with 10,000 bootstrap samples to examine H5b. Table 8 shows that the effect of virtual anime endorser–product incongruence on inconsistency brand attitude whether the degree of product involvement was high or low. Particularly, the direct effect is strengthened when the consumers have higher product involvement (low = 0.80, mean = 0.26, and high = 0.82). As presented in Table 9, the results of this study also support Hypothesis 4, which states that moderate virtual anime endorser–product incongruence has a positive influence on consumers' purchase intention ($\beta = 0.21$, $p < 0.01$). The results of step 4 presented in Table 9 reveal that product involvement moderated the relationship between virtual anime endorser–product incongruence and purchase intention ($\beta = 0.65$, $F = 18.38$, $p < 0.01$); thus, Hypothesis 6b is supported. In addition, this study employed PROCESS macro for SPSS 22.0 with 10,000 bootstrap samples to examine H6b. Table 10 shows that the effect of virtual anime endorser–product incongruence on inconsistency purchase intention whether the degree of product involvement was high or low. Particularly, the direct effect is strengthened when the consumers have higher product involvement (low = 0.59, mean = 0.04, and high = 0.68).

TABLE 5 Results of product involvement as a moderating role between virtual anime endorser-product congruence and purchase intention.

	Consistency purchase intention (β)			
Predictors	**Step 1**	**Step 2**	**Step 3**	**Step 4**
Gender	−0.04	−0.04	−0.05	−0.03
Age	0.05	0.06	0.06	0.07
Marriage	−0.01	−0.01	−0.01	−0.00
Salary	−0.10*	−0.10*	−0.10*	−0.10*
Education	−0.04	−0.04	−0.04	−0.04
Vocation	−0.07	−0.06	−0.06	−0.06
Product Involvement		0.26**	0.23**	0.22**
Interaction of CEPEC			0.19**	0.14**
CEPEC * Product Involvement				0.52**
R^2	0.01	0.02	0.02	0.03
Adjusted R^2	0.01	0.01	0.01	0.02
F	1.97*	2.29	4.08*	7.41**

CPEC, Congruence of endorser-product and endorser celebrity. *$p < 0.05$ and **$p < 0.01$.

TABLE 6 Results for the effect of CPEC on consistency purchase intention across levels of product involvement.

Moderator variable	**Effect size**	***SE***	**LL 95% CI**	**UL 95% CI**
Low product involvement	0.91	0.37	0.19	1.13
Middle product involvement	0.08	0.07	0.05	0.37
High product involvement	0.79	0.08	0.63	0.93
Index	0.04	0.05	0.06	0.21
Moderator variable	**Effect size**	***SE***	**LL 95% CI**	**UL 95% CI**
Low product involvement	0.59	0.13	0.32	0.85
Middle product involvement	0.04	0.04	0.04	0.26
High product involvement	0.68	0.04	0.60	0.77
Index	0.03	0.04	0.03	0.26

Bootstrap samples = 10,000. SE, Standard error; LL, Lower limit; UL, Upper limit; CI, Confidence interval; CPEC, Congruence of endorser-product and endorser celebrity.

TABLE 8 Results for the effect of IEPEC on inconsistency brand attitude across levels of product involvement.

Moderator variable	**Effect size**	***SE***	**LL 95% CI**	**UL 95% CI**
Low product involvement	0.80	0.18	0.46	1.13
Middle product involvement	0.26	0.06	0.15	0.37
High product involvement	0.82	0.06	0.71	0.93
Index	0.56	0.08	0.07	0.19

Bootstrap samples = 10,000. SE, Standard error; LL, Lower limit; UL, Upper limit; CI, Confidence interval; IEPEC, Incongruence of endorser-product and endorser celebrity.

TABLE 7 Results of product involvement as a moderating role between virtual anime endorser-product incongruence and attitude toward the brand.

	Inconsistency brand attitude (β)			
Predictors	**Step 1**	**Step 2**	**Step 3**	**Step 4**
Gender	−0.03	−0.03	−0.03	−0.02
Age	−0.14*	−0.07	−0.06	−0.05
Marriage	−0.10**	−0.07*	−0.07*	−0.07*
Salary	0.06	0.06	0.07	0.06
Education	−0.03	−0.02	−0.02	−0.02
Vocation	−0.07	−0.03	−0.02	−0.03
Product Involvement		0.34**	0.23**	−0.11
Interaction of IEPEC			0.19**	0.24**
IEPEC * Product Involvement				0.61**
R^2	0.02	0.13	0.15	0.17
Adjusted R^2	0.02	0.12	0.15	0.16
F	3.40**	113.83**	23.81**	15.39**

IEPEC, Incongruence of endorser-product and endorser celebrity. *$p < 0.05$ and **$p < 0.01$.

TABLE 9 Results of product involvement as a moderating role between virtual anime endorser-product incongruence and purchase intention.

	Inconsistency purchase intention (β)			
Predictors	**Step 1**	**Step 2**	**Step 3**	**Step 4**
Gender	−0.03	−0.03	−0.03	−0.02
Age	−0.14*	−0.07	−0.06	−0.05
Marriage	−0.10**	−0.07*	−0.07*	−0.06*
Salary	0.07	0.07	0.08	0.07
Education	−0.03	−0.02	−0.02	−0.02
Vocation	−0.07	−0.03	−0.03	−0.03
Product involvement		0.36**	0.25**	0.20**
Interaction of IEPEC			0.21**	0.19**
IEPEC * Product Involvement				0.65**
R^2	0.02	0.14	0.16	0.18
Adjusted R^2	0.02	0.13	0.16	0.17
F	4.30**	121.69**	26.81**	18.38**

IEPEC, Incongruence of endorser-product and endorser celebrity. *$p < 0.05$ and **$p < 0.01$.

TABLE 10 Results for the effect of IEPEC on inconsistency purchase intention across levels of product involvement.

