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The antecedents of reading behavior in university libraries: a meta-analysis

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Introduction: Although university libraries have become important places for readers to improve their literacy, acquire knowledge, and conduct academic research, however, scholars still have limited understanding of the antecedents of reading behavior.

Methods: Drawing upon a comprehensive theoretical framework, we conducted a systematic review and meta-analysis to systematically summarize and outline the key determinants of current reading behavior.

Results: This study included 37 studies ($N = 15,434$), our results identified 44 antecedents and compared their differences based on the following factors: (1) internal factors (individual, motivations, and habit preferences), (2) external factors (reading environment, society and culture), and (3) contextual factors. Among them, attitude ($r = 0.51$) is the strongest predictor of reading intention. In addition, we conducted an exploratory analysis to determine the moderating effects of publication time, cultural background (national development level), population type, methods (sample collection and measurement methods), and reading style on the relationship between antecedents and behavior. Finally, we evaluated publication's bias and literature quality is used to determine the robustness and scalability of the results.

Conclusion: We present the first systematic meta-analysis study evidence on antecedents and reading behavior, which summarizes ample empirical knowledge about reading behavior in the literature and follows contemporary meta-analysis guidelines and best practices to produce transparent and replicable scientific discoveries. Our research findings also contribute to reading interventions and provide policy and practical implications for future research on reading promotion.

KEYWORDS

antecedents, meta-analysis, reading behavior, theoretical framework, university libraries

1 Introduction

As is well known, reading ability is an important indicator for predicting overall educational success and even life success. Reading is of great significance for individual cognition, future development, cultural inheritance, etc. (Snow et al., 2007; UNESCO Education Sector, 2004). It is worrying that the reading performance of students in universities around the world continues to decline (Avvisati, 2020; OECD, 2021). The possible cause of this phenomenon is the decrease in reading frequency. Taking the Netherlands as an example, the time spent by university readers on reading books each week is decreasing year by year (Wennekers et al., 2018). At the same time, data from over 1.8 million readers worldwide

shows that the reading rate of newspapers, magazines, or (longer) online texts has also decreased from about 65% in 2006 to 40% in 2016, and the average weekly reading time is gradually decreasing (OECD, 2021; Sabri and Weber, 2021). Although effective intervention measures can improve reading performance, reading as a skill still needs to be practiced: if students do not read frequently, it will trigger a negative cycle and damage their reading ability (Mol and Bus, 2011; Schiefele and Loweke, 2017). Managers, practitioners, and education policy makers are seeking strategies to reverse the trend of declining reading frequency. Therefore, it is particularly important to construct a systematic explanatory framework through interdisciplinary theoretical integration to understand the antecedents of reading behavior.

In the past decades, scholars have studied the influencing factors of reading behavior of readers in college libraries from many different theoretical perspectives. For example, Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Grounded Theory, Self-Determination Theory, etc. have been analyzed in terms of internal factors (individual traits, motivation, and habitual preferences), external factors (reading environment, society and culture), and situational factors. TRA and its extended TPB were prioritized due to their dominant role in behavior prediction, because they systematically linked internal psychological factors (such as attitudes, perceived behavioral control) with social contextual factors (such as subjective norms) to behavioral intentions and actual behavior, while grounded theory and others were used to supplement contextual factors. It excels at capturing sudden and situational factors (such as real-time changes in the library environment, the influence of others, etc.) to supplement the factors that these core theories have not captured. However, to date, no systematic review has examined the antecedents of reading behavior. Some previous studies have identified factors that impede reading intentions and behaviors, such as habit (Chang et al., 2023; Hu, 2020), perceived risk (Chang et al., 2023; Xu et al., 2021; Zhang, 2020), ingroup identification (Vezzali et al., 2012), intergroup stereotypes (Vezzali et al., 2012), and some factors stimulate readers' intention and behavior to read, e.g., Attitude (Liu, 2024; Wang et al., 2018), content quality (Liu, 2022; Ming et al., 2020), group norm (Khanjani et al., 2019), intention (Zhang, 2021), perceived usefulness (Li, 2023), satisfaction (Hu, 2020), service experience (Ming et al., 2024), and subjective norm (Liu, 2024). However, the findings were not consistent; for example, habit, moral norm, perceived behavioral control, perceived ease of use, price value, and social influence were positively correlated with reading intention (Chang et al., 2023; Khanjani et al., 2019; Li, 2023; Liu, 2024; Ming et al., 2020; Ye et al., 2015), however, a number of studies have also reported that these variables are negatively or irrelevantly related to reading intention (Chang et al., 2023; Hu, 2020; Li, 2023; Liu, 2024; Liu et al., 2022; Shahrzad et al., 2017; Ye et al., 2015). Given the inconsistent results, it is clear that reading interventions are critical in promoting or inhibiting reading behaviors, and there is a need for systematic meta-analyses because the synthesis of these results is critical for researchers and policy makers involved in reading research. There is a need for strong and comprehensive guidance for researchers to invest in promising or underdeveloped areas, to assist in reader management practices, and to provide evidence for universal reading programs, reading research, and reading promotion policies (Jia et al., 2025; Merke et al., 2024; Rachel et al., 2007).

To date, only two studies have reviewed the literature on reading behavior; however, these reviews were qualitative or partially quantitative summaries. For example, Rachel et al. (2007) quantitatively reviewed reading and behavior in terms of student population, intervention level, and environment (Rachel et al., 2007), and Merke et al. (2024) quantitatively reviewed the positive short-term intervention effects of independent silent reading on students' reading (Merke et al., 2024), which can lead to empirical subjective distortion of data (Hedges, 2009). In contrast, meta-analysis provides a highly systematic, objective, openly transparent, and reproducible method for reviewing empirical literature (Tang and Li, 2025). It outlines strategies for collecting primary studies, applying selection criteria, developing and cross-validating categories of variables, and synthesizing findings. By combining findings, meta-analysis has high statistical power to detect small effect sizes; this can reveal the diversity of findings and explain differences between studies (Li et al., 2020; Zhang et al., 2023).

Therefore, this study aims to fill this gap by collecting and analyzing the reading behavior literature to determine the antecedents of readers' reading behavior, and the theoretical model of the study is shown in Figure 1. This study examines two main questions:

- Q1: What are the key antecedents of reading behavior in university libraries, and what is the strength of evidence supporting the relationships between these antecedents and reading behavior?
- Q2: Which moderating factors explain the heterogeneity in the relationships between antecedents and reading behavior, and what implications do these findings hold for future reading interventions and policy development?

2 Literature review

In recent decades, researchers have thoroughly examined the elements that affect reading behavior in college libraries from various theoretical angles. Theories such as the Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Grounded Theory (GT), and Self-Determination Theory (SDT) have collectively offered a diverse theoretical framework for these investigations. TRA and TPB believe that behavioral intention is the most direct antecedent of behavior, and this framework considers attitude (positive or negative evaluation of reading), subjective norm (social pressure of reading), and perceived behavioral control (perception of reading difficulty) as the main predictors of intention and subsequent reading behavior (Zhang and Liu, 2019). SDT: This framework focuses on the quality of motivation, distinguishing between autonomous motivation (driven by interest or enjoyment) and controlled motivation (driven by reward or avoidance of guilt), both of which drive reading engagement (Liu, 2024). GT and other related theories: These theories are commonly used in digital reading or library usage research, contributing contextual factors such as perceived usefulness and perceived ease of use, and explaining how instrumental value drives reading behavior (Yao, 2021).

Reading behavior refers to the actual action process in which individuals, driven by their reading intentions, are influenced by internal factors (personal habits, motivations) and external environment (library atmosphere, social culture), and perceive

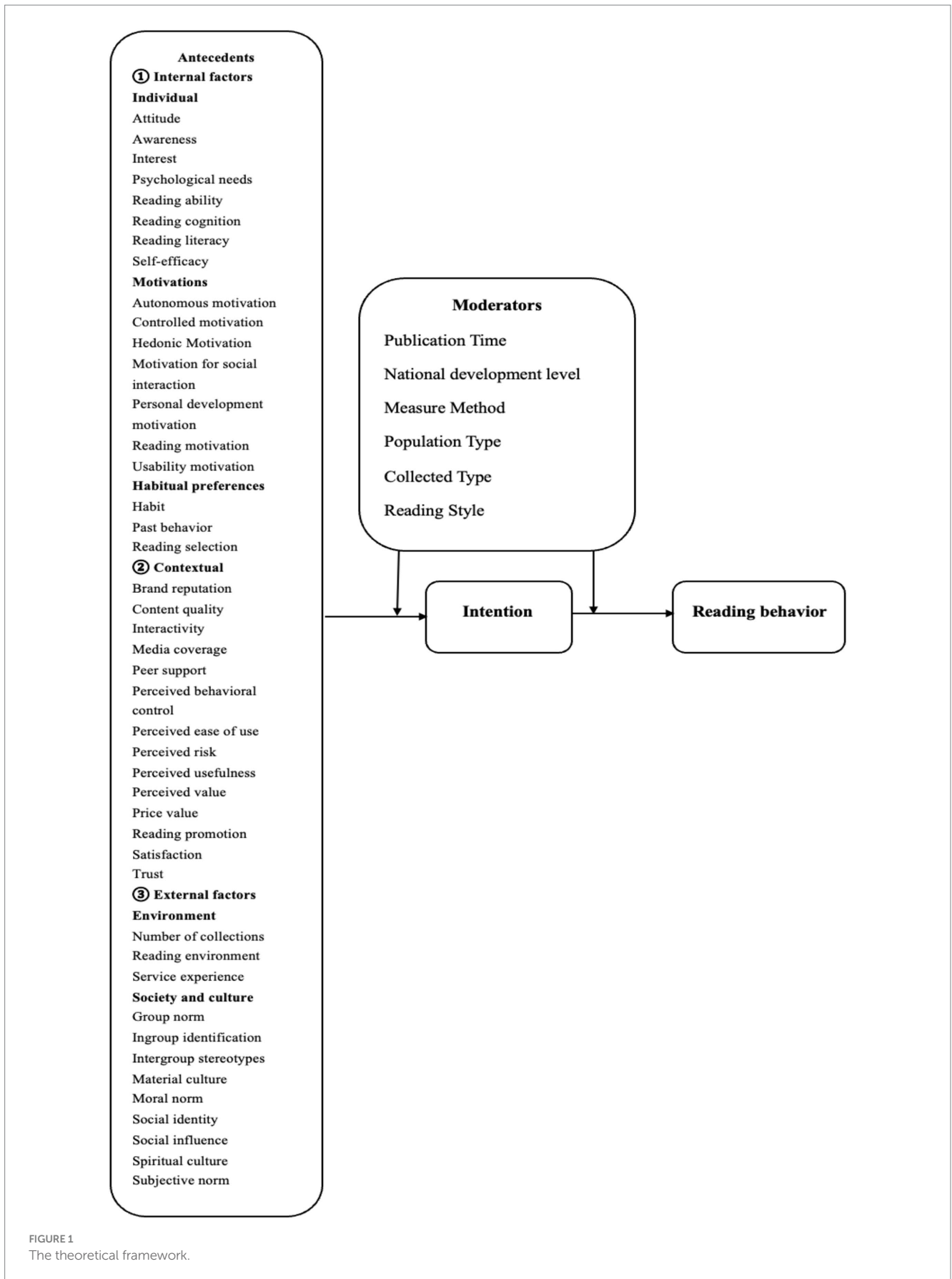


FIGURE 1
The theoretical framework.

symbols through visual, auditory, etc., in order to obtain information, construct meaning, and conduct academic exploration (Chang et al., 2023; Jia et al., 2025; Merke et al., 2024; Zhang, 2020). Reading intention refers to the subjective likelihood or intensity of an individual's intention to engage in reading activities in a specific context, such as a university library. It is the individual's psychological preparation state for whether to perform reading behavior, and it is also the most direct antecedent variable for predicting actual reading behavior.

