

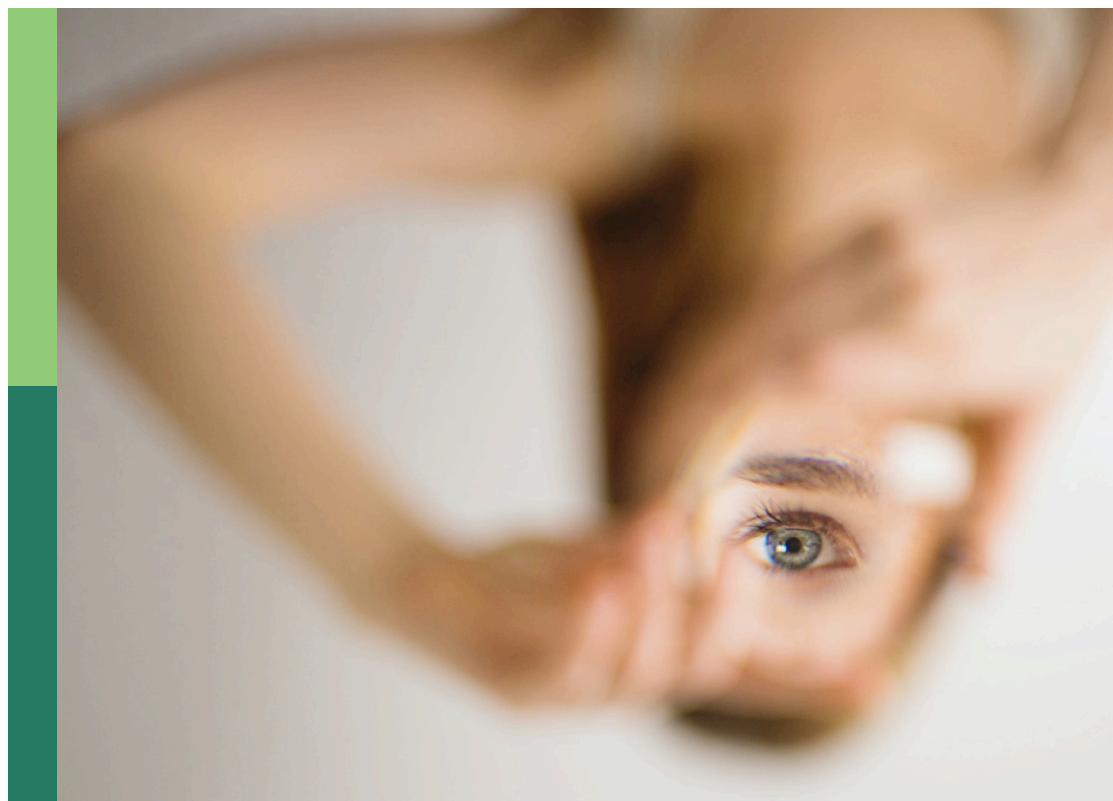
Creative organization development through leadership

Edited by

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Creative organization development through leadership

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Editorial: Creative organization development through leadership

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Editorial on the Research Topic

Creative organization development through leadership

Introduction

The influence of leadership has affected human history for thousands of years, although systematic research on leadership only started in the 20th century. Leadership studies, which produced trait theory, explored behavioral and contingency approaches, with the perspective toward leadership mostly being shaped by these theories until the 1980s. However, some scientists began to question the usefulness of the concept of leadership and thought that leadership studies were limited in their approaches (Hoy and Miskel, 2010). Based on modern theories, leadership is now not confined in definition to the exercise of managerial authority; it can also occur when formal leaders engage in informal behaviors beyond their official responsibilities. For example, Sparrowe and Liden (2005) discovered that, through informal activities, such as a luncheon or a social event, leaders may share valuable contacts in their informal networks by introducing them to their colleagues. For this reason, leadership now refers to a social influence process in which leaders attempt to motivate and enable others to contribute toward achieving collective goals (Bass, 1985, 1990, 2005; Yukl, 2002).