Moderator variable	Effect size	SE	LL 95% CI	UL 95% CI
Low product involvement	0.59	0.13	0.32	0.85
Middle product involvement	0.04	0.04	0.04	0.26
High product involvement	0.04	0.04	0.60	0.77
Index	0.03	0.04	0.03	0.26

Bootstrap samples = 10,000. SE, Standard error; LL, Lower limit; UL, Upper limit; CI, Confidence interval; IEPEC, Incongruence of endorser-product and endorser celebrity.

Discussion

This study examined that virtual anime endorser–product congruence and moderate virtual anime endorser–product incongruence influence consumers' attitude toward a brand and purchase intention by using a questionnaire that matched a virtual anime endorser with an anime-related product and a general product. In addition, this study investigated that product involvement moderates the relationships between the virtual anime endorser–product congruence/moderate anime endorser–product incongruence and consumers' behaviors (i.e., brand attitude and purchase intention). In particular, the effects of virtual endorser credibility on consumers' attitudes were more significant under high product involvement than under low product involvement. The findings of this study indicate that moderate virtual anime endorser–product incongruence plays a significant role in increasing consumers' purchase behaviors. Consumers with high product involvement tend to exhibit purchase intention when the endorser endorses incongruent products.

The results of this study revealed that the participants with low product involvement had a high level of brand attitude when the endorser endorsed incongruent products. The results of this study indicate that highly involved consumers are affected by peripheral clues under endorser–product incongruence. After introduction to the product through the virtual endorser, the participants of this study exhibited high brand attitude. The findings of previous studies suggest that the same clues may simultaneously induce information processing through the central and peripheral paths (Petty and Cacioppo, 1986; Tang et al., 2012; Lee and Koo, 2016). The virtual anime endorser is a peripheral clue when endorsing physical products and a central clue when endorsing virtual products (Petty et al., 1987). Virtual anime endorsers may be suitable for endorsements of anime-related products and physical products, especially inconsistent endorsements. Consumers with high involvement may be affected by peripheral clues, such as the anime virtual endorser. For consumers with a high degree of product involvement, endorser–product congruence may be regarded as a central clue in the formation of brand attitude. The aforementioned results have rarely been obtained in studies on virtual anime endorser–product congruence.

Theoretical implications

This study has several critical theoretical implications and enhances the depth of understanding of endorsement studies in consumer psychology. First, previous studies on endorsers and consumers have mainly focused on celebrity endorsers (e.g., Liang and Lin, 2018). Little research has been conducted on the effects of virtual endorser–product incongruence on consumer choice. This study demonstrated that consumers have different brand attitudes toward products under different levels of consistency between endorsers and products and emphasized the role of product involvement as a moderating factor in the relationships of virtual endorser–product congruence and moderate virtual endorser–product incongruence with brand attitudes.

Second, no research has focused on the endorsement of physical products by virtual anime characters. Most studies that have referred to the ELM considered products to be only single peripheral clues. Therefore, peripheral clues have been considered to affect only low-level product involvement. However, this study verified that when consistency between an endorser and a product is considered irrelevant, the attitude of high-involvement consumers may be determined by the quality and value of the product. Conversely, the attitude of those with low involvement may be determined by the virtual anime endorser. Therefore, this study investigated the effect of the degree of product involvement on the relationship between virtual anime endorser–product incongruence and brand attitudes.

Third, the results of this study are consistent with those of Lee and Koo (2016), who suggested that future research include product involvement as a moderator in the analysis. This study examined the effects of endorser–product congruence and moderate endorser–product incongruence for different product categories and demonstrated that the level of product involvement has critical moderating influences on the effects of endorser–product congruence, moderate endorser–product incongruence, and endorser credibility on consumer behaviors.

Practical implications

This study analyzed whether product involvement strengthened the relationships of virtual anime endorser–product congruence and virtual anime endorser–product incongruence with consumer behaviors. This study suggests companies with limited endorsement budgets on how to identify the ideal endorser. For consumers with low or high product involvement, companies can select endorsers who exhibit moderate incongruence with their product but must be cautious when choosing highly attractive endorsers. Highly attractive endorsers mostly serve to attract consumers' attention to the product rather than to elevate the brand attitude of the product. Virtual endorsers are therefore advantageous because their attractiveness can draw the attention and curiosity of consumers, which can stimulate product purchase (Hsu et al., 2018). Companies have employed virtual anime characters to endorse products on certain occasions despite the incongruence of the brand image or product with the virtual character's image.

Managers can draw on virtual characters' attractiveness to increase consumer purchase intention and product recognition. This approach is effective for virtual consumers who are already familiar with virtual characters. These consumers may already have a high psychological attachment to the virtual anime endorsers at the time when they are presented with endorser–product incongruence. Even if the product involvement of consumers decreases, the effects of endorser credibility on general consumers with a fascination for anime characters can be maintained. These consumers may require strong image congruence between the endorser and the product for the endorser credibility to take full effect. Thus, marketing companies may use the effects of virtual anime endorser–product congruence and moderate virtual anime endorser–product incongruence to increase consumer's purchase intention and brand attitude.

Limitations and future research

This study has some limitations. First, although the questionnaire was administered at animation-related event venues, such as animation and accessories stores, this study may not confirm whether all the formal participants were familiar with animation-related endorsers or whether animation-related endorsers could serve as ideal virtual endorsers for the participants. However, Hatsune Miku was the virtual anime endorser in this study, and the results indicated that most animation consumers could accept Hatsune's role as a product endorser. Other virtual anime endorser characters may be included in future research to provide additional information.

Second, this study examined the relationships of endorser–product congruence and moderate endorser–product incongruence with consumers' attitudes (i.e., brand attitude and purchase intention). Research has indicated that the attractiveness of the endorser may affect consumer intent and brand attitude (Liu et al., 2007). In this study, the attractiveness of Hatsune Miku may have influenced the effectiveness of endorsement advertising. Therefore, future research may include the construct of attractiveness to examine its effect on the relationships of endorser–product congruence and moderate endorser–product incongruence with brand attitude and purchasing intention.