Drawing on these theories, the studies have generally explored readers' internal factors (such as personal characteristics, motivations, and habitual preferences), external factors (like the reading environment, societal and cultural influences), and the mechanisms of contextual factors. By integrating both quantitative and qualitative approaches, these studies uncover the dynamics of reading behavior and the complex interplay of multiple factors, thereby providing theoretical backing for enhancing library services and developing reading promotion strategies. However, current research still falls short in comprehensively considering all factors and their mechanisms of action (Yao, 2021; Zhang and Liu, 2019).

Internal factors are inherent and relatively stable psychological traits and states, encompassing individual characteristics, motivation, and habitual preferences, which serve as intrinsic motivators for reading behavior. Regarding individual traits, aspects such as attitude, awareness, interest, psychological needs, reading ability, reading cognition, reading literacy, and self-efficacy all influence reading behavior (Liu, 2024; Wang et al., 2018). A positive attitude and high awareness can significantly boost reading frequency, while the level of interest in reading directly affects the initiative and continuity of reading. Meeting psychological needs, possessing strong reading ability, good reading cognition and literacy, and high self-efficacy can all enhance the likelihood and depth of reading behavior. In terms of motivation, various types such as autonomous motivation, controlled motivation, hedonic motivation, motivation for social interaction, personal development motivation, reading motivation, and usability motivation drive reading behavior to varying extents. Autonomous motivation is more predictive of reading behavior as it arises from an individual's interest in and satisfaction with reading itself, whereas controlled motivation, although it also encourages reading, has a relatively weaker impact. Habit, past behavior, and reading selection are part of habitual preferences, making individuals more inclined to repeat previous reading patterns, with past behavior being predictive of current reading habits, while specific reading selection preferences also influence individuals' reading choices and actions.

External factors represent a macro, objective environment and socio-cultural conditions that exist outside the individual, serving as an external backdrop that readers find challenging to directly alter or control impact reading behavior, these factors also influence reading behavior, and mainly include the reading environment, society, and culture. The comfort and suitability of the reading environment significantly affect the reading experience. A library with a vast collection can offer readers more options, and a favorable reading environment (such as one that is quiet, well-lit, and well-equipped) can considerably extend reading time and increase reading frequency. The quality of service experience can also impact readers' reading behavior and their loyalty to the library. In terms of society and culture, group norm, ingroup identification, intergroup stereotypes, material culture, moral norm, social identity, social influence, spiritual

culture, subjective norm indirectly affect reading behavior by influencing individuals' social cognition, adherence to norms, and value judgments. For example, positive group norms and social influence can enhance individuals' reading motivation, while negative intergroup stereotypes may reduce reading willingness (Li, 2023; Liu, 2024).

Contextual factors encompass the immediacy, interactivity, and perception present during reading activities, acting as a "mediating scenario variable" that links internal and external influences. These factors are shaped not only by external elements, such as the quality of library services impacting readers' "perceived ease of use," but also directly influence reading behaviors' immediate choices. Readers can modify their behavior through personal perception or interaction. Otherwise, a library's brand reputation can boost individuals' trust and satisfaction, thereby encouraging reading behavior. The quality of reading content is pivotal in determining the appeal of reading materials, with high-quality content more effectively sparking readers' interest and motivation. Interactivity measures the level of engagement between reading materials and readers, with greater interaction significantly boosting reading frequency, then promoting their reading behavior. Media coverage has heightened the library's visibility and influence, drawing in more potential readers. Peer support offers emotional and informational backing, enhancing individuals' motivation to read. Contextual factors like perceived behavioral control, perceived ease of use, perceived risk, perceived usefulness, perceived value, price value, reading promotion, satisfaction, and trust indirectly shape the occurrence and progression of reading behavior by affecting individuals' perceptions and evaluations (Liu et al., 2022; Yao, 2021; Zhang and Liu, 2019).

When examining the moderating factors of readers' reading behavior in university libraries, it is essential to consider moderating variables, as they can influence the relationship between antecedents and reading behavior. The timing of publication may impact the relevance and applicability of research findings, with potential variations in conclusions across different periods. The national development level reflects the broader cultural and educational context, and readers' reading behavior may differ in countries or regions with varying development levels. The choice of measurement method can influence the accuracy and reliability of research data, with different tools and indicators potentially leading to varied results. The population type determines the specific background and needs of the research subjects, with notable differences in reading behavior among different population groups. The collection type affects the representativeness and scope of data, with different data collection methods potentially impacting research outcomes. Reading style reflects an individual's preferences and habits during reading, with varying styles potentially influencing material selection and reading persistence (Ming et al., 2020; Yao, 2021; Zhang and Liu, 2019).

In summary, existing literature systematically examines the factors influencing reading behavior in college libraries from three perspectives: internal psychological mechanisms, external environmental constraints, and situational interactions, offering complementary theoretical frameworks. However, many studies still concentrate on a single theory or local factors, with insufficient exploration of the dynamic mechanism of multi-factor interaction. Firstly, there is a lack of understanding regarding the relative importance and interaction of factors within these theoretical perspectives. For example, it is currently unclear how internal

psychological drivers (such as TRA attitudes) interact with external social influences (such as subjective norms of TPB) or situational constraints (such as risk perception, perceived behavioral control) and may be regulated by them. Secondly, the advantages of single theory and cross-sectional research limit the ability to establish holistic and hierarchical antecedent models. This study aims to integrate the core variables of TRA, TPB, and Grounded theories through a meta-analytic approach to construct a comprehensive theoretical model covering individual-environmental-situational contexts, in order to reveal the driving mechanisms of reading behavior in a more comprehensive way. Meanwhile, the study will introduce moderating variable analysis to identify the heterogeneity of reading behavior patterns in different contexts, which will provide empirical evidence for library service innovation and reading promotion strategies.

3 Methods

3.1 Literature search

When conducting and reporting our systematic review, we followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al., 2009; Li et al., 2020) and conducted a systematic search with the participation of professional research librarians to identify relevant literature. The search strategy included the following steps: First, a database search was conducted: on March 15, 2025, we systematically searched the following international electronic databases: Web of Science, Scopus, CNKI, and Google Scholar. Search keywords were combined with Boolean logic operators (e.g., “AND,” “NOT,” “OR”) and truncators (e.g., “*”), etc. For example, in the Web of Science database, the search formula: TS = (university OR college*) AND TS = (reading intention OR reading willingness OR reading behavior*) AND TS = (factor* OR cause* OR antecedent*), the detailed search formula is shown in [Supplementary material](#). Second, additional searches were conducted: to minimize the effect of publication bias, we also searched for unpublished conference papers, research proposals, and reviewed the reference section of the acquired literature through the snowballing method. Finally, the initial search identified a total of 4,243 potentially relevant studies, which were screened and those that met the systematic evaluation criteria were included in the analysis; the search process is shown in [Figure 2](#).

3.2 Inclusion and exclusion criteria

Prior to constructing the dataset, we developed the following inclusion criteria: (1) Study design: this included any study design that assessed the antecedents of reading intentions or behaviors. (2) Study type: quantitative studies with outcome indicators of reading intentions or behaviors. (3) Data reporting: studies were required to report correlation coefficients (or other convertible coefficients such as d , r^2 , and SE) and sample size. Exclusion criteria included (1) Failure to examine antecedents of reading behavior or intention. (2) Duplication of results or literature. (3) Lack of full-text sources, such as reviews, conference proceedings, or editorials.

3.3 Coding and data extraction process

To ensure coding accuracy, a coding team of three researchers with knowledge of health and management and experience in methodology was assembled. The coding process included the following steps: (1) Forming the coding team: coding criteria were identified through discussion and initial experimental coding was conducted. (2) Conducting independent coding: two researchers independently coded all relevant studies covering multiple features that may be relevant for *post hoc* analysis. (3) Conduct cross-validation: two researchers cross-checked for coding consistency and independently screened titles and abstracts after reaching 85%. (4) Independent data extraction: two researchers independently extracted data and merged the results into a final data table. Disagreements during coding and extraction were resolved through discussion or a third reviewer.