In this context, it is clear that leadership plays an important role in an organization's development and sustainability and that educational organizations need creative leaders. For this reason, this special issue aims to address creativity and leadership in education. Thereby, this issue will draw attention to the contemporary term "creative leadership" and contribute to educational fields by means of exploring the relationship between creativity and leadership. Creativity is developed by guiding rather than being taught. For this, environments that allow rich and diverse experiences should be designed (Vural et al., 2024) and leadership affects lots of different issues in organizations, such as emotions (Goleman, 1998; Goleman et al., 2002, 2005; Batool, 2013; George, 2000; Ginsberg, 2020). In order to build and sustain an organizational culture dominated by creativity, innovation, and digitalization, organizations must effectively identify and mobilize the creative resources of their members. When organizational members experience a work environment that restricts or fails to encourage individual creative expression, a gap may exist between the level of individual creative potential and the actual amount of individual creativity practiced within the organization. Leadership development may represent one important

key for unlocking this idle creative potential and enhancing overall organizational effectiveness (Houghton and DiLiello, 2010). Moreover, the ethical behavior of leaders and atmosphere of an organization allows employees to maintain positive emotions (Xiu and Zhao, 2016) and helps leaders and employees create a more creative atmosphere in organizations. So, organizations should focus on leadership to develop creativity via all dimensions and on all levels of the organization. In order to achieve this, reshaping organizational psychology and culture accordingly can be stated as one of the main missions of organizational leadership. Trust is the key factor for leadership (Titrek, 2016) to develop a positive organizational psychology and climate in organizations.

Creativity was initially considered an innate ability that existed primarily in artistic fields. However, it later began to be regarded as a skill that could be developed. As organizational life accelerated, it became apparent that organizations that stood out possessed creative employees. Consequently, developing this skill became important for both employees and those managing the organization. It is also understood that as those managing organizations increase their individual skills, such as creativity, they become more effective as leaders. Recent studies have proven that creativity is necessary for both individuals and organizations. Studies have also shown that leadership is instrumental in encouraging creativity and innovation. Creativity requires an organizational environment where employees feel safe to express new ideas and take risks. In this context, it is clear that creative leadership plays an important role in an organization's development and sustainability. This issue will draw attention to the contemporary term "creative leadership" and contribute to educational fields by means of exploring the relationship between creativity and leadership. Vural et al., discussed how creativity is developed through guidance rather than teaching. For this, environments that allow rich and diverse experiences should be designed. In order to build and sustain an organizational culture dominated by creativity and innovation, organizations must effectively identify and mobilize the creative resources of their members. When organizational members experience a work environment that restricts or fails to encourage individual creative expression, a gap may exist between the level of individual creative potential and the actual amount of individual creativity practiced and developed within the organization via leadership. Houghton and DiLiello explain that leadership development may act to unlock idle creative potential and enhance overall organizational effectiveness. So, organizations should focus on leadership to develop creativity via all dimensions and at all levels of the organization.

We believe that this issue will contribute to the Organizational Psychology Specialty Section by addressing the role of critical concepts in the workplace. Contributions are expected to examine the relationship between different aspects of creative leadership against the backdrop of organizational life, behavior, and psychology. Moreover, this special issue will also reveal the effects of creative organizational culture, which is one of the most fundamental issues in terms of organizational psychology, and the factors affecting this culture in detail. In addition, this special issue aims to reveal how creative organizational culture is changing organizational behavior and psychology as well as

organizational structure in today's rapidly changing world. The creative organizational leaders who will produce this change, their characteristics, and the new skills they need to acquire can be stated as another important purpose of this special issue. Leadership today is being redefined—not only as a formal function or title but as an enabler of innovation, adaptability, and ethical transformation in organizations navigating volatile and complex environments. The Research Topic '*Creative organization development through leadership*' was launched to investigate these shifting contours and to foster a dialogue around how leadership practices drive sustainable and inclusive development across diverse contexts.