Third, the sample of this study was relatively small, as it is characteristic of single-source data from employees, which may raise concerns about common method bias. In addition, the results of this study may not be generalized to all consumers in other countries even if the findings of this study found that the influences of virtual anime endorser–product congruence and moderate the endorser–product incongruence on consumer

brand attitude and purchase intention. Future research investigating whether these prototypes differ in other countries would be valuable and may examine diverse cultural samples to reduce generalizability issues.

Conclusion

This study validated that virtual endorser-product congruence and moderate virtual endorser-product incongruence affect consumers' attitude toward a brand and purchase intention. In addition, product involvement was identified as a critical moderator in the relationships of virtual anime endorser–product congruence and moderate virtual anime endorser–product incongruence with consumer behaviors. Managers cannot maximize the effectiveness of celebrity endorsers if they consider only one of the two key factors. Furthermore, virtual anime endorser–product congruence and incongruence significantly influence the relationship between endorser credibility and consumer responses. Therefore, the use of virtual anime characters as endorsers can be beneficial for enhancing consumers' attitude toward a brand and purchase intention.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

Author contributions

All authors confirm being the contributors of this work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Why do Chinese enterprises make imitative innovation?—An empirical explanation based on government subsidies

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The previous literature analyzed the widespread imitative innovation of Chinese enterprises from various perspectives, including enterprises' rational choice of cost-gain, property rights system, human capital and policy environment. However, this paper provides a brand-new perspective on government subsidies for the reasons behind the imitative innovation of enterprises. According to the statistics from Chinese enterprise-labor matching, we found that government subsidies stimulated enterprises to make "imitative innovation" through patent purchase rather than independent R&D. Government subsidies were used for low-risk "imitative innovation" because of enterprises' rent-seeking behavior, low R&D ability and the review of government subsidy projects. Based on the above conclusions, this paper suggests that the government should reduce or withdraw its intervention in enterprise innovation and implement the post-subsidy and post-evaluation mechanism for government-subsidized programs.

KEYWORDS

government subsidies, imitative innovation, independent innovation, enterprise performance, enterprise innovation

Introduction

Schumpeter (1991) divided technological innovation into three categories: independent, imitative, and cooperative. Innovation is the transformation of knowledge into economic activities (Tang, 2006). As one of the important factors for improving productivity, independent innovation plays an important role in economic development. However, the enterprises may be less motivated to conduct independent innovation activities because of high risk and income uncertainty.

In China, it is a consensus that innovation can drive economic development, especially enterprises' development. Innovation always serves the development of industry (Taylor, 1993). However, what surprised us is that innovation returns are getting lower. The reason is that China has followed the path of imitative innovation over the past 30 years; that is, China achieves technological progress through the introduction and purchase of technology. There is no doubt that imitative innovation helps China make many innovative achievements in the early stage of enterprise of development. However, with the increasing market demand for innovation, independent innovation, especially the establishment of independent brands, standards, technology

and original R&D, becomes particularly important for economic development. Empirical evidence shows that imitative innovation can help latecomer countries to catch up with developed countries in the short-term effects, but it is not conducive to long-term economic growth. Only with independent innovation can long-term economic growth be realized (Aghion et al., 2001). And, creative imitation can improve financial performance (Lee and Zhou, 2012). However, China still has a long way to go before realizing independent innovation.

Scholars have studied why it is difficult for China to make independent innovations. The reasons include enterprises' rational choice of cost-gain, property rights system, culture, human capital, and government subsidies. Two aspects of induction and extrusion effects on enterprise R&D were explored regarding the government subsidies. However, the above explanations, especially the government subsidies, cannot effectively explain why the Chinese government ranks at the top of the world in total R&D investment but lags in innovation capacity. Furthermore, the induction effect and extrusion effect on enterprise R&D only point out that government subsidies can encourage enterprises to increase or decrease R&D expenditure but do not fundamentally explain why enterprise innovation behaviors change, especially the change in enterprise innovation mode selection. China's current incentive system may not be enough to stimulate independent research and development of enterprises (Dai, 2010).

Based on this, this paper will focus on the impacts of government subsidies on enterprise innovation behaviors and analyze why the enterprises mainly adopt imitative innovation. This paper divides enterprise innovation into two types- "independent innovation" and "imitative innovation," and then analyzes government subsidies will affect which type of innovation. In this study, "independent innovation" means the enterprise's technological progress created from R&D investment, and "imitative innovation" means the technological introduction from other countries. The connotations of "independent innovation" and "imitative innovation" will be further developed in detail. "Independent innovation" includes the total number of patents granted, the number of domestic patents granted, and the number of foreign patents granted, while "imitative innovation" is defined as the total number of patents introduced, the number of domestic patents introduced and the number of foreign patents introduced. The empirical tests will be conducted on whether the government subsidies can promote the imitative innovation of enterprises, and the influence mechanism of government subsidies on imitative innovation will be analyzed. Given this, the in-depth analysis of enterprise innovation behavior should be based on the comprehensive empirical observations of a large number of microscopic data, so this paper will adopt the statistics of Chinese enterprise-labor matching to verify the above issues.

Literature review

The existing literature explores the reasons behind enterprise imitative innovation. It is believed that the factors for enterprise imitative innovation include the following aspects:

First, innovation is generally regarded as the field of producers (Gambardella et al., 2017) it comes from the enterprise s' rational choice of cost gain. Romer (1990) noted that the non-competition nature of the technology allows a manufacturer to use technology without preventing other manufacturers from using it simultaneously, so the cost of technology imitation can even be as low as zero. Compared with independent innovation requiring substantial human resources, material resources and financial resources, imitative innovation costs a little and can maximize the income with a fixed cost, so enterprises prefer imitative innovation (Aghion et al., 2001; König et al., 2016). Further, at the national level, developing countries can absorb knowledge spillover and achieve endogenous growth through imitation at a low cost in the short term (Barro, 1997). Characterized by low cost and low risk, imitative innovation becomes the best choice for technological progress in developing countries to obtain the existing technologies of developed countries (Vandenbussche and Aghion, 2006) to narrow the economic gap with developed countries.