3.4 Effect size conversion

Most of our studies are based on reported correlation coefficients, which examine the relationship between antecedents and reading behavior. The correlation coefficient is usually marked as R or r . However, other coefficients [such as R^2 , d , or standard deviation (SD)] have also been used in some studies. In this case, it is necessary to convert these coefficients into r , as follows (Card, 2011):

$$d = \frac{m1 - m2}{s}$$

$$r = \frac{d}{\sqrt{4 + d}}$$

where $m1$ and $m2$ are the means of Groups 1 and 2, respectively, and s is the pooled SD across the two groups.

$$r = \frac{(1 - R^2)^2}{n - 1}$$

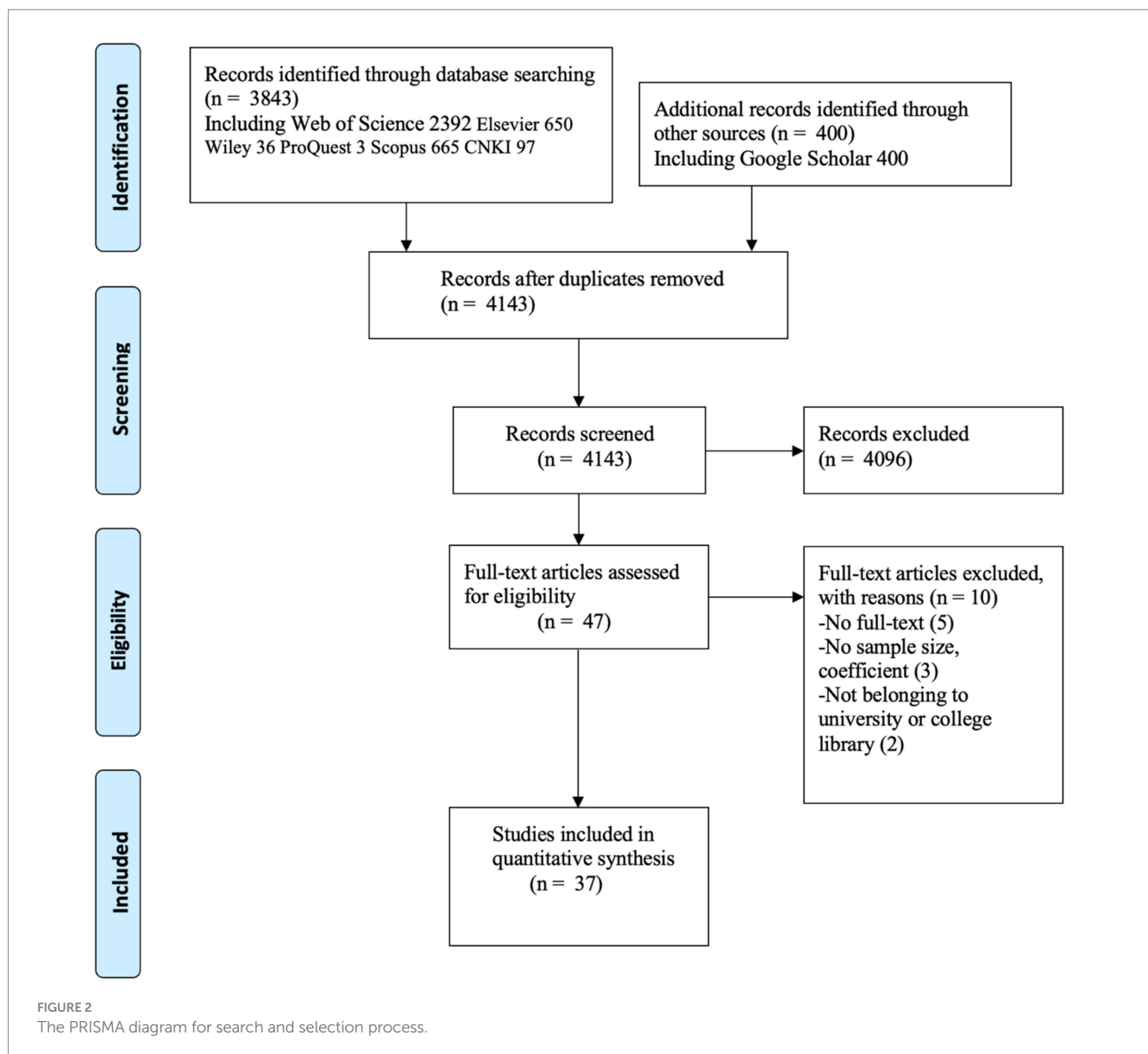
R^2 was the determinant coefficient, and n was the sample size.

$$Z_i = 0.5 \ln \left(\frac{1 + r_i}{1 - r_i} \right), SE_i = \frac{1}{\sqrt{W_i}}, Z = \frac{\sum (W_i * Z_i)}{\sum W_i}, r = \frac{e^{2z} - 1}{e^{2z} + 1}$$

$W_i = n - 3$, where Z is the Z-score when calculating Fisher's Z.

3.5 Risk of bias assessment

We used a risk of bias assessment tool for observational studies to independently assess the quality of included studies. The tool consists of six entries assessing the overall quality of the study, with response options of ‘yes’, ‘no’ or ‘cannot be determined/not applicable’. Each study received a quality score based on the percentage of positive responses: $\geq 75\%$ excellent; 50–75% good; and $\leq 50\%$ poor.



3.6 Data analysis

To determine the antecedents of reading intention and behavior more truthfully and reliably, we used the random effects model of Schmidt and Hunter (2015) for analysis; Microsoft’s Excel 2021 (version 16.76) is used to extract and organize data; R (version 4.3.1)’s “metafor” package and Comprehensive Meta Analysis Version 3 software (CMA 3.3.07; Biostat, USA) were used for meta-analysis, moderator analysis, publication bias analysis, etc. First, we use the correlation coefficients reported in each study, the internal consistency reliability coefficient (α), and then we calculated the true correlation coefficient (r) between antecedents and reading behavior (p also known as the zero-order correlation coefficient, which is the correlation coefficient after weighted observation of the average sample size or the true correlation coefficient after measurement error correction). For a few studies that reported other effect values (such as d , mean, and SD), we converted them into a unified comprehensive effect value r . For studies without reported reliability,

internal consistency reliability tends to overestimate the reliability of score-based standards (and, conversely, underestimate the correlation of corrections), α corrected the magnitude of the attenuation effect, as internal measurement errors are usually smaller than inter measurement errors (LeBreton and Senter, 2008). Therefore, we used the weighted average r of all studies that reported the reliability of this variable. For studies that included multiple and/or outcome measurements, we calculated a comprehensive r for inclusion in the overall meta-analysis (Schmidt and Le, 2004). Subsequently, to better evaluate the impact of publication bias in the included studies, we used a combination of the Failsafe N (Rosenthal) and Egger regression analysis methods, as both methods have advantages and disadvantages in testing different samples. For example, the Egger regression analysis is prone to errors when the sample size is small. Therefore, Egger regression analysis is not suitable for testing small-sample studies. Failsafe N (Rosenthal) can compensate for this deficiency, which reflects the number of studies required to reverse the results of the meta-analysis and estimate the

impact of potential unpublished negative results on positive meta-analysis results (Li et al., 2020; McDaniel et al., 2006). When the number of Failsafe N was much greater than the number of included studies, especially when the number of studies exceeded $5K + 10$, where K is the number of included studies (Card, 2011), it was difficult to change the results of the meta-analysis. However, its judgment criteria are not the golden rule; therefore, we combined the two to evaluate the impact of publication bias on the included studies. This is conducive to reflecting the robustness of the meta-analysis results on any systematic omissions in the published literature without significant results. Finally, the quality of the included studies was evaluated as a basis for the reliability and scalability of the research results.

4 Results

After searching the databases and reviewing the relevant articles, we have collected a large amount of valuable information. In the next, we provide the detail study characteristics and results.

4.1 Study characteristics

After screening, 37 publications were included with a total sample size of 15,434 participants, the vast majority of whom were female participants. These studies covered 10 countries across three continents, including both developing and developed countries, and showed a significant increasing trend over the last 5 years (2020–2024). Specifically, the sample was drawn from the following continents and countries: Asia ($k = 34$), North America ($k = 1$), Europe ($k = 1$), China ($k = 30$), USA ($k = 1$), UK ($k = 1$), India ($k = 1$), Malaysia ($k = 1$), Iran ($k = 1$), South Korea ($k = 1$), Jordan ($k = 1$). Of the 37 included studies, the samples were students ($k = 28$) or adults (both teachers and students; $n = 9$). In terms of reading styles, these were electronic-reading ($k = 20$), paper reading ($k = 11$), and mixed reading ($k = 6$). Theoretical perspectives were overwhelmingly Theory of Planned Behavior and Theory of Reasoned Action ($k = 21$), while Push-Pull-Mooring theory, Self-determination theory, and Grounded theory were more less. The research methodology was mainly Structural Equation Modeling (SEM) ($k = 28$) and less Multiple Regression (MLM) ($k = 9$). Sample collection methods are offline ($k = 19$), i.e., through on-site distribution of questionnaires and on-site interviews, online ($k = 14$), i.e., through emails, online questionnaires, telephone interviews, and mixed collection (i.e., a combination of online and offline, $k = 4$), and other detailed information is shown in Table 1.

4.2 Antecedents of reading intention and behavior

The meta-analysis results between antecedents, reading intention and behavior are shown in Table 2. Overall, of the 44 antecedents examined, 40 were significantly correlated with reading intention and behavior, most of which had a true effect value with 0.3 or higher. Thus, antecedents had significant and important effects (i.e., ranging from medium to large) on reading intention and behavior.

As detailed in Table 2, among the antecedents, Attitude ($r = 0.51$), Autonomous motivation ($r = 0.36$), Awareness ($r = 0.06$), Brand reputation ($r = 0.39$), Content quality ($r = 0.29$), Controlled motivation ($r = 0.18$), Group norm ($r = 0.31$), Habit ($r = 0.41$), Hedonic motivation ($r = 0.30$), Interactivity ($r = 0.26$), Material culture ($r = 0.31$), Media coverage ($r = 0.13$), Motivation for social interaction ($r = 0.17$), Number of collections ($r = 0.33$), Past behavior ($r = 0.26$), Peer support ($r = 0.20$), Perceived behavioral control ($r = 0.26$), Perceived ease of use ($r = 0.23$), Perceived usefulness ($r = 0.41$), Perceived value ($r = 0.23$), Personal development motivation ($r = 0.25$), Psychological needs ($r = 0.32$), Reading ability ($r = 0.36$), Reading cognition ($r = 0.33$), Reading environment ($r = 0.23$), Reading literacy ($r = 0.08$), Reading motivation ($r = 0.12$), Reading promotion ($r = 0.35$), Reading selection ($r = 0.14$), and Satisfaction ($r = 0.44$), Self-efficacy ($r = 0.47$), Service experience ($r = 0.29$), Social identity ($r = 0.19$), Spiritual culture ($r = 0.25$), Subjective norm ($r = 0.36$), Trust ($r = 0.37$), and Usability motivation ($r = 0.22$) showed a significant positive correlation with reading intention, and Intention ($r = 0.39$) showed a significant positive correlation with reading behavior (all their confidence intervals excluding zero). Perceived risk ($r = -0.27$), Ingroup identification ($r = -0.19$), and Intergroup stereotypes ($r = -0.19$) were significantly negatively correlated with reading behavior (their confidence intervals excluding zero), and [there was no or little] credible evidence of an association between Interest, Moral norm, Price value, Intention and Behavior (their 95% CI including zero).