This special issue has attracted attention from different academics all over the world. The high levels of diversity and originality in the contributed studies is a clear indication that it is a significant issue. We have received high-quality submissions that multidimensionally analyze the relationship between emotion, leadership, and its effects on organizational culture, psychology, and education systems, with the aim of thoroughly revealing the subject by accepting academically effective studies. Moreover, I would like to thank the valuable academicians from Türkiye, Brasil, China, Cyprus, Congo, Korea, Spain, Thailand, and New Zealand and the academicians and researchers from many different countries who provided editorial support for this special issue. The 25 articles accepted for this special issue discuss leadership, leadership type, and related topics of leadership in organization. In detail, the studies discuss leadership types (five papers), digital and transformational leadership (six papers), innovation (five papers), creativity (two papers), emotions (two papers), ethical leadership (two papers), leadership competencies (two papers), gender issues (two papers), organizational development and behavior (all papers) and other related topics such as psychological safety, physical capacity, organizational security, organizational trust, school effectiveness, job satisfaction, team reflexivity, diversity, organizational healing, leader tolerance, identification, agility, and self-esteem. When all Research Topics are examined, it is seen that the focus is on the effects of leadership types on organizational behavior and organizational psychology.

Aquino et al. classified interpersonal and intrapersonal leadership competencies into five competency areas and examined the interpersonal and intrapersonal influences in detail. They demonstrated that effective leadership operates at both the individual and interpersonal levels. They stated that leaders significantly influence their internal processes, relationships, and interactions. Resilient leaders stabilize teams during crises; foster a commitment to continuous learning, innovation, collaboration, and knowledge sharing with strong communication skills; and strengthen relationships with customers, subordinates, and stakeholders. Empathetic leadership creates healthier work environments by reducing stress and conflict, fostering motivation and commitment, and fostering team transformation and adaptability. Therefore, these leadership competencies are crucial for maintaining a competitive advantage.

Yuqi et al. also investigated the impact of platform leadership on employee innovation behavior. This study demonstrated the positive impact of leadership on organizational learning, knowledge sharing, peer support, and psychological empowerment and demonstrated the contributions of platform leadership to

organizational development. These factors significantly increase employees' innovation behavior, highlighting the importance of developing a learning-oriented culture, encouraging knowledge sharing, and psychologically empowering employees, suggesting applicable insights for leadership policies.

Qasim and Laghari examined the concepts of ethical leadership, creativity, and psychological safety using an ethical climate as a moderator. Their study findings indicated that ethical leadership is a significant direct and indirect factor influencing creativity through a sense of belonging and psychological safety, and that the moderating role of an ethical climate is also significant. The study found that ethical leadership is a strong predictor of sense of belonging and psychological safety, which contribute to employees' creativity. Moreover, Zhu et al. also examined the ethical behavior of leaders and investigated the causal model of radical innovation in China, examining the mediating effect of leader identity and the moderating effect of promotion orientation. They found that leader ethical behavior positively influenced both leader identity and radical innovation. Furthermore, leader identity mediated the relationship between leader ethical behavior and radical innovation. They concluded that promotion orientation strengthened the effect of leader ethical behavior and leader identity on radical innovation.

Some researchers have conducted research examining leadership styles and the emotional dimension of the organization. Bai and He investigated the “double-edged sword” effect of shared leadership on employee voice behavior. On the one hand, their study shows that shared leadership as an empowerment mechanism positively influences employees' voice behavior through empowerment associated with perception of organizational status. On the other hand, shared leadership as an exhaustion mechanism suggests that it negatively impacts employee voice behavior through the service pathway characterized by emotional exhaustion. It is suggested that employees' expectations of empowerment play a critical role in triggering these opposing mechanisms, and that high employee expectations of empowerment increase the positive effects of the empowerment mechanism while reducing the negative impact of the depletion mechanism. Ma et al. examined the roles of organizational behavior, belonging, and organization-based self-esteem in inclusive leadership and subordinates' career goals. This research provides a deeper understanding of the relationships between leadership styles and employees' job satisfaction, identifying a positive relationship between inclusive leadership and career goals. Furthermore, they found that organizational belonging also mediated the relationship between inclusive leadership and career goals. They concluded that organizational centrality and self-esteem moderated the relationship between inclusive leadership and career goals both directly and indirectly through belonging. Liu C.-E. et al. reported that an error-avoidance climate positively influences poor leadership, and that moral disengagement and ego depletion mediate the relationship between an error-avoidance climate and poor leadership. Furthermore, they found that an error-avoidance climate moderates the relationship with moral disengagement, concluding that the relationship between an error-avoidance climate and moral disengagement is stronger when leaders have a high preventative-regulatory focus and a high incentive-regulatory