Second, the system is also an important factor. The change in the intellectual property system in developing countries may hardly obtain bottom-up support, which hinders the innovation-driven development of enterprises. In terms of the imitative innovation behaviors of Chinese enterprises, Zheng and Wang (2012) noted that an imperfect institutional environment would undermine intellectual property protection, so enterprises will follow other innovators and adopt imitative innovation strategies. Besides, a weak legal environment and imperfect property rights system will lead to partial imitative innovation behaviors (Lee and Zhou, 2012). The lack of intellectual property protection will hinder innovation protection rather than bring about imitative innovation behaviors (Taylor, 1993; Yang and Maskus, 2001). Business models under specific systems can also stimulate innovation (Lee and Shin, 2018).

The third factor is human capital. According to Datta and Mohtadi (2006), the transformation from imitation to independent innovation in developing countries is restricted by human capital. It can be said that human capital determines whether an enterprise chooses independent innovation or imitative innovation (Yang et al., 2014). The lack of entrepreneurship, especially entrepreneurial innovation, largely handicaps the improvement of enterprises' technological and innovative ability (Cheng and Song, 2016; Emami and Dimov, 2016; Jahanshahi and Brem, 2018). Moreover, entrepreneurs' original innovation path, especially insufficient R&D investment, determine that enterprises may rely on imitation to improve their technical level (Tang, 2014; Cheng et al., 2016).

Fourth, culture also has influenced. Culture, as a factor underpinning enterprise behavior, has an important influence on enterprise innovation. Enterprises are essentially culturally driven when they need to choose whether to pioneer in innovation or imitative innovation (Hartmann, 2006). Gallagher and Worrell (2008) pointed out that enterprises with a market culture (strong market competition) generally attach great importance to R&D output and market demand, so they may choose an imitative innovation path which requires less time. Similarly, Zhang and Chen (2014) believed that enterprises with hierarchical cultures attach great importance to stability and undisruptive innovation, so they may choose an imitative innovation method with less innovation investment and low innovation risk.

Fifth, government subsidies are also a key. Most scholars explain the influence of government subsidies on enterprise R&D from the two aspects: "induction effect" and "extrusion effect." Scholars for the "induction effect" view believe that as market failure brings a reduced risk and preference for enterprise R&D investment, the government can stimulate the enterprises to increase R&D expenditure through government subsidies and improve innovation performance (Arrow, 1972; Czarnitzki and Hussinger, 2004; Mateut, 2017). However, there is evidence on whether such improved innovation performance is an independent one or not. Scholars for the "extrusion effect" believe that government subsidies will have an extrusion effect on the R&D investment activities of enterprises, that is, enterprises may reduce their R&D investment and output of independent R&D activities (Link, 1982; Wallsten, 2000; Cheng et al., 2019; Kuehnl et al., 2019). However, the use of extrernal funding increases with firm's innovation effort (Bartoloni, 2013).

However, based on the above explanations, the literature fails to explain under what conditions enterprises choose imitative innovation and why enterprises choose imitative innovation? In particular, the government subsidies cannot fundamentally explain the change in enterprise innovation behavior, especially the change in enterprise innovation mode selection. Therefore, this paper innovatively analyzes the reasons behind enterprise imitative innovation based on government subsidies and then explores the internal influence mechanism of the reasons. Based on the microdata of enterprise-labor matching, this paper will discuss the empirical impact of government subsidies on two different innovation types of enterprises, analyze the heterotrophic influences of different kinds of government subsidies, and put forward policy recommendations to avoid the imitative innovation of Chinese enterprises in the future.

Recently, innovation has attracted extensive attention in the economic field, and many scholars focus on this important issue. Kovalenkov and Vives (2008) captured the relationship between competition and innovation. She et al. (2017) discussed the relationship between financial structure and innovation and found that financial structure affects innovative investment. Nie et al. (2017) examined the effects of switching costs on innovative investment. Nie and Yang (2020) characterized the innovation under capacity constraints and showed that rare resource deters innovative investment. All the existed literature about innovation concludes underinvestment phenomena in innovation. To stimulate innovation, governmental intervention seems to be an efficient tool. Acemoglu and Ufuk (2012) showed that intellectual property rights policy improves innovation. The governmental subsidy is regarded as another tool to stimulate innovation. In theory, Wang et al. (2018) argued that subsidy for insurance improves green innovation. Cheng et al. (2019) proved that governmental subsidy improves the environmental effects of the supply chains of the firm. Huang et al. (2019) argued that innovation subsidy improves production quality.

Much empirical evidence also identifies that subsidy improves innovation. Leibowicz (2018) found that subsidies improve innovation with stronger spillovers and moderately costly research and development to a great degree. Marino et al. (2016) identified the crowding out effects of public research and development subsidies on private firms. Buchmann and Micha (2019) checked the German biotech industry and found that subsidy increases the number of patents. Interestingly, based on the data from Slovakia, Kuehnl et al. (2019) found that innovation subsidy has significantly positive effects on labor productivity, whereas these effects disappear after 1 year. Zhang and Guan (2018) also identified time-varying phenomena about innovation subsidies. Szücs (2018) checked the stimulating impact of innovation subsidy on innovation cooperation between firms and universities. In summary, both theoretical and empirical conclusions show that subsidy improves innovation. Many papers focus on the subsidizing mechanism to achieve the best efficiency. Chen et al. (2017) analyzed the subsidy in the agricultural sector. Arkolakis et al. (2018) addressed innovation under global economy. Nie et al. (2017) compared input subsidy with output one and found that output subsidy plays an advantage based on consumers. Wang et al. (2018) proposed insurance subsidies to improve innovation. Recently, Yang et al. (2014) considered governmental subsidy in renewable energy projects and showed that governmental subsidy enhances the success of renewable energy development. Recently compared input with output subsidy under uncertainty and concluded that input subsidy reduces risk. Although the subsidy mechanism is extensively investigated, no research focuses on the subsidy mechanism under the asymmetric situation.