4.3 Moderators' analysis

As noted by Hunter and Schmidt (2004), differences in study results may be due to statistical artifacts or potential regulatory factors such as demographic and methodological characteristics. Therefore, in addition to core hypothesis testing, we conducted exploratory moderator analyses (since moderator effects analyses need to have 3 different types of groups with within-group differences, we selected antecedents that met the requirement of at least $k \geq 6$) to assess whether our findings varied depending on the publication time, national development level, reading styles, demographic, methodological characteristics and so on. Tables 3–8 show the detailed moderator analyses' results. Overall, the results of the regression analyses for publication time showed no influence (the estimates were not significant) and the publication time did not show a moderating effect (e.g., in the relationships between Attitude-Intention, Intention-behavior, etc.). In the cultural context analysis (National development level), developed countries moderated most interpersonal relationships slightly more than developing countries. In methodological characterization (Measure method, Collection Type, and Population type), the moderating effect of model measurement through structural equation modeling was stronger than that of multiple regression, and the moderating effect of online methods such as email, telephone, and online questionnaires was slightly stronger for most relationships than that of offline through fieldwork methods, in the sample population type, the population consisting of teachers had a stronger moderating effect than the student population (most of the estimates were between 0.30 and 0.70), in the reading styles, the electronic-reading style most of the relationships more strongly than the traditional paper reading style in most of the relationships, for

TABLE 1 General characteristics of the 37 included studies.

No.	Article ID	Publication year	Location	Location code	National development level	Main findings	Theoretical perspective	Measure method	Valid sample size	Population type	Collected types	Reading styles	Gender (male)%	Antecedents	Outcomes
1	Ming et al. (2020)	2021	China	Asia	Developing	The results showed that the user behavior intention to use mobile library application is mainly influenced by system feature (i.e., accessibility, relevance, and system help), interface feature (i.e., screen design, navigation, and term), and individual difference (i.e., performance expectancy, domain knowledge, and social influence).	Grounded Theory	SEM	421	Teachers and Students	Offline	Paper	56%	Perceived ease of use, Content quality, Reading environment, Perceived usefulness, Social influence	Intention
2	Ming et al. (2024)	2024	China	Asia	Developing	The results show: thrust factors (participation attitude), pull factors (promotion incentive), both motivational factors and anchoring factors (social influence) have a significant positive impact on users' willingness to participate.	Push-Pull-Mooring (PPM) Theory, Social Identity Theory	SEM	562	Teachers and Students	Online	Paper	45%	Perceived value, Psychological needs, Social Identity, Media coverage, Reading promotion, Service experience	Intention
3	Wang et al. (2018)	2018	China	Asia	Developing	Results showed that information quality, information environment and information technology had positive and significant effects on users' attitude, among which the influence coefficient of information environment was the largest. Information technology and users' attitude had positive and significant effects on the behavioral intention of users.	Information Ecology Theory	SEM	206	Students	Offline	Electronic	55.30%	Reading environment, Attitude, Service experience	Intention
4	Hu (2020)	2020	China	Asia	Developing	After controlling for individual characteristics, university students' sense of acquisition in the library has a significant positive impact on their reading intention.	Push-Pull-Mooring (PPM) Theory, Social Identity Theory	MLM	330	Students	Offline	Paper and Electronic	27.60%	Satisfaction, Number of collections, Habit, Reading ability	Intention
5	Zhang (2021)	2021	China	Asia	Developing	The antecedent variables, such as system usability and feedback immediacy, both positively influence the immersive experience of university student users.	Flow Theory	MLM	505	Students	Online	Electronic	50%	Perceived ease of use, Interactivity, Content quality	Intention, Behavior

(Continued)

TABLE 1 (Continued)

No.	Article ID	Publication year	Location	Location code	National development level	Main findings	Theoretical perspective	Measure method	Valid sample size	Population type	Collected types	Reading styles	Gender (male)%	Antecedents	Outcomes
6	Ge (2022)	2022	China	Asia	Developing	To foster a conducive environment for reading on campus, enhance the reading proficiency of university students, and improve the quality of service provided by libraries for physical books, are strategies that can guide students in cultivating commendable reading habits. These measures can bolster their inclination toward reading physical books from libraries, thereby facilitating effective reading and profound contemplation among the student body.	Theory of Reasoned Action	MLM	212	Students	Offline	Paper	50%	Gender, Education, Controlled motivation, Autonomous motivation, Reading ability, Reading environment, Content quality, Service experience, Intention	
7	Liu (2022)	2022	China	Asia	Developing	The findings indicate that the relevance, timeliness, personalization, interactivity, and entertainment value of digital reading promotion information all have a significant positive impact on users' perceived value.	Stimulus-Organism-Response Theory	SEM	332	Students	Offline	Electronic	47.29%	Content quality, Perceived ease of use, Interactivity, Perceived value	Intention
8	Xu et al. (2021)	2021	China	Asia	Developing	Perceived risk has a direct negative impact on the intention to use reading therapy services in university libraries, while perceived usefulness and service experience have a direct positive impact. Additionally, perceived ease of use and enjoyment exert an indirect positive influence.	Theory of Reasoned Action	SEM	455	Teachers and Students	Online	Paper	29%	Perceived usefulness, Perceived risk, Service experience	Intention
9	Yang and Li (2017)	2017	China	Asia	Developing	Campus material culture and spiritual culture can significantly and directly positively influence the reading intention of social readers in libraries.	Theory of Reasoned Action	SEM	560	Teachers and Students	Offline	Paper	43.21%	Material culture, Spiritual culture, Brand reputation	Intention
10	Wang (2020)	2020	China	Asia	Developing	Through descriptive analysis, this study found that university students' willingness to read paper books is not very low, but their reading behavior of books is relatively small.	Self-Determination Theory	MLM	303	Students	Offline	Paper and Electronic	40.59%	Number of collections	Intention, Behavior

(Continued)

TABLE 1 (Continued)

No.	Article ID	Publication year	Location	Location code	National development level	Main findings	Theoretical perspective	Measure method	Valid sample size	Population type	Collected types	Reading styles	Gender (male)%	Antecedents	Outcomes
11	Liu (2024)	2024	China	Asia	Developing	According to the empirical analysis, the results indicate that autonomous motivation positively and significantly affects reading intention by means of reading attitude, subjective norm and perception of behavior. Reading attitude, subjective norm and perceived of behavior have positive effects on reading intention respectively. Additionally, it is found that reading service level and reading environment positively influence reading intention, while transfer cost has a significant negative impact on it.	Theory of Reasoned Action	SEM	479	Students	Online	Paper and Electronic	47.50%	Autonomous motivation, Attitude, Subjective norm, Service experience, Number of collections, Reading environment, Price value, Perceived behavioral control	Intention
12	Zhang (2021)	2023	China	Asia	Developing	The study reveals that performance expectancy, effort expectancy, social influence, and information quality exhibit significant positive correlations with users' intention to engage in deep reading through university library micro-media platforms. Furthermore, performance expectancy, effort expectancy, social influence, and information quality indirectly influence deep reading behavior through the mediating variable of deep reading intention. Additionally, facilitating conditions and reading ability have a direct positive impact on users' deep reading behavior. However, the effect of perceived risk is found to be insignificant.	Theory of Reasoned Action	SEM	426	Students	Online	Paper and Electronic	47.89%	Perceived ease of use, Social influence, Perceived usefulness, Content quality, Reading ability, Perceived risk	Intention

(Continued)

TABLE 1 (Continued)

No.	Article ID	Publication year	Location	Location code	National development level	Main findings	Theoretical perspective	Measure method	Valid sample size	Population type	Collected types	Reading styles	Gender (male)%	Antecedents	Outcomes
13	Ti (2020)	2020	China	Asia	Developing	The main findings of this study include, delineating the four dimensions of reader engagement in reading promotion in university libraries: information acquisition, information sharing, cooperative behavior, and interpersonal interaction.	Theory of Planned Behavior	MLM	327	Students	Mix	Paper and Electronic	32.41%	Satisfaction, Interactivity	Intention, Behavior
14	Shamlou et al. (2022)	2022	Iran	Asia	Developing	Findings showed that attitude is the most important factor affecting online health information seeking intention. It was also found that online health information seeking intention has a positive and significant effect on women's information seeking behavior.	Theory of Planned Behavior	SEM	400	Students	Offline	Paper	0%	Attitude, Subjective norm, Perceived behavioral control	Intention
15	Li (2023)	2023	China	Asia	Developing	Perceived ease of use has no impact on reading intention, while others have significantly impact on reading intention.	Theory of Planned Behavior	SEM	840	Students	Mix	Paper and Electronic	0%	Satisfaction, Trust, Social influence, Perceived usefulness, Perceived ease of use	Intention
16	Hao (2023)	2023	China	Asia	Developing	The social influence presented the strongest effect on behavioral intention and proved that attitude directly influenced behavioral intention. The factors of perceived value and perceived enjoyment impacted behavioral intention.	Theory of Planned Behavior	SEM	500	Students	Online	Electronic	23%	Attitude, Social influence	Intention
17	Li (2024)	2024	China	Asia	Developing	Perceived usefulness significantly impacts behavioral intention.	Theory of Planned Behavior	SEM	500	Students	Offline	Electronic	46%	Perceived usefulness	Intention
18	Vezzali et al. (2012)	2012	Italy	Europe	Developed	Attitude has a positive impact on reading intention, while ingroup identification and intergroup stereotypes have negative impact on reading intention.	Theory of Planned Behavior	SEM	96	Students	Offline	Paper	50%	Attitude, Ingroup identification, Intergroup stereotypes	Intention

(Continued)

TABLE 1 (Continued)

No.	Article ID	Publication year	Location	Location code	National development level	Main findings	Theoretical perspective	Measure method	Valid sample size	Population type	Collected types	Reading styles	Gender (male)%	Antecedents	Outcomes
19	Jia (2021)	2021	China	Asia	Developing	Reading cognition, reading motivation, reading choices, and reading emotions not only have a positive impact on reading behavior.	Grounded theory	MLM	582	Students	Online	Paper	41%	Reading cognition, Reading motivation, Reading selection, Reading emotions	Behavior
20	Zhang (2020)	2020	China	Asia	Developing	Personal development motivation, usability motivation has a positive impact of reading behavior, while interest and motivation for information acquisition and emotional expression motivation has no impact on it.	Media Dependence Theory, Usage and Satisfaction Theory, Interaction Determination Theory	SEM	300	Students	Online	Electronic	47%	Motivation for social interaction, Personal development motivation, Interest, Usability motivation, Reading motivation	Behavior
21	Liu et al. (2022)	2022	China	Asia	Developing	The results indicate that the pull factor (perceived usefulness) and push factor (peer support) have a significant positive impact on college students' reading intention, while the anchoring factor (privacy disclosure, inertia) has a significant negative impact.	Push-Pull-Mooring Theory	SEM	273	Students	Offline	Paper	54%	Perceived usefulness, Peer support, Perceived risk, Habit, Service experience	Intention
22	Yao, 2021	2021	China	Asia	Developing	Reading promotion can indirectly affect college students' reading willingness by positively influencing their reading attitudes, subjective norms, and perceived reading behavior control.	Theory of Planned Behavior	SEM	569	Students	Mix	Paper	36%	Attitude, Subjective norms, Perceived behavioral control, Reading promotion	Intention
23	Han (2018)	2018	China	Asia	Developing	The autonomous motivation and basic psychological needs of readers have a positive impact on their willingness to read outside of class, while controlled motivation has no effect on their willingness to read outside of class.	Self-determination theory	SEM	515	Students	Mix	Paper	47%	Autonomous motivation, Psychological needs	Intention