focus. Zhang and Ma examined how employees' expected and perceived trust, a fundamental emotional concept in organizational behavior, influence impression management. They determined that trust promotes socially positive management and reduces selfish behaviors. They also found that higher levels of trust were positively associated with prosocial behaviors; employees with high expected trust but low perceived trust resorted to selfish strategies, while employees with low expected trust but high perceived trust exhibited stronger prosocial tendencies. Furthermore, Wang et al. investigated the relationship between an error management climate, psychological safety, and employee piracy through the moderating role of risk-taking characteristics in organizations. The results show that an error-management environment has a significant positive effect on employees' piracy innovation behaviors; psychological safety plays a mediating role between an error-management environment and piracy innovation behaviors; and risk-taking characteristics play a moderating role in the relationship between psychological safety and employees' piracy innovation behaviors.

Zhang Y. et al. investigated the mediating role of perceived organizational support and organizational identification in increasing job commitment through leader tolerance. They found that leader tolerance significantly increased employees' job commitment and confirmed the mediating roles of perceived organizational support and organizational identification in the relationship with job commitment.

Erden investigated the impact of teachers' psychological capital on the quality of work life based on the mediating effect of emotions. The mediating role of emotions in the relationship between teachers' psychological capital and perceptions of quality of work life was fully supported, and he found a significant correlation between their psychological capital, perceptions of quality of work life, and emotions. Psychological capital was found to have a significant and positive impact on both emotions and perceptions of quality of work life.

In several studies featured in this special issue, the significance of digital transformation for organizational innovation is underlined. For instance, Sibassaha et al. investigated the impact of digital transformation on employees' innovative behaviors in Brazil, examining the moderating roles of organizational culture and leadership styles. Their findings emphasize that the ability to cope with challenges and the presence of organizational cultural support play a crucial role in facilitating the influence of digital transformation on innovation. Notably, they also demonstrate that higher levels of transformational leadership do not necessarily enhance innovation in organizations undergoing digital transformation—an observation of considerable theoretical value. Similarly, Li et al. showed that digital leadership is associated with more favorable shifts in the emotional commitment of younger employees. They further argue that employee empowerment and voice behaviors mediate this relationship, creating a chain-mediating mechanism between digital leadership and emotional commitment. Along the same lines, Chen et al. revealed that managerial cognition exerts a significant positive effect on innovation performance; moreover, compositional capability mediates this link, while the updating of organizational routines

strengthens the positive association between managerial cognition and compositional capability.

Other contributions have examined organizational innovation through the lenses of leadership and conflict. Wang and Duan, for example, analyzed intergenerational diversity and team innovation by considering the roles of conflict and shared leadership. Their results indicate that generational diversity predicts both cognitive and affective conflict, which exert opposing influences on team innovation. Shared leadership strengthens the positive relationship between cognitive conflict and team innovation, thereby enhancing the indirect effect of intergenerational diversity. However, it was found to have no significant impact on the link between affective conflict and team innovation. In a related study, Liu M. et al. explored how team reflexivity affects employees' feedback-seeking behaviors. They report that shared mental models mitigate the effect of team reflexivity on transactive memory systems (TMS). These findings suggest that recognizing the roles of reflexivity, TMS, and shared mental models can help organizations design more effective strategies to encourage feedback-seeking behaviors among employees.

In the context of hybrid work, Kim and Yoon examined the impact of empowering leadership on adaptive performance in Korea, focusing on the serial mediating effects of knowledge sharing and employee agility. Their results confirm that empowering leadership positively influences adaptive performance and that knowledge sharing and agility partially mediate this relationship.

The special issue also features studies that investigate the interplay between intra-school relations and leadership. Kaya analyzed the mediating effects of professional resilience and job satisfaction in the relationship between transformational leadership and teachers' creativity. The findings reveal that transformational leadership significantly predicts job satisfaction and professional resilience, though it does not have a statistically significant direct effect on creativity. Nonetheless, professional resilience mediates the link between transformational leadership and creativity. Taken together, these results suggest that the prevalence of transformational leadership in schools may enhance both teachers' resilience and their creative potential.