Likewise, Nie et al. (2020) also tried to investigate the subsidized innovation efficiency under the prism of game theory. They found the U-shaped relationship between subsidized firms' innovations and product sustainability. Also, they demonstrated that those firms denoted with high subsidize firms had more output compared with low subsidize firms. Finally, they concluded that bilateral subsidy brings more innovations than unilateral subsidy. Similarly, Nie et al. (2020) also tried to investigate the innovation strategies concerned public and private firms to capture the welfare effect of public ownership.

They found that private firms responded more to research and development activities than public firms. Also, they pointed out the significant loss in profit due to an increase in total productivity via the degree of public ownership. According to the policy suggestions, the mixed economy can significantly boost the shortcomings mentioned.

Data sources and sample selection

Data sources and samples

Wuhan University, the author's alma mater, the University of Hong Kong University of Science and Technology, Tsinghua University and the Chinese Academy of Social Sciences carried out a large-scale first-hand enterprise survey to achieve academic research. This survey was originally launched in 2012. After 2 years of questionnaire design, trial survey, communication and coordination, and 5 field simulation surveys and summary on trial and errors from October 2014 to May 2015, the field survey was completed in May-August 2015 and May-August 2016, respectively.

To ensure sample heterogeneity and representativeness, this research selected Guangdong Province's largest economic aggregate, manufacturing scale, and significant regional economic development gap as the survey region. Hubei Province, with the economic aggregate at the medium level in China, was selected as the control region. The survey adopted a strict random hierarchical sampling method compared with the existing data. Specifically, according to the principle of isometric sampling, 13 prefecture-level cities were randomly selected from each province, and 19 districts (counties) under the jurisdiction of 13 prefecture-level cities were selected as the final survey units. The enterprise samples were selected according to the number of employees in the enterprise list of the third economic census by weighted sampling, and the employee samples were selected based on 30% of the middle and senior enterprise managers and 70% of the front-line employees in the employee list of the survey enterprises by stratified random sampling. This time, the probability distribution based on a strict random hierarchical sampling method was consistent with the real distribution of enterprises and employees.

From the perspective of enterprise information, entrepreneurs' personal information and employee information, the survey was the first large sampling survey on enterprises in large developing economies, except for small Nordic economies such as Denmark and Norway. The survey fully collected enterprise information, such as innovation performance, scale, Age of enterprise, capital, ownership type, export or not, and various types of government subsidies enjoyed by the enterprises. Most importantly, the data included enterprise imitative innovation and independent innovation and other indexes, thus providing complete data for studying why Chinese enterprises form imitative innovation.

Test model

According to the research needs, this paper built the following model:

$$\text{lninnovation} = \alpha 0 + \alpha + \alpha\ 2\text{Cij} + \text{Ai} + \text{Ij} + \mu_{\text{IJ}} \qquad (1)$$

Where innovation was the innovative performance of the *j*th enterprise in the *i*th region, subisidy_{ij} referred to the government subsidies accepted by the *j*th enterprise in the *i*th region, C_{ij} was the control variables; I_j meant the fixed effect of region and industry, and U_{ij} was the random disturbance term. Other variables in the model were set as their natural logarithm except for the dummy variables. The variables in the model were defined as follows:

Dependent variable

The dependent variable was the innovation performance of enterprises. Since the innovative performance was mainly about the transformation or industrialization of innovation achievements, the sales of new products were used as the proxy variable of enterprise innovation performance according to OECD's method 1997 for measuring innovation performance. This indicator reflected the performance after the industrialization of innovation achievements and the applied performance (Chen and Chen, 2006). Crepon et al. (1998) and Pellegrino et al. (2012) have studied the innovative ability based on the development or sales of new products of enterprises. Therefore, the sales of new products that reflect process and product innovation were suitable for this paper.

Independent variables

Government subsidies belong to independent variables. It is generally believed that the policy tools for the Chinese government to intervene in enterprise innovation include various science and technology plans, technology innovation funds, fiscal and financial policies, etc. The government subsidies in this paper were all directly related to technologies. Therefore, according to the research needs, the total government subsidies, whether to enjoy government subsidies and other variables were adopted, and the government subsidies were classified to verify the effect of government subsidies on enterprise innovation.

Imitative innovation is also in this category. The key to independent innovation lies in the emphasis on enterprise acquiring technology from other countries or direct purchase or introducing domestic and foreign patents. Therefore, this paper selected the total number of patents introduced and the number of domestic and foreign patents introduced in 2015 to analyze the "imitative innovation."

Independent innovation is another independent variable. According to the definition given in the "*Statistics on the Independent Innovation of Large and Medium-sized Industrial*

TABLE 1 Descriptive statistics.