(Continued)

TABLE 1 (Continued)

No.	Article ID	Publication year	Location	Location code	National development level	Main findings	Theoretical perspective	Measure method	Valid sample size	Population type	Collected types	Reading styles	Gender (male)%	Antecedents	Outcomes
24	Sigurdsson et al. (2018)	2018	UK	Europe	Developed	The findings suggest that factors such as perceived entertainment, credibility and information significantly improve attitudes toward in-app advertisements, and that the effectiveness of these advertisements is based on cultural differences. The participants from India exhibited more positive attitudes toward in-app advertisements than their counterparts from the UK.	Theory of Reasoned Action	SEM	251	Teachers and Students	Online	Electronic	67%	Attitude	Intention
25	Khanjani et al. (2019)	2019	Iran	Asia	Developing	There was a significant relationship between intention toward sending and reading text messages while driving and gender, attitude, subjective norm, Perceived Behavioral Control (PBC), and moral norm.	Theory of Planned Behavior	MLM	257	Teachers and Students	Offline	Electronic	44%	Attitude, Subjective norm, Perceived behavioral control, Group norm, Moral norm	Intention
26	Ye et al. (2015)	2015	Malaysia	Asia	Developing	The findings indicated that performance expectancy (PE), hedonic motivation (HM), price value (PV) and habit (HT) have significant and positive relationship on BI to adopt mobile e-book. Contrary to expectations, effort expectancy (EE), social influence (SI) and facilitating condition (FC) does not have significant influence on BI.	Theory of Reasoned Action, Theory of Planned Behavior	MLM	250	Students	Offline	Electronic	66%	Social influence, Perceived ease of use, Hedonic motivation, Price value, Habit	Intention
27	Tsai (2017)	2012	China	Asia	Developing	Trust, perceived usefulness, perceived ease of use has a positive impact on attitude, and attitude has a positive impact on reading intention.	Technology Acceptance Model	SEM	213	Teachers and Students	Online	Electronic	50%	Attitude	Intention
28	Chai et al. (2021)	2021	China	Asia	Developing	According to the SEM, all factors could predict intention to learn AI, whether directly or indirectly.	Theory of Planned Behavior	SEM	682	Students	Online	Electronic	52%	Self-efficacy, Social influence, Perceived usefulness	Intention

(Continued)

TABLE 1 (Continued)

No.	Article ID	Publication year	Location	Location code	National development level	Main findings	Theoretical perspective	Measure method	Valid sample size	Population type	Collected types	Reading styles	Gender (male)%	Antecedents	Outcomes
29	Teo et al. (2019)	2019	China	Asia	Developing	The results of this study showed that the research model had a good fit. Two variables—usefulness and ease of use—had significantly influenced Macau students' attitudes toward Moodle use. Other variables such as usefulness, attitude, and perceived behavioral control were found to be important determinants of students' behavioral intentions.	Diffusion of Innovation Theory, Technology Acceptance Model	SEM	564	Students	Offline	Electronic	41%	Perceived usefulness, Attitude, Perceived behavioral control, Subjective norm	Intention
30	Wang et al. (2024)	2024	China	Asia	Developing	Attitude, perceived behavioral control, literacy and subjective norms have a positive impact on intention.	Theory of Planned Behavior	SEM	245	Students	Offline	Electronic	49%	Awareness, Perceived ease of use, Content quality, Moral norm, Subjective norm, Perceived behavioral control, Attitude	Intention
31	Jung et al. (2011)	2011	South Korea	Asia	Developed	Self-efficacy has a positive impact on readers' reading intention.	Innovation Diffusion Theory, Technology Acceptance Model	MLM	500	Teachers and Students	Offline	Electronic	50%	Self-efficacy	Intention
32	Luo et al. (2021)	2021	China	Asia	Developing	Attitude, subjective norms, perceived behavioral control, Perceived usefulness have a positive on students' intention, and then to read e-book.	Theory of Planned Behavior, Technology Acceptance Model	SEM	433	Students	Offline	Electronic	50%	Attitude, Subjective norm, Perceived behavioral control, Perceived usefulness	Intention
33	Chang et al. (2023)	2023	China	Asia	Developing	Effort expectancy, social influence, price value, perceived risk and habit have a significant impact on behavioral intention, and behavioral intention and habit have a significant impact on use behavior.	Technology Acceptance Model	SEM	189	Students	Online	Electronic	50%	Perceived ease of use, Social influence, Price Value, Perceived risk, Habit	Intention, Behavior
34	Masadeh et al. (2022)	2022	Jordan	Asia	Developing	Attitude, subjective norms, and perceived behavior control positively influence behavioral intention toward using e-textbooks, and the behavioral intention of using an e-textbook positively influences their reading behavior.	Theory of Planned Behavior	SEM	625	Students	Offline	Electronic	50%	Perceived risk, Perceived usefulness, Perceived ease of use, Subjective norm, Self-efficacy, Attitude, Perceived behavioral control	Intention
35	Shahrzad et al. (2017)	2017	USA	North America	Developed	Attitude and perceived behavioral control were found to be positive predictors of intention.	Theory of Planned Behavior	SEM	243	Students	Offline	Electronic	31%	Attitude, Subjective norm, Perceived behavioral control, Group norm, Moral norm, Past behavior	Intention, Behavior

(Continued)

TABLE 1 (Continued)

No.	Article ID	Publication year	Location	Location code	National development level	Main findings	Theoretical perspective	Measure method	Valid sample size	Population type	Collected types	Reading styles	Gender (male)%	Antecedents	Outcomes
36	Chen (2016)	2016	China	Asia	Developing	Attitude was found to be positive a predictor of behavior.	Motivation Theory	SEM	837	Students	Online	Electronic	47%	Attitude	Intention
37	Xiao et al. (2014)	2014	China	Asia	Developing	The study's findings show that the proposed model has good explanatory power and confirms its robustness in predicting customers' intention to use e-book service.	Theory of Planned Behavior	SEM	452	Teachers and Students	Online	Electronic	28%	Perceived usefulness, Attitude, Perceived behavioral control, Subjective norm	Intention

example, in the Attitude-Intention, Intention-Behavior, Perceived behavioral control-Intention, and other relationships.

4.4 Publication bias analysis

Publication bias (i.e., selective reporting) refers to any situation during data collection, analysis, interpretation, and publication that may lead to systematic deviations of conclusions from the true results, such as self-censorship by authors to satisfy theoretical expectations or a journal's tendency to support a significant result. To alleviate this concern, we tested for publication bias using Failsafe N (Rosenthal) and Egger regression analyses-both of which are typically based on the distribution of effect sizes defining a given zero-order relationship. The former refers to how many unpublished 'zero result' studies are needed to overturn the current conclusion. If the calculated value is much greater than the critical value (5K + 10), it indicates that the possibility of the conclusion being affected by publication bias is extremely small, and the result is robust and reliable, the latter tests whether the funnel plot is symmetrical. If the *p*-value of the intercept term is not significant (usually *p* > 0.05), it indicates that small sample studies have no systematic impact on the results and there is no significant publication bias. Table 2 shows information specific to the publication bias analysis of the included studies. A limited analysis of publication bias was not available due to the inclusion of studies that did not qualify for two or more articles and had a non-zero standard error (SE). The results of the publication bias analyses shown in Table 1 were the same. Failsafe N (Rosenthal) values were much larger than 5K + 10 (where K denotes the number of included studies), and the intercept terms of the Egger regression analyses were mostly equal to or close to zero, with most of the *p*-values not significant. For example, for Attitude and Intention, Intention and Reading behavior, the Failsafe N was 8,213 and 3,041 (much larger than 5K + 10, where K is 18 and 14, respectively), with *p*-values of 0.12 and 0.16 (both greater than or equal to 0.05). Thus, we can conclude that even the presence of publication bias in the current study had a tolerable and negligible effect on the results.

4.5 Article quality evaluation results

The results of the bias risk assessment are shown in Table 9. The bias tool consisted of six main areas: recall description, blinding, random generation, recall, task concealment, and other biases. Two reviewers performed the risk of bias assessment. Overall, the rates of low, high, and unknown risk were 82.0, 12.2, and 5.8%, respectively. The mean risk score of 30 articles was low (82.0%), 5 articles had high risk scores (12.2%), and 2 articles had unclear scores (5.8%); therefore, the quality of the literature in the included studies was high and the risk of bias was low.

5 Discussion

This meta-analysis synthesized 37 studies (N = 15,434) to address two core research questions: (RQ1) identifying the key antecedents of

TABLE 2 Meta-analysis results for antecedents of reading intention and behavior.

Variables	k	N	r	95%CI		Q (p-value)	I ²	Fail-safe N (Rosenthal)	Egger's test	
									t	p-value
Antecedents										
Individual										
Attitude	18	6,878	0.51	0.34	0.65	1,229.34***	98.62	8,213	1.63	0.12
Awareness	1	245	0.06	-	-	-	-	-	-	-
Interest	1	300	0.03	-	-	-	-	-	-	-
Psychological needs	2	1,077	0.32	0.26	0.37	1.00***	0.06			
Reading ability	5	1,628	0.36	0.17	0.53	71.12***	94.38	298	0.14	0.45
Reading cognition	1	582	0.33	-	-	-	-	-	-	-
Reading literacy	1	245	0.08	-	-	-	-	-	-	-
Self-efficacy	3	1,807	0.47	0.07	0.74	182.34*	98.9	373	0.47	0.36
Motivations										
Autonomous motivation	3	1,206	0.36	0.00	0.63	82.01*	97.56	118	0.14	0.91
Controlled motivation	1	212	0.18	-	-	-	-	-	-	-
Hedonic motivation	1	250	0.30	-	-	-	-	-	-	-
Motivation for social interaction	1	300	0.17	-	-	-	-	-	-	-
Personal development motivation	4	1,815	0.25	0.13	0.36	21.39***	85.98	121	0.99	0.43
Reading motivation	1	582	0.12	-	-	-	-	-	-	-
Usability motivation	1	300	0.22	-	-	-	-	-	-	-
Habitual preferences										
Habit	6	1,702	0.41	0.03	0.68	344.11*	98.55	422	1.08	0.17
Past behavior	1	243	0.26	-	-	-	-	-	-	-
Reading selection	1	582	0.14	-	-	-	-	-	-	-
Contextual										
Brand reputation	1	560	0.39	-	-	-	-	-	-	-
Content quality	5	1,812	0.29	0.10	0.46	71.88**	94.44	220	0.88	0.22
Interactivity	5	2,174	0.26	0.19	0.33	1.68***	65.75	193	0.65	0.56
Material culture	1	560	0.31	-	-	-	-	-	-	-
Media coverage	1	562	0.13	-	-	-	-	-	-	-
Peer support	1	273	0.20	-	-	-	-	-	-	-
Perceived behavioral control	11	4,524	0.26	0.13	0.38	203.26***	95.08	961	1.58	0.07
Perceived ease of use	21	8,968	0.23	0.18	0.29	158.87***	87.41	2,740	0.88	0.19
Perceived risk	5	1,968	-0.27	-0.43	-0.09	64.79***	93.83	174	0.07	0.95