Kandemir examined the mediating role of school effectiveness in the relationship between transformational leadership and workplace exclusion. The study shows that both school effectiveness and transformational leadership exert significant negative effects on workplace exclusion, with school effectiveness mediating this relationship. Practical recommendations include offering in-service training on transformational leadership and school effectiveness for administrators as well as providing teachers with opportunities for professional development and participation in decision-making, thereby helping to reduce workplace exclusion. Similarly, Dere highlighted that the development of STEM intelligence and the acquisition of scientific attitudes positively influence student motivation in higher education. The findings further indicate that female students hold more favorable attitudes toward scientific research. As positive attitudes toward research and researchers increase, so too does motivation for STEM. Improvements across verbal-linguistic, logical-mathematical, spatial, interpersonal, intrapersonal, and naturalistic intelligences

were also found to contribute to these positive attitudes, thereby enhancing STEM motivation.

Finally, the literature also reveals conceptual intersections between organizational leadership and women's leadership. Some authors have therefore turned their attention to this dimension. Palomo-Vadillo et al. developed an index to measure gender-focused investment practices within organizations, proposing and validating an instrument designed to capture multiple dimensions of gender-lens investing (GLI) from both academic and practitioner perspectives. Likewise, Eratli Sirin and Öz identified gender-based negative experiences in organizational contexts, noting that female observers are disproportionately subject to the glass ceiling compared with their male counterparts. They recommend the implementation of positive organizational discrimination measures in the selection of football observers to address this imbalance.

Conclusion

Based on the papers collected here, it can be stated that there is a relationship between leadership and creativity, and it has been scientifically demonstrated that this relationship plays an important role in the development of organizational culture and behavior. Furthermore, it is understood that the topic is related to employee emotions toward organizations; trust, especially, is a key factor in promoting a positive organizational culture. Moreover, an ethical climate also supports innovation, organizational identification, and healing. Nowadays, leadership needs creative thinking and an ethical organizational environment. In addition, digitalization has started to affect organizational leadership and psychology.

Organizational leadership is related to many behavioral and cultural topics such as innovative behavior, creativity, employee outcomes, organizational commitment, team reflexivity, social support, inclusion, sustainability, team building, developmental feedback, motivation, emotional intelligence, work engagement, organizational quality, organizational identification, emotions, psychological safety, social support, life satisfaction, job satisfaction, perceived power, ethical behavior, professional development, school health, and change. When employees experience positive emotions, such as happiness, love, and respect, they are motivated to discard time-tested or automatic (everyday) behavioral scripts in favor of novel, creative, and often unscripted paths of thought and action. Therefore, a leader's ethical behavior that puts employees' needs and wellbeing first, making them feel respected and accepted, will strengthen employee-leader relationships and create a positive organizational climate.

From these study results, we understood that creativity, ethical behavior and atmosphere, emotions, and trust in organizational leaders correlate strongly with each other. Furthermore, based on the results, we can say that leadership, creativity, and ethical behaviors affect school culture and transformational organization behavior in schools. We can also claim that creativity in organizations and schools is important. Moreover, managers and organizational leaders have to focus on developing a creative and innovative organizational culture combined with an ethical atmosphere. Finally, leaders' motivation and dedication inspire

team transformation and adaptability. Thus, these leadership competencies are instrumental in sustaining a competitive edge and driving organizational growth amidst a dynamic business environment.

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Conflict of interest

The authors declare that the research was conducted in the absence of any of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The mediating role of school effectiveness in the relationship between transformational leadership and workplace exclusion

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The purpose of this study is to reveal the mediating role of school effectiveness in the relationship between transformational leadership and workplace exclusion. The sample of the study consisted of 410 teachers working in primary, secondary and high schools in Bolu/Türkiye province center in the 2023–2024 academic year. Correlational design was used in the study and path analysis was used to reveal the predictive relationships between variables. As a result of the study, it was seen that the hypotheses put forward in line with the model put forward were confirmed. In this context, it was concluded that transformational leadership has a significant positive effect on school effectiveness (Hypothesis 1), school effectiveness has a significant negative effect on workplace exclusion (Hypothesis 2), transformational leadership has a significant negative effect on workplace exclusion (Hypothesis 3) and finally school effectiveness has a mediating role in the effect of transformational leadership on workplace exclusion (Hypothesis 4). In the context of the results, suggestions were made such as providing in-service courses for school administrators on transformational leadership and school effectiveness, preventing exclusion at work by giving teachers the opportunity to develop themselves and participate in the decisions taken.