Variable name	Statistical definition	Obs.	Mean	Std. Dev.	Min	Max
Sales of new products	Sales of new products of enterprises in 2015 (10,000 yuan)	1,009	156581.400	4722708	0	1.50E+08
Total government subsidies	Total government subsidies enjoyed by enterprises in 2015 (10,000 yuan)	1,116	41.931	401.761	0	12,295
Whether to enjoy government subsidies?	Whether the enterprises enjoyed government subsidies in 2015? (0-1)	1,117	0.234	0.423	0	1
Environmental subsidies	Total environmental subsidies enjoyed by enterprises in 2015 (10,000 yuan)	1,102	4.521	71.979	0	1,875
High-tech subsidies	Total high-tech subsidies enjoyed by enterprises in 2015 (10,000 yuan)	1,100	14.727	124.267	0	3,120
Technical innovation funds	Total technical innovation funds obtained by enterprises in 2015 (10,000 yuan)	969	4.605	65.783	0	1520.5
Total number of patents granted	Number of patents granted in 2015 (pcs.)	1,057	10.574	106.951	0	2,934
Number of domestic patents granted	Number of domestic patents granted in 2015 (pcs.)	1,085	9.790	85.277	0	2178.333
Number of foreign patents granted	Number of foreign patents granted in 2015 (pcs.)	1,059	1.403	25.759	0	755.667
Total number of patents introduced	Number of patents introduced in 2015 (pcs.)	1,092	0.430	6.844	0	212
Number of domestic patents introduced	Number of domestic patents introduced in 2015 (pcs.)	1,093	0.188	1.972	0	40
Number of foreign patents introduced	Number of foreign patents introduced in 2015 (pcs.)	1,095	0.048	0.796	0	20
R&D investment	Total R&D expenditure in 2015 (10,000 yuan)	809	1828.947	11179.490	0	216,523
Age of enterprise	Years of enterprise establishment (years)	1,086	12.612	7.535	3	62
Scale	Enterprise workforce in 2015 (person)	1,118	1.534	0.751	1	3
Export or not	Whether the enterprises exported in 2015 (0-1)	1,116	0.424	0.494	0	1
Entrepreneurs' education level	Years of entrepreneurs' education (years)	1,186	14.348	3.085	0	22
Private enterprises	Whether the enterprises were private holding enterprises in 2015	734	2	0	2	2
State-owned enterprises	Whether the enterprises were state holding enterprises in 2015	87	1	0	1	1
Foreign enterprises in Hong Kong, Macao and Taiwan	Whether the enterprises were foreign enterprises in Hong Kong, Macao and Taiwan in 2015	184	3	0	3	3
Foreign enterprises in non-Hong Kong, Macao and Taiwan	Whether the enterprises were foreign enterprises in non-Hong Kong, Macao and Taiwan in 2015	109	4	0	4	4

Enterprises" compiled by the National Bureau of Statistics, the independent innovation of industrial enterprises refers to the research and experimental development (hereinafter referred to as R&D) activities as well as the patents and other innovation output brought about by the industrial enterprises. This paper adopted the total number of patents granted, the number of domestic patents granted, and foreign patents granted in 2015 as proxy variables for independent innovation.

Control variables

According to the research needs, the control variables selected in this paper included: R&D investment used by Liu and Liu (2022), entrepreneurs' education level, Age of enterprise used by Zhang et al. (2021), and scale used by Panfiluk (2021), whether to export, ownership type, etc. Given the differences in the innovation ability in different industries and regions, the model has also controlled the fixed effects of industry and region.

To sum up, the descriptive statistics of the main variables of this paper are shown in Table 1.

Empirical test results and analysis

Basic regression results

Firstly, this paper discussed whether government subsidies could promote enterprise innovation. Under the premise of fully controlling the enterprise, industry, region and other factors, this paper measured the empirical impact of total government

TABLE 2 Impact of government subsidies on enterprise innovative performance.

Variable name	Explained variable (Logarithm of new product sales in 2015)			
	(1)	(2)	(3)	(4)
Total government subsidies	0.651*** (0.0933)	0.219** (0.104)		
Whether to enjoy government subsidies			2.380*** (0.364)	0.853** (0.363)
R&D investment		0.549*** (0.0646)		0.550*** (0.0633)
Age of enterprise		−0.380* (0.230)		−0.367 (0.229)
Scale		0.328 (0.269)		0.407 (0.266)
Export or not		0.349 (0.342)		0.342 (0.341)
Education level of top leaders		0.924** (0.442)		0.904** (0.433)
State-owned enterprises		−0.252 (0.484)		−0.253 (0.485)
Foreign enterprises in Hong Kong, Macao and Taiwan		−1.398*** (0.443)		−1.421*** (0.448)
Foreign enterprises in non-Hong Kong, Macao and Taiwan		−1.198* (0.706)		−1.270* (0.705)
Fixed effect of region	Yes	Yes	Yes	Yes
Fixed effect of industry	Yes	Yes	Yes	Yes
Sample amount	676	676	676	676
R-squared	0.219	0.372	0.204	0.372

(1) The above results were calculated by stata14.0; (2) The figures in brackets were Robust Std. Error; (3) *was the significance level of 10%, **was the significance level of 5%, and ***was the significance level of 1%.

subsidies, whether to enjoy government subsidies and other variables on the innovative performance of enterprises. The statistical results are shown in Table 2. It should be noted that Table 2 shows the OLS estimates under robustness regression conditions, providing the impact of government subsidies on enterprise innovative performance. By controlling the scale, Age of enterprise, R&D investment, ownership type, export, etc., we can find that total government subsidy significantly and positively affected the innovation performance of enterprises at the confidence level of 1%. After substituting whether to enjoy government subsidies into the OLS regression equation for the robustness of results, it can be seen that government subsidies still significantly affected the innovative performance of enterprises. Therefore, it can be said that government subsidies can positively affect the innovation performance of enterprises. Therefore, is the enterprise innovation promoted by government subsidies an imitative innovation or an independent innovation? This paper will make a detailed analysis in the following section.

Government subsidies, independent innovation and imitative innovation

Therefore, does the enterprise innovation performance promoted by government subsidies belong to independent innovation? If not, is it an "imitative innovation"? This paper selected the total number of patents granted and the number of domestic and foreign patents granted to analyze the "independent innovation." Furthermore, this paper sets the total number of patents introduced and the number of domestic and foreign patents introduced to analyze the "imitative innovation." The empirical results are shown in Tables 3, 4.

First, this paper placed the interactive item between the total number of patents granted and the government subsidies into the model. The results are shown in Table 3. According to the empirical results, the interactive item was significantly negative, indicating that government subsidies and independent enterprise innovation can curb the innovation performance of enterprises. The greater the government subsidies, the more significant their direct role in promoting enterprises' innovative performance. However, it will indirectly weaken the enterprises' independent innovation in promoting the innovation performance of enterprises. Thus, this paper placed the interactive item between the number of domestic and foreign patents granted into the model. The regression model (2) shows that the interaction between government subsidies and independent innovation was significantly negative. Although the interactive item in the regression model (3) was insignificant, the government subsidies failed to improve the enterprises' R&D ability for new products, not to mention the innovation performance of enterprises. Therefore, the independent innovation mechanism did not play a positive role, and the government subsidies had an extrusion effect on independent innovation used for innovation performance improvement.