(Continued)

TABLE 2 (Continued)

Variables	k	N	r	95%CI		Q (p-value)	I ²	Fail-safe N (Rosenthal)	Egger's test	
									t	p-value
Perceived usefulness	11	5,671	0.41	0.29	0.52	296.63***	96.63	2,950	0.38	0.72
Perceived value	1	332	0.23	–	–	–	–	–	–	–
Price value	3	918	0.12	–0.17	0.40	38.63	94.82	3	2.09	0.13
Reading promotion	1	569	0.35	–	–	–	–	–	–	–
Satisfaction	7	2,814	0.44	0.22	0.62	261.65***	97.71	997	0.81	0.23
Social identity	1	562	0.19	–	–	–	–	–	–	–
Trust	1	840	0.37	–	–	–	–	–	–	–
Intention	14	4,966	0.39	0.25	0.51	366.25***	96.45	3,041	1.51	0.16
External factors										
Environment										
Number of collections	9	2,984	0.33	0.17	0.47	173.97***	95.4	763	0.82	0.44
Reading environment	5	1,309	0.23	0.10	0.35	23.10***	82.69	79	0.87	0.22
Service experience	6	2,187	0.29	0.12	0.44	81.44***	93.86	312	0.94	0.4
Society and culture										
Group norm	3	757	0.31	0.24	0.38	2.41***	16.93	58	4.21	0.15
Ingroup identification	1	96	–0.19	–	–	–	–	–	–	–
Intergroup stereotypes	1	96	–0.19	–	–	–	–	–	–	–
Moral norm	4	1,002	0.04	–0.17	0.24	34.02	91.18	0	2.2	0.16
Social influence	7	3,308	0.23	–0.02	0.45	311.14	98.07	396	0.78	0.47
Spiritual culture	1	560	0.25	–	–	–	–	–	–	–
Subjective norm	11	4,524	0.36	0.19	0.51	381.59***	97.38	1,635	0.8	0.44

*p < 0.01, **p < 0.005, ***p < 0.001.

university library reading intention and behavior, and quantifying their effect sizes; and (RQ2) examining how contextual, demographic, or methodological factors moderate these relationships. The results not only validate existing theoretical frameworks (e.g., TRA, TPB) but also resolve gaps in prior single-study research by providing generalizable effect estimates. This study is based on the core premise that, despite differences in context and methods across primary studies, systematic integration can reveal universal patterns in the antecedents of reading behavior. Our meta-analysis aims to accumulate and refine knowledge, rather than simply listing individual study results. Overall, we present the first systematic meta-analysis study evidence on antecedents, intention and behavior, as well as moderators that influence these relationships, the current results of this study indicate that each project provides useful insights, and the practical value of learning this comprehensive approach cannot be ignored.

Specifically, this study identified 37 articles and a total of 44 identified antecedents based on strict adherence to the system evaluation report standards. Among them, 40 factors are significantly

correlated with reading intention or behavior. Among the antecedents of internal factors centered around Individual, Motivations, and Habitual preferences, Attitude is the strongest positive predictor of reading intention (with a medium to large intensity of influence, as 0.51 has an impact value greater than 0.5), this aligns with Liu (2024), who found Attitude predicted library reading in 479 Chinese university students (Liu, 2024), and same findings in Shamlou's research (Shamlou et al., 2022). Meanwhile, critically, in our results, this consistency across regions suggests Attitude's influence is universal—readers' positive evaluations of library reading (e.g., perceiving it as productive or enjoyable) directly shape engagement, regardless of cultural background, regarding the attitude factor, libraries could design 'reading challenges' to enhance reading enjoyment. While Perceived risk is the strongest negative predictor of reading intention (with a medium intensity of influence, $r = -0.27$), it is because it directly triggers readers' loss avoidance psychology, making them more inclined to avoid potential negative consequences (such as wasting time, encountering comprehension difficulties, or causing academic setbacks) when making decisions, rather than

TABLE 3 Meta-analysis results for the relationships: the role of publication time.

Moderators	Relationships	Models	<i>k</i>	Point estimate	95%CI		<i>Q</i>	<i>Z</i>	<i>R</i> ²	<i>p</i> -value
Publication time	Attitude-intention	Regression	18	-0.05	-0.11	0.00	3.31	-1.82	0.09	0.070
	Habit-intention	Regression	6	-0.16	-0.28	-0.04	7.28	-2.70	0.46	0.017
	Intention-behavior	Regression	14	-0.02	-0.12	0.09	0.12	-0.34	0.01	0.731
	Number of collections-intention	Regression	9	-0.09	-0.21	0.04	1.81	-1.34	0.14	0.180
	Perceived behavioral control-intention	Regression	11	0.00	-0.05	0.05	0.00	0.03	0.00	0.980
	Perceived ease of use-intention	Regression	21	0.02	0.00	0.05	2.99	1.73	0.02	0.080
	Perceived usefulness-intention	Regression	11	0.01	-0.05	0.07	0.10	0.31	0.00	0.756
	Satisfaction-intention	Regression	7	-0.08	-0.34	0.19	0.31	-0.56	0.00	0.580
	Social influence-intention	Regression	7	0.03	-0.07	0.12	0.31	0.55	0.00	0.590
	Subjective norm-intention	Regression	11	-0.04	-0.10	0.03	1.33	-1.15	0.00	0.248

TABLE 4 Meta-analysis results for the relationships: the role of national development level.

Moderators	Relationships	Level	<i>k</i>	Point estimate	95%CI		<i>Z</i>	<i>Q</i>	<i>Q</i> _{within}	<i>Q</i> _{between}	<i>p</i> -value
National development level	Attitude-intention	Developed	3	0.66	0.62	0.71	19.24	22,979.00	1,165.81	63.53	0.000
		Developing	15	0.43	0.40	0.45	35.83	939.02			0.000
	Habit-intention	Developed	-	-	-	-	-	-	344.11	0.00	-
		Developing	6	-0.37	-0.41	-0.32	-15.77	344.11			0.000
	Intention-behavior	Developed	1	0.68	0.61	0.75	12.96	0.00	325.28	40.97	0.000
		Developing	13	0.39	0.37	0.42	28.26	325.28			0.000
	Number of collections-intention	Developed	9	0.32	0.29	0.35	17.90	173.97	0.00	173.97	0.000
		Developing	-	-	-	-	-	-			-
	Perceived behavioral control-intention	Developed	1	-0.26	-0.38	-0.14	-4.19	0.00	121.90	81.36	1.000
		Developing	10	0.32	0.29	0.34	21.39	121.90			0.000
	Perceived ease of use-intention	Developed	21	0.24	0.22	0.26	23.24	158.87	158.87	0.00	0.000
		Developing	-	-	-	-	-	-			-
	Perceived usefulness-intention	Developed	11	0.40	0.38	0.43	32.17	296.63	296.63	0.00	0.000
		Developing	-	-	-	-	-	-			-
	Satisfaction-intention	Developed	-	-	-	-	-	-	0.00	261.65	-
		Developing	7	0.41	0.38	0.44	22.84	261.65			0.000
	Social influence-intention	Developed	-	-	-	-	-	-	311.14	0.00	-
		Developing	7	0.28	0.25	0.31	16.64	311.14			0.000
	Subjective norm-intention	Developed	1	0.35	0.23	0.45	5.61	0.00	381.55	0.04	1.000
		Developing	10	0.34	0.31	0.36	22.78	381.55			0.000

pursuing the benefits that reading may bring. This concern about expected losses will directly weaken the willingness to read and become a key psychological barrier that hinders the occurrence of reading behavior (Li et al., 2020; Masadeh et al., 2022), for risk perception, trial periods could be offered to lower the decision

threshold for users, and intention is also the strongest positive predictor of reading behavior (with an impact value between 0.3 and 0.5, medium impact). Among the antecedents centered on environmental, social, and cultural factors, Subject norm is the strongest positive predictor of reading intention (with an impact value

TABLE 5 Meta-analysis results for the relationships: the role of measure method.

Moderators	Relationships	Level	k	Point estimate	95%CI		Z	Q	Q within	Q between	p-value
Measure method	Attitude-intention	MLM	2	0.32	0.24	0.40	7.45	1.71	1,216.59	12.75	0.190
		SEM	16	0.46	0.44	0.48	39.35	1,214.89			0.000
	Habit-intention	MLM	4	-0.26	-0.31	-0.20	-9.15	82.54	275.42	68.69	0.000
		SEM	2	-0.61	-0.67	-0.55	-15.28	192.88			0.000
	Intention-behavior	MLM	8	0.34	0.31	0.38	18.28	78.75	332.92	33.33	0.000
		SEM	6	0.48	0.45	0.51	25.00	254.17			0.000
	Number of collections-intention	MLM	8	0.37	0.33	0.40	19.19	125.53	48.44	173.97	0.000
		SEM	1	0.04	-0.05	0.13	0.81	0.00			1.000
	Perceived behavioral control-intention	MLM	2	0.40	0.33	0.47	9.62	0.22	9.79	203.26	0.640
		SEM	9	0.27	0.24	0.30	17.63	193.25			0.000
	Perceived ease of use-intention	MLM	9	0.24	0.21	0.27	14.72	72.76	158.63	0.23	0.000
		SEM	12	0.25	0.22	0.27	17.99	85.87			0.000
	Perceived usefulness-intention	MLM	-	-	-	-	-	-	296.63	0.00	-
		SEM	11	0.40	0.38	0.43	32.17	296.63			0.000
	Satisfaction-intention	MLM	6	0.46	0.43	0.50	22.09	232.06	232.06	29.60	0.000
		SEM	1	0.27	0.20	0.33	7.95	0.00			1.000
	Social influence-intention	MLM	1	-0.02	-0.14	0.10	-0.31	0.00	285.43	25.71	1.000
		SEM	6	0.31	0.27	0.34	17.39	285.43			0.000
Subjective norm-intention	MLM	2	0.75	0.71	0.78	21.74	10.34	165.41	216.17	0.001	
	SEM	9	0.27	0.24	0.29	17.15	155.08			0.000	

between 0.4 and 0.5, medium impact), while Ingroup identification and Intergroup stereotypes are the strongest negative predictors of reading intention (with an impact value below 0.2, small impact). Subjective norms positively influence reading intention through social identity mechanisms, while intragroup identity and intergroup stereotypes may have a negative impact on reading intention by triggering identity protection mechanisms and consuming cognitive resources (Wang et al., 2024; Shahrzad et al., 2017; Vezzali et al., 2012).