KEYWORDS

school, school effectiveness, teacher, transformational leadership, Türkiye, workplace exclusion

Introduction

It is known that leadership styles are important for organizations to achieve the goals they set and that effective leadership plays a major role in achieving the goals of organizations. Leadership, which is one of the important concepts, can be defined as the process of mobilizing those who are behind them in line with a specific goal with these characteristics of individuals with high analytical and intuitive power, empathy, and expertise (Buil et al., 2018).

Today, with the rapid pace of change, a racing environment has emerged in the world and it has become important to realize change and change on time. Leadership (Demirtaş and Şama, 2016) and especially transformational leadership can be considered important for organizations to realize this change (Yu and Jang, 2024). Because while transformational leaders support innovation in products and technologies, they also lead changes in the strategy, mission, culture and structure of organizations (Samson et al., 2021). Transformational leadership triggers the needs that are important to those around them by making them realize

the importance of their task (Yao et al., 2024). The missions of transformational leadership include inspiring and encouraging those around them and focusing on developing shared commitment and vision by bringing about positive change in community culture (Pineda, 2023). They coach their followers and empower them by supporting them in learning and personal development (Andoka et al., 2024; Harms and Crede, 2010; Kartika, 2024; Lai et al., 2020), and they positively influence their followers in terms of performance as they strategically anticipate the future and create an exciting team spirit (Joo and Lim, 2013). In addition, transformational leaders create an effective interaction between themselves and their followers by appealing to the feelings of individuals and establishing an emotional bond with them (Barutçugil, 2014). They have a vision for the future, can see changes in the organizational environment, and have the ability to motivate and inspire their members (Andoka et al., 2024). Truly transformational leaders are a directive, sensitive and forward-looking concept (Nguyen et al., 2023) that is necessary to bring about change in areas such as human resources, tools, infrastructure, finance, etc. to achieve targeted business results. Similar to these explanations, Hay (2006) explains the characteristics of transformational leaders as visionary, risk-taking, having effective communication skills, enthusiastic, open to learning, inspiring others, giving importance to cooperation, caring about the individual needs of employees, etc. When the relevant literature is examined, it is seen that transformational leadership has positive effects in organizations. For example; Alzoraiki et al. (2024) found that transformational leadership positively affects school culture and teaching performance; Jiatong et al. (2022) found that transformational leadership has a positive effect on affective organizational commitment and job performance; Yu and Jang (2024) found that transformational leadership has a positive effect on teachers' work. When the research results are examined, it is seen that transformational leadership has a positive effect on many aspects such as organizational culture, organizational commitment and job performance. From this perspective, it can be interpreted that transformational leaders have a positive impact on the organization, creating a positive climate in the organization and reducing negativities such as organizational exclusion.

As a frequently used concept, ostracism is the exclusion, ignoring, disregarding and isolation of a person from other individuals or groups, often without giving a reason (Williams, 1997). According to another definition, ostracism is a distressing emotion for the individual, a situation that reduces the individual's self-perception and can take away the sense of control in interaction with others (Sulea et al., 2012). Ostracism can be considered as a hidden pain that reduces the motivation of employees and affects their attitudes (Li and Zhang, 2019). On the other hand, ostracism in the workplace is a situation in which an individual or group is rejected or ignored by another individual or group to the extent that it constitutes an obstacle in terms of job success, positive relationship or reputation (Hitlan et al., 2006). In other words, exclusion in the workplace causes employees to be ignored in the organization they work for and, consequently, to become depressed and unable to meet their basic needs (Xing and Li, 2022). It is understood that individuals who are exposed to exclusion in the workplace; group loyalty, job satisfaction and organizational citizenship perceptions decrease (Mohsin et al., 2022; Qian et al., 2019; Zhang et al., 2023), cause problems such as depression, anxiety, and emotional exhaustion (Wang G.H. et al., 2023; Yang and Wei, 2018) and are one of the main causes of stress in

organizations (Liu et al., 2013; Noor and Abbas, 2024). This situation is also reflected in the studies conducted. For example, Wang L. M. et al. (2023) concluded in their study that increased information sharing in the workplace decreases exclusion and burnout. Noor and Abbas (2024) found that ostracization in the workplace depletes resources such as self-esteem and self-control. At this stage, it can be interpreted that exclusion can cause negative consequences for organizations and prevent positive situations such as school effectiveness.