Next, this paper analyzes the imitative innovation of enterprises, and the results are shown in Table 4. By substituting the total number of patents introduced into the regression model (1) as the interaction term, we can find that the interactive item between the total number of patents introduced and the government subsidies was significantly positive, which

TABLE 3 Government subsidies and enterprise "independent innovation."

Variable name	Explained variable (Logarithm of new product sales in 2015)		
	(1)	(2)	(3)
Total government subsidies	0.308** (0.143)	0.305** (0.144)	0.263** (0.113)
Total government subsidies * Total number of patents granted	**-0.0769* (0.0429)**		
Total number of patents granted	0.690*** (0.219)		
Total government subsidies * Number of domestic patents granted		**-0.0785* (0.0442)**	
Number of domestic patents granted		0.719*** (0.223)	
Total government subsidies * Number of foreign patents granted			**-0.0872 (0.0642)**
Number of foreign patents granted			0.558 (0.480)
R&D investment	0.418*** (0.0744)	0.413*** (0.0748)	0.539*** (0.0649)
Age of enterprise	−0.403* (0.230)	−0.401* (0.230)	−0.362 (0.230)
Scale	0.257 (0.280)	0.251 (0.280)	0.272 (0.279)
Export or not	0.279 (0.346)	0.284 (0.346)	0.345 (0.350)
Education level of top leaders	0.810* (0.430)	0.812* (0.429)	0.861** (0.438)
State-owned enterprises	−0.123 (0.464)	−0.116 (0.464)	−0.167 (0.477)
Foreign enterprises in Hong Kong, Macao and Taiwan	−1.401*** (0.443)	−1.406*** (0.443)	−1.432*** (0.449)
Foreign enterprises in non-Hong Kong, Macao and Taiwan	−0.742 (0.749)	−0.719 (0.745)	−0.833 (0.747)
Fixed effect of region	Yes	Yes	Yes
Fixed effect of industry	Yes	Yes	Yes
Sample amount	655	655	655
R-squared	0.387	0.388	0.376

(1) The above results were calculated by stata14.0; (2) The figures in brackets were Robust Std. Error; (3) * was the significance level of 10%, ** was the significance level of 5%, and *** was the significance level of 1%.

suggests that government subsidies can improve the innovation performance of enterprises by stimulating enterprises to introduce more domestic and foreign patents. Government subsidies encourage enterprises to purchase existing technical achievements in the short term to meet the acceptance requirements of government subsidies faster and lay a foundation for future government subsidies.

Then, the number of introduced domestic and foreign patents was placed into the regression model as the "imitative innovation" indicator. The results were consistent with the total number of patents introduced. Although the interactive item coefficient between the number of domestic patents introduced and the government subsidies was not significant, it was positive; the interactive item coefficient between the number of foreign patents introduced and the government subsidies was positive and significant. Under the premise of fully controlling the factors, like enterprise, industry, region, scale, Age of enterprise, R&D investment and ownership type, export or not, government subsidies stimulated enterprises to make the "imitative innovation" and buy domestic and foreign patents to improve the innovation performance of enterprises. The government subsidies stimulated enterprises to form imitative innovation.

This paper also classified the government subsidies to grasp the heterogeneity effect of different government subsidies on enterprise imitative innovation. The empirical results are shown in Table 5. This paper further put the interactive item between the innovation-related government subsidies, such as environmental subsidies, high-tech subsidies and technical innovation funds and the enterprise imitative innovation variable into the regression model. The results showed that the interactive item between the two types of government subsidies of high-tech subsidies and technical renovation funds and the imitative enterprise innovation was significantly and positively related, which meant that the two types of government subsidies were key for enterprises to form imitative innovation. While the interactive item between the environmental subsidies and the enterprise imitative innovation was significantly negative, which indicated that the ecological subsidies could not make enterprises adopt imitative innovation. The reason may be that there were clear rigid requirements for equipment purchase and emission reduction in terms of the environmental subsidies for enterprises, and enterprises failed to satisfy the needs through the introduction or purchase of patents, so they did not promote enterprises to have imitative innovation.

TABLE 4 Government subsidies and enterprises "imitative innovation."

Variable name	Explained variable (Logarithm of new product sales in 2015)		
	(1)	(2)	(3)
Total government subsidies	0.184** (0.0833)	0.210* (0.111)	0.214** (0.108)
Total government subsidies * Total number of patents introduced	**0.352* (0.211)**		
Total number of patents introduced	−0.919** (0.455)		
Total government subsidies * Number of domestic patents introduced		**0.0669 (0.0971)**	
Number of domestic patents introduced		−0.829* (0.499)	
Total government subsidies * Number of foreign patents introduced			**0.415** (0.162)**
Number of foreign patents introduced			−1.547* (0.893)
R&D investment	0.597*** (0.0522)	0.566*** (0.0647)	0.556*** (0.0642)
Age of enterprise	−0.357 (0.217)	−0.427* (0.233)	−0.392* (0.230)
Scale	0.205 (0.224)	0.341 (0.273)	0.278 (0.267)
Export or not	0.287 (0.296)	0.294 (0.342)	0.317 (0.342)
Education level of top leaders	0.576 (0.489)	0.842* (0.436)	0.848* (0.435)
State-owned enterprises	−0.289 (0.433)	−0.347 (0.482)	−0.348 (0.489)
Foreign enterprises in Hong Kong, Macao and Taiwan	−1.227*** (0.431)	−1.433*** (0.451)	−1.406*** (0.451)
Foreign enterprises in non-Hong Kong, Macao and Taiwan	−0.990* (0.524)	−1.273* (0.692)	−1.176* (0.698)
Fixed effect of region	Yes	Yes	Yes
Fixed effect of industry	Yes	Yes	Yes
Sample amount	671	671	671
R-squared	0.333	0.376	0.375

(1) The above results were calculated by stata14.0; (2) The figures in brackets were Robust Std. Error; (3) * was the significance level of 10%, ** was the significance level of 5%, and *** was the significance level of 1%.