Among these antecedents, it is interesting to note that the variables with high influence values are mostly centered in a network formed by attitude, intention, perceived behavioral control, subjective norm, etc., while Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB) are the most effective frameworks for explaining how attitudes consciously influence individuals' reading behavior (Shahrzad et al., 2017; Tang and Li, 2025; Vezzali et al., 2012). From the Theory of Rational Behavior, Attitude, as an individual's positive evaluation of reading behavior ($r = 0.51$), together with the significant other's or group's expectation of reading represented by the Subjective norm ($r = 0.36$), constitutes the core antecedent of behavioral intention in TRA. This echoes the theoretical finding of Intention as the strongest positive predictor of reading behavior in the study ($r = 0.39$), suggesting that an individual's intention to read is not only rooted in his or her own attitudes, but is also significantly driven by social norms, which focuses on cognitive information-based attitude formation process, with the underlying assumption that humans are rational. This theory suggests that readers consider the meaning and consequences of their actions by integrating a variety of information before engaging in reading behavior. The TPB further

extends this framework. TPB is the successor to the TRA, which posits that human behavior is not 100% voluntary, but is under control. Therefore, the addition of perceived behavioral control variables forms the Theory of Planned Behavior, which helps to better understand readers' reading intentions and behaviors. This theory suggests that all factors that may influence behavior are indirectly influenced by behavioral intentions. Therefore, this paper also forms a comprehensive research framework based on these two theories, which states that all possible factors influence readers' intention to read, which in turn shifts from reading intentions to reading behaviors, for example, the result of Perceived behavioral control ($r = 0.26$) reflects an individual's beliefs about the ability to perform reading intentions and beliefs about the ability to perform reading behaviors, and although the strength of its influence is slightly weaker than that of attitudes and subjective norms, it still plays a key role in the theoretical network, corroborating the applicability of TPB in explaining behaviors that are not fully controlled by volition (e.g., reading behaviors that are influenced by factors such as ease of access to library resources, time management, etc.) (Masadeh et al., 2022). It is worth noting that the strong negative effect of Perceived risk ($r = -0.27$), as a key negative predictor of situational factors, may provide empirical evidence for the embedding of risk perceptions in the TRA/TPB model, either by influencing attitudes or by directly affecting behavioral intentions. This interaction between variables reveals precisely the dynamic complexity of reading behavioral decision-making and provides an important direction for contextualized revision of the theoretical model (Li et al., 2020; Tang and Li, 2025).

TABLE 6 Meta-analysis results for the relationships: the role of population type.

Moderators	Relationships	Level	k	Point estimate	95%CI		Z	Q	Q within	Q between	p-value
Population type	Attitude-intention	Students	12	0.35	0.32	0.37	25.83	118.86	907.44	321.90	0.000
		Teachers and Students	6	0.70	0.67	0.72	35.30	788.58			0.000
	Habit-intention	Students	6	-0.37	-0.41	-0.32	-15.77	344.11	344.11	0.00	0.000
		Teachers and Students	-	-	-	-	-	-			-
	Intention-behavior	Students	14	0.41	0.39	0.43	30.43	366.25	366.25	0.00	0.000
		Teachers and Students	-	-	-	-	-	-			-
	Number of collections-intention	Students	9	0.32	0.29	0.35	17.90	173.97	0.00	173.97	0.000
		Teachers and Students	-	-	-	-	-	-			-
	Perceived behavioral control-intention	Students	8	0.26	0.23	0.29	15.87	188.44	189.26	14	0.000
		Teachers and Students	3	0.38	0.33	0.44	12.48	0.82			0.000
	Perceived ease of use-intention	Students	16	0.23	0.21	0.25	19.27	151.83	164.06	4.81	0.000
		Teachers and Students	5	0.28	0.24	0.32	13.18	2.23			0.000
	Perceived usefulness-intention	Students	8	0.39	0.36	0.41	26.82	261.94	288.99	7.64	0.000
		Teachers and Students	3	0.46	0.42	0.50	17.98	27.05			0.000
	Satisfaction-intention	Students	7	0.41	0.38	0.44	22.84	261.65	261.65	0.00	0.000
		Teachers and Students	-	-	-	-	-	-			-
	Social influence-intention	Students	6	0.27	0.24	0.30	14.81	306.84	306.84	4.29	0.000
		Teachers and Students	1	0.37	0.28	0.45	7.87	0.00			1.000
Subjective norm-intention	Students	8	0.28	0.25	0.31	17.06	147.73	315.68	65.90	0.000	
	Teachers and Students	3	0.53	0.48	0.57	18.03	167.96			0.000	

Through antecedent analyses of reading intention and behavior, most of the review studies were based on cross-sectional designs. Thus, the direction of most of the effects is unclear and may be the result of multidirectional effects or other variables. Further examination of reading intention and behavior would greatly benefit from experimental or longitudinal approaches (e.g., through multilevel and randomized controlled trials, Kazemi et al., 2018; Petursdottir et al., 2009). Longitudinal studies are also particularly interesting because they can take into account the continuous evolution of readers' behaviors and

intentions, and because readers' reading intentions may often take some time to translate into actual reading behaviors. Therefore, this allows for a more accurate understanding of the entire process by which readers make actual reading behaviors. Through an experimental or longitudinal research design, it is also possible to further elucidate whether the causal factors influencing reading intention and behavior are antecedents, consequences, or both.

In addition, through moderators' analysis, readers' samples require more attention and diversity. For example, the results indicate

TABLE 7 Meta-analysis results for the relationships: the role of collection types.

Moderators	Relationships	Level	k	Point estimate	95%CI		Z	Q	Q within	Q between	p-value
Collected types	Attitude-intention	Mix	1	0.32	0.24	0.39	7.81	0.00	1,087.80	141.54	1.000
		Offline	10	0.35	0.32	0.38	20.78	85.35			0.000
		Online	7	0.57	0.55	0.59	35.21	1,002.45			0.000
	Habit-intention	Mix	–	–	–	–	–	–	84.15	259.96	–
		Offline	5	–0.24	–0.29	–0.19	–9.51	84.15			0.000
		Online	1	–0.91	–0.93	–0.88	–20.45	0.00			1.000
	Intention-behavior	Mix	1	0.16	0.05	0.27	2.94	0.00	338.71	27.55	1.000
		Offline	10	0.41	0.39	0.44	26.00	314.14			0.000
		Online	3	0.46	0.41	0.50	16.39	24.56			0.000
	Number of collections-intention	Mix	–	–	–	–	–	–	125.53	48.44	–
		Offline	8	0.37	0.33	0.40	19.19	125.53			0.000
		Online	1	0.04	–0.05	0.13	0.81	0.00			1.000
	Perceived behavioral control-intention	Mix	1	0.23	0.15	0.30	5.47	0.00	198.38	4.89	1.000
		Offline	8	0.31	0.28	0.34	17.44	187.34			0.000
		Online	2	0.26	0.20	0.32	8.04	11.04			0.000
	Perceived ease of use-intention	Mix	1	0.06	–0.01	0.13	1.68	0.00	125.57	33.30	1.000
		Offline	11	0.25	0.22	0.28	16.32	88.66			0.000
		Online	9	0.27	0.24	0.30	17.44	36.90			0.000
	Perceived usefulness-intention	Mix	1	0.47	0.41	0.52	14.68	0.00	266.48	30.15	1.000
		Offline	6	0.34	0.31	0.37	18.77	173.94			0.000
		Online	4	0.46	0.43	0.50	22.30	92.54			0.000
	Satisfaction-intention	Mix	3	0.47	0.42	0.50	19.42	138.99	245.27	16.39	0.000
		Offline	4	0.34	0.29	0.38	12.68	106.27			0.000
		Online	–	–	–	–	–	–			–
	Social influence-intention	Mix	1	0.12	0.06	0.19	3.58	0.00	268.37	42.76	1.000
		Offline	2	0.23	0.16	0.30	0.05	25.46			0.000
		Online	4	0.37	0.33	0.41	16.44	242.91			0.000
Subjective norm-intention	Mix	1	0.25	0.17	0.32	5.95	0.00	314.79	66.80	1.000	
	Offline	8	0.41	0.38	0.44	23.73	314.70			0.000	
	Online	2	0.14	0.08	0.20	4.29	0.09			0.050	

that the type of online collection has a greater impact on antecedents, reading intentions, and behaviors than offline because most studies use a convenience sample, such as obtaining a sample through a questionnaire. This convenience sample usually consisted of computer-savvy individuals (since most of the studies were done online, e.g., answering questions through an online link), which was more conducive for readers to enhance their understanding of reading behaviors by reading the survey questions. This better enhances readers' intention to read and shapes reading behavior, as in the results we found a significant positive correlation between e-reading style and reading intention. In addition, cross-national differences are the focus of attention because different national contexts (national development levels) represent different cultural and political situations, including Western and Eastern cultures, which always influence reading behaviors and the implementation of interventions (Joubert et al., 2013; Yang and Li, 2017). For example, in our results, we found that

developing countries had a slightly stronger influence on antecedents, reading intentions, and behaviors than developed countries, and we saw this impact specifically in our studies of country samples such as the United States, Italy, and China, but it is worth noting that the samples from developed countries were relatively small, and future research needs to pay further attention to studies from developed countries with a view to possibly testing or revising the results.

Overall, the relationship between most antecedents and reading intention is stronger than the relationship between intention and behavior. One possibility is that some antecedents (such as perceived usefulness and satisfaction) prompt readers to consider reading; however, students face situational barriers such as time scarcity and cumbersome data acquisition in reality (such as risk perception, environmental changes, behavioral control, etc.) (Jia et al., 2025; Merke et al., 2024). For example, there is a time mismatch between the long-term goal nature of academic reading and the short-term priority

TABLE 8 Meta-analysis results for the relationships: the role of reading styles.