Effectiveness is defined as “the degree to which the organization achieves its goals” (Barnard, 1938, cited in Çiftçi, 2023) or the state of achieving success in the results obtained by using effective methods in terms of revealing the determined goals, reaching the necessary resources and adapting to the environment (Ada and Baysal, 2012). From this point, it is seen that effectiveness is an important situation for organizations. Because it is known that organizations maintain their existence when they are effective and sufficient (Aydın, 2010). It is understood that this situation is also valid for schools, which are important organizations. Effective schools are characterized by clear educational goals, systematic evaluation, safe school climate, quality, and holistic development of students (Edmonds, 1979, as cited in Diş, 2023). In other words, effective schools are schools where students are supported with all areas of development at the highest rate (Abdurrezzak, 2015). In effective schools, factors such as teacher motivation (Khun-Inkeeree et al., 2022), strong leadership, positive school culture, meeting students' needs, promoting social justice, and parent involvement are prominent (Javornik and Klemenčič Mirazchiyski, 2023). It is seen that there are different stakeholders in the formation of these environments in effective schools. Zigarelli (1996) stated that factors such as teacher quality, leadership and communication skills of the administrator, teacher participation, strong school culture, and participation of families are important in effective schools. Weindling (1989; as cited in Al-Mekhlafi and Osman, 2022) similarly listed the characteristics of effective schools as emphasizing learning, shared vision and expectations, parent-school collaboration, professional leadership, staff development, positive reinforcement, etc. As can be seen, many factors play a role in effective schools. This situation has also manifested itself in research. For example, Kale (2023) concluded in his study that there is a positive significant relationship between school effectiveness and trust in instructors; Özgenel (2020) concluded in his study that school climate predicts school effectiveness. Again, Özgenel and Koç (2020) found that there is a significant relationship between teachers' professional commitment and school effectiveness.

Since transformational leaders strategically envision the future and create excitement in the team spirit, it is seen that they positively increase the performance of their followers (Joo and Lim, 2013) and adopt management based on learning and development (Loyless, 2023). It can be said that this situation also manifests itself in schools. Transformational leaders enable teachers to develop up-to-date teaching and learning approaches, allowing them to develop individually and, accordingly, to educate students according to the requirements of the age (Celep, 2004). Transformational leadership aids school and community development through a culture that fosters innovative capacity and moral commitment to student achievement, sustained performance and school community development (Alzoraiki et al., 2024). At this point, it can be interpreted that the transformational leadership characteristics of administrators

have a positive effect on schools to be effective schools. Because it is seen that schools that try to increase their academic levels make efforts to increase their leadership capacities, and school principals who serve as administrators make efforts to transform the school culture (Marks and Printy, 2003). In addition, transformational leaders make individual contributions to their colleagues by sharing risks and responsibilities with them (Moolenaar et al., 2010). In addition, transformational leaders contribute to the development of employees by supporting them, and they produce appropriate solutions to problems by expressing their wishes (Bass, 1996). Thus, it is interpreted that negative attitudes such as emotional exhaustion, high stress, and exclusion in the workplace (Lane, 2017), which lead to problems such as achieving goals, etc., will decrease in organizations where transformational leadership characteristics are seen. When the related literature is examined, it is seen that there is no study investigating the effect of transformational leadership on workplace exclusion and the mediating role of school effectiveness. This situation makes the research important. In addition, when the effect of transformational leadership on workplace exclusion is revealed, it will be easier to encourage school administrators to become transformational leaders. In addition, investigating the mediating role of school effectiveness in the effect of transformational leadership on workplace exclusion makes the research important in terms of revealing the characteristics of effective schools. Finally, it is thought that the research is important in terms of shedding light on both decision makers and future studies.