Conclusions and policy suggestions

Under the premise of fully controlling the enterprise, industry, region and time effect, an econometric test on large samples for the internal reasons behind imitative innovation of Chinese enterprises has been conducted by analyzing the data of government subsidies. By reviewing the previous literature, we analyzed the reasons behind the imitative innovation of enterprises, including enterprises' rational choice of cost-gain, property rights system, human capital, and policy environment, but all these methods failed fundamentally explain the change of enterprise innovation behaviors, especially the change in enterprise innovation mode selection. According to this paper, government subsidies, which were key to the formation of imitative innovation, stimulated enterprises to form imitative innovation. Through empirical research, we found that government subsidies stimulated enterprises to make "imitative innovation" through patent purchase rather than independent R&D. Government subsidies were used for low-risk "imitative innovation" because of enterprises' rent-seeking behavior and low R&D ability and the review of government subsidy projects.

Policy recommendation

Based on the above empirical research results, this paper puts forward the following policy recommendations:

First, it is recommended that the government reduce or withdraw from its intervention in the highly risky field of enterprise innovation. According to the analysis results, government subsidies fail to stimulate the enterprises' abilities for independent innovation because enterprises are inclined to adopt the low-risk innovation form of "imitative innovation" when improving innovation levels. Based on this, government subsidies have only helped improve enterprises' innovation ability superficially, but the independent innovation ability of enterprises has not been fundamentally improved. Therefore, the government should reduce or withdraw from its intervention in fiscal policy and suspend other policies in the high-risk field of enterprise innovation. When it comes to large enterprises, the government may procure their specific products to expand the market demand for relevant industries and thus promote the independent innovation of the industries. For small and medium-sized enterprises, the government can provide more supportive policies through preferential

TABLE 5 Government subsidies and enterprises "imitative innovation."

Names of variables	Explained variable (log value of new product sales in 2015)		
	Model 1	Model 2	Model 3
Environmental subsidies	−0.0926 (0.218)		
Environmental subsidies * Total number of patents introduced	**-1.904*** (0.484)**		
High-tech subsidies		0.844*** (0.151)	
High-tech subsidies * Total number of patents introduced		**1.012** (0.481)**	
Technical innovation funds			0.0693 (0.200)
Technical innovation funds * Total number of patents introduced			**2.743*** (0.538)**
Total number of patents introduced	0.611*** (0.0636)	0.554*** (0.0644)	0.613*** (0.0643)
R&D investment	0.261 (0.494)	0.180 (0.538)	−0.108 (0.498)
Age of enterprise	0.0678 (0.213)	−0.0406 (0.211)	0.0266 (0.214)
Scale	1.045*** (0.258)	0.868*** (0.257)	1.010*** (0.255)
Export or not	1.188*** (0.322)	1.097*** (0.318)	1.191*** (0.323)
Education level of top leader	1.932*** (0.473)	1.673*** (0.464)	1.903*** (0.472)
State-owned enterprises	−0.227 (0.467)	−0.272 (0.444)	−0.165 (0.465)
Foreign enterprises in Hong Kong, Macao and Taiwan	−1.584*** (0.450)	−1.455*** (0.430)	−1.557*** (0.449)
Foreign enterprises in non-Hong Kong, Macao and Taiwan	−0.850 (0.602)	−0.823 (0.598)	−0.894 (0.602)
Fixed effect of region	Yes	Yes	Yes
Fixed effect of industry	Yes	Yes	Yes
Sample amount	809	809	809
R-squared	0.177	0.213	0.176

(1) The above results were calculated by stata14.0; (2) The figures in brackets were Robust Std. Error; (3) * was the significance level of 10%, ** was the significance level of 5%, and *** was the significance level of 1%.

policies, such as tax reduction and tax return, as most of these enterprises are still in the initial stage of enterprise of independent R&D.

Secondly, innovative subsidies' achievement inspection and acceptance mechanism should be reformed. In order to prevent enterprises from using subsidy funds for imitative innovation, the government can change the prior subsidy into post-subsidy and conduct strict inspection and acceptance of the subsidy results. In addition, the targeted enterprises for acceptance should be classified, enterprises with strong independent innovation ability should be strictly audited, and small and medium-sized enterprises with poor autonomy should be provided more time for independent innovation by appropriately expanding the audit period.

Thirdly, the achievement evaluation mechanism for innovative subsidies needs to be established. In addition to accepting the number of patents, an innovative performance evaluation system needs to be established to review the independent R&D expenditure and the number of patents for independent application and strictly regulate the audit by purchase.

Limitations and future research

First, the scope of the research is limited to a particular emerging economy (China). China's institutions, culture, and so on may be different from those of other economies, although China has the largest emerging economy. Because of this, the selection of alternative economies or industries may have an impact on the findings of the research. The objects of the research can be chosen again for use as test subjects in subsequent studies. Second, to supplement the findings of previous research, we can conduct additional research in the future to investigate the influence of other internal factors of the enterprise, such as the type of enterprise ownership and the degree to which the enterprise is financially standardized. Finally, regarding the influence of the enterprise's surrounding environment on its operations, our investigation considers only the institutional setting of the innovation subsidy. It is necessary to conduct additional research in order to investigate the effects of other policies (such as high-tech enterprise qualification recognition, talent subsidy, and so on), as well as the effects of different external environments (such as the market environment).

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

Author contributions

FS and CZ: statistical data analyses and writing of the manuscript. Both authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted without any commercial or financial relationships construed as a potential conflict of interest.

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