Moderators	Relationships	Level	k	Point estimate	95%CI		Z	Q	Q within	Q between	p-value
Reading styles	Attitude-intention	Electronic	14	0.49	0.47	0.51	39.10	1,146.57	1,149.76	79.58	0.000
		Paper	3	0.33	0.28	0.39	11.27	3.19			0.203
		Both	1	0.18	0.09	0.26	3.88	0.00			1.000
	Habit-intention	Electronic	2	-0.46	-0.53	-0.38	-10.37	326.64	327.00	17.41	0.000
		Paper	1	-0.17	-0.29	-6.00	-2.89	0.00			1.000
		Both	3	-0.37	-0.43	-0.32	-12.25	0.05			0.975
	Intention-behavior	Electronic	5	0.58	0.55	0.61	29.52	159.55	187.63	178.62	0.000
		Paper	1	0.19	0.09	0.28	3.73	0.00			1.000
		Both	8	0.29	0.25	0.32	14.81	28.08			0.000
	Number of collections-intention	Electronic	-	-	-	-	-	-	0.00	173.97	-
		Paper	-	-	-	-	-	-			-
		Both	9	0.32	0.29	0.35	17.90	173.97			0.000
	Perceived behavioral control-intention	Electronic	8	0.32	0.29	0.36	18.59	185.72	185.78	17.49	0.000
		Paper	2	0.23	0.17	0.29	7.33	0.05			0.821
		Both	1	0.16	0.07	0.24	3.45	0.00			1.000
	Perceived ease of use-intention	Electronic	13	0.26	0.23	0.29	19.05	119.92	131.97	26.90	0.000
		Paper	5	0.28	0.24	0.32	13.18	2.23			0.000
		Both	3	0.13	0.09	0.18	5.50	9.83			0.000
	Perceived usefulness-intention	Electronic	6	0.36	0.33	0.39	21.64	229.73	250.63	46.00	0.000
		Paper	3	0.36	0.31	0.41	12.81	1.01			0.040
		Both	2	0.54	0.49	0.57	21.19	19.89			0.000
	Satisfaction-intention	Electronic	-	-	-	-	-	-	261.65	0.00	-
		Paper	-	-	-	-	-	-			-
		Both	7	0.41	0.38	0.44	22.84	261.65			0.000
Social influence-intention	Electronic	4	0.37	0.33	0.41	15.49	262.30	262.70	48.43	0.000	
	Paper	1	0.37	0.28	0.45	7.87	0.00			1.000	
	Both	2	0.14	0.08	0.19	4.84	0.40			0.051	
Subjective norm-intention	Electronic	8	0.41	0.38	0.44	23.94	309.84	314.20	67.39	0.000	
	Paper	2	0.19	0.13	0.25	6.01	4.35			0.037	
	Both	1	0.13	0.04	0.22	2.89	0.00			1.000	

of daily tasks. High cost reading makes it easier for readers to turn to low-cost alternative options, which makes it difficult to implement self proclaimed images. They may not promote real reading behavior (Jia et al., 2025; Merke et al., 2024). In addition, common methods and simultaneous measurements of each antecedent and intention may lead to exaggerated correlations, such as small sample trust, self-efficacy, and brand reputation variables. Therefore, caution should be exercised when interpreting and using the significant correlation between future intentions and behaviors.

5.1 Limitations and future directions

It is recognized that this meta-analysis is limited by the quality of the data available, differences in the operationalizability of each factor, and the potential for publication bias. First, most of the studies were

conducted in a relatively small number of countries, especially those with small sample sizes from developing countries. As a result, the samples collected may not be representative of the global community of college readers. We addressed these issues using a comprehensive strategy that included collecting studies, applying rigorous selection criteria, correcting for unreliable measures, and testing the robustness of each effect using the Failsafe N (Rosenthal) method (Li et al., 2020; Tang and Li, 2025). To fill the gap in sample representativeness, future research can adopt the following specific methods: (1) adopting a stratified sampling design to cover countries with different levels of development (such as high-income, middle high income, middle low income) and cultural backgrounds (such as individualism vs. collectivism culture), ensuring balanced representation of regional and economic dimensions; (2) Conduct cross-cultural collaboration research, collaborate with research institutions in underrepresented regions such as Africa and Latin America, and expand the geographical

TABLE 9 Risk-of-bias assessment of eligible articles.

Risk-of-bias criteria	Description	Risk- <i>n</i> (%)		
		High	Low	Unclear
Selection bias	Is there a random allocation of subjects in the experiment? Is there random sampling in the study?	4 (10.8)	32 (86.5)	1 (2.7)
Performance bias	Are the conditions outside the experiment consistent? Do investigators and respondents know the purpose of the study?	5 (13.5)	29 (78.4)	3 (8.1)
Detection bias	Is the standard measurement tool the same for the experimental group and the control group?	4 (10.8)	33 (89.2)	0 (0)
Attrition bias	What is the proportion of valid questionnaires, is there a missing value in the answers, and are there explanations for the above?	4 (10.8)	31 (83.8)	2 (5.4)
Reporting bias	Are the results of the study reported truthfully (i.e., both positive and negative results are reported)?	5 (13.5)	27 (73.0)	5 (13.5)
Other bias	Is the basic information description of the sample complete, and are the reliability and validity of the measurement tool in the study reported?	5 (13.5)	30 (81.1)	2 (5.4)

coverage of the sample; (3) Integrate the mixed method data collection mode (such as combining online questionnaires with offline interviews), capture the reading behavior of non digital native groups or Internet users with limited access, and improve the diversity of samples.

Secondly, we are unable to test the multivariate causal model of reading behavior, as most research reports lack empirical connections with other research streams. For example, there is no research investigating the impact of readers' temporary delays on rational behavior theory or planned behavior factor theory. In future research, the connections between these different theories should be investigated, as this approach considers the correlation between antecedents and reader delay effects, as well as the overall model that allows for testing reader motivation (Khanjani et al., 2019; Masadeh et al., 2022; Tang and Li, 2025). For example (1) implement a multi wave longitudinal tracking design (such as setting 3–4 measurement time points within 1–2 academic years), capture the dynamic causal relationship between antecedent variables, intention, and behavior, and clarify the time series of variable effects; (2) Conducting randomized controlled trials (RCTs) to validate causal effects—for example, designing reading promotion interventions (such as personalized intention setting prompts, optimization of resource access convenience), and comparing the results of the intervention group with the control group to verify the effectiveness of key antecedent variables; (3) Incorporate cross theoretical constructs (such as integrating perceived behavioral control of TPB and autonomous motivation of SDT) into a unified multivariate model to examine complex interaction mechanisms.

Despite these issues, our meta-analysis comprehensively integrates the key influences of readers' reading intentions and behaviors based on all available evidence to date. It reveals new insights that were not present in the original research or previous reviews, and identifies the possibility of insufficient future exploratory research.

5.2 Theoretical and practical implications

This meta-analysis advances the theoretical understanding of university library reading behavior by validating, extending, and refining

existing frameworks while resolving empirical ambiguities. Firstly, it verifies the utility of the Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB) in library contexts, as core constructs like Attitude ($r = 0.51$, the strongest positive antecedent), Subjective Norm ($r = 0.36$), and Perceived Behavioral Control ($r = 0.26$) consistently predict reading intention and behavior across included studies. Secondly, this review identifies gaps in existing literature that require further research. For example, although inexperienced and non-college readers may not be able to join the reading plan due to insufficient understanding of it, only a few studies have investigated this hypothesis and planned to compare the knowledge and willingness of readers and non-readers. Identifying the strongest predictive factors for reading behavior, such as attitude, habit, satisfaction, and self-efficacy, highlights the structure that provides the most effective opportunities to increase and retain readers. Interventions aimed at addressing these factors should be the focus of management practice. Other areas that require future investigation based on their theoretical rationality and lack of empirical universality include attitudes, perceptions, reciprocity, intention, satisfaction related factors toward readers' reading needs, as well as collecting the impact of reading environment factors (Merke et al., 2024). In addition, as the influence of certain factors such as reading willingness has been shown to change over time, more longitudinal research is needed on readers. Finally, most of the samples in this meta-analysis come from the faculty and student population of universities.

The findings translate to actionable strategies for university library managers, educators, and policymakers, all grounded in the magnitude of key antecedent effects. Firstly, for library managers, intervention measures should prioritize high impact internal factors: enhancing attitudes through user centered design (such as comfortable reading spaces, "reading packages" aligned with academic goals), and combating the negative impact of perceived risks through digital library integration (such as mobile applications that link students' non library digital reading with library resources); they should also promote reading through campus activities that emphasize exclusive resources and seminars focused on papers, utilize external factors such as brand reputation, and mitigate perceived risks in developing countries through expanding databases and "resource guarantee" services. Secondly, for educators, the positive impact of disciplinary norms demonstrates the rationale for incorporating library use into the curriculum (such as assignment requirements for library citations, reading activity) and establishing self-efficacy through early career "library

literacy” modules. Finally, at the same time, policymakers should address background differences by funding digital infrastructure and librarian training in developing countries (for example, Group Norm has a stronger influence in developed countries), and support inclusive access by funding “community reading passes” for non-student groups (such as community members) to address barriers such as social exclusion (Navas et al., 2022).

6 Conclusion

To our knowledge, this is the first to present a systematic meta-analysis study evidence on antecedents, intention and behavior, as well as moderators that influence these relationships. We established a comprehensive theoretical framework and systematically summarize and outline the key determinants of current reading behavior using meta-analysis. This study included 37 studies ($N = 15,434$), our results identified 44 antecedents and compared their differences based on the following factors: (1) internal factors (individual, motivations, and habit preferences), (2) external factors (reading environment, society and culture), and (3) contextual factors. The results highlight that Attitude ($r = 0.51$), Self-efficacy ($r = 0.47$), and Satisfaction ($r = 0.44$) are the most potent positive drivers of reading intention, which in turn significantly predicts actual reading behavior ($r = 0.39$), whereas factors such as Perceived Risk and Intergroup Stereotypes negatively impact engagement. Beyond direct associations, the study reveals that these mechanisms are heterogeneous across different contexts; exploratory moderator analysis indicates that relationships are stronger in developed countries, among teacher populations compared to students, and within electronic reading contexts rather than traditional paper formats. Methodologically, studies utilizing SEM and online data collection yielded stronger moderating effects. Supported by a literature set characterized by high quality and negligible publication bias, these findings validate a comprehensive theoretical framework for understanding reader engagement and offer precise pathways—specifically targeting attitude and self-efficacy—for developing effective reading promotion interventions. We present the first systematic meta-analysis study evidence on antecedents of reading behavior, which summarizes ample empirical knowledge about reading behavior in the literature and follows contemporary meta-analysis guidelines and best practices to produce transparent and replicable scientific discoveries. Our research findings also contribute to reading interventions and provide theoretical, policy and practical implications for future research on reading promotion.

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.

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XZ: Data curation, Funding acquisition, Investigation, Methodology, Visualization, Writing – original draft, Writing – review & editing. ZL: Conceptualization, Writing – review & editing.

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Conflict of interest

The author(s) declared that this work 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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Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2025.1644168/full#supplementary-material>

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