Method

Study group

The study group of the current study consisted of 410 volunteer teachers working in primary, secondary and high schools in the center of Bolu/Türkiye in the second semester of the 2023–2024 academic year. The type of sampling in which the researcher saves time, money and effort by easily accessing the group of the size needed by the researcher is accepted as convenient sampling (Büyüköztürk, 2010). Furthermore, the selection of schools was based on their different levels, types (vocational, science and Anatolian high schools, middle schools, imam-hatip middle schools, etc.) and social environments. Thus, it was aimed to reach different opinions by reaching teachers working at different levels of education. Of the teachers who participated in the study; 262 (63.7%) were female, 149 (36.3%) were male; 310 (75.6%) had undergraduate education, 100 (24.4%) had

postgraduate education; 68 (16.6%) had 0–10 years, 192 (46.8%) 11–20 years; 119 (29.0%) had 21–30 years of seniority and 31 (7.6%) had 31 or more years of seniority; 116 (28.3%) worked in primary schools, 133 (32.4%) in secondary schools and 161 (39.3%) in high schools; 387 (94.4%) were married and 23 (5.6%) were single.

Research model and hypotheses

In the study, correlational design (Dancey and Reidy, 2017) was used to determine the relationship between transformational leadership, school effectiveness and workplace exclusion according to teacher perceptions, and path analysis was used to reveal the predictive relationships between variables.

The model created for transformational leadership, workplace exclusion and school effectiveness in the context of the current study is given in Figure 1.

When Figure 1 is examined, the research model was determined as transformational leadership (independent variable), school effectiveness (mediating variable), and workplace exclusion (dependent variable). In line with the determined model, the following hypotheses were included;

Hypothesis 1: Transformational leadership has a significant positive effect on school effectiveness.

Hypothesis 2: School effectiveness has a significant negative effect on workplace exclusion.

Hypothesis 3: Transformational leadership has a significant negative effect on workplace exclusion.

Hypothesis 4: School effectiveness has a mediating role in the effect of transformational leadership on workplace exclusion.

Data collection

The research data were collected face-to-face from volunteer teachers with the permission of Bolu Abant İzzet Baysal University Human Research Ethics Committee in Social Sciences with protocol number 2024/69. During the data collection phase, school administrations were first informed. Then, participating teachers were briefly informed about the study by the researcher and data were

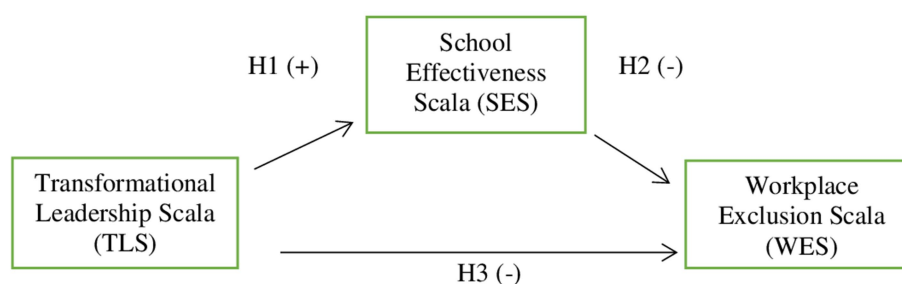


FIGURE 1
Research model.

collected from volunteer teachers. The data obtained were transferred to digital media and made ready for analysis.

Data analysis

It is important that the sample size is sufficient to determine any effect between variables in research. In order to reveal indirect effects between variables, 115–285 participants are recommended for mediation analysis (Fritz and MacKinnon, 2007). In the current study, a sample size of 410 participants, which is larger than this range, was included. JAMOVİ analysis program was used in the analysis of the data. Before the analysis, Skewness and Kurtosis distributions were checked for normality distribution. In the distributions, the data belonging to 4 participants with extreme values (those with a scale mean score of 4 and above) in the WES in the exclusion at work scale were excluded from the data set, and no extreme data were found in other scales. Since the scales met the normality condition, no rotation was performed on the data. The analysis continued with the data of 410 participants. When the results were examined, it was found that the scales of TLS (Skewness = -0.913 , $sd = .121$; Kurtosis = $.573$, $sd = .240$), WES (Skewness = -1.416 , $sd = .121$; Kurtosis = 1.964 , $sd = .240$), SES (Skewness = -1.107 , $sd = .121$; Kurtosis = 1.440 , $sd = .240$), the skewness and kurtosis values of the scales were between -2 and $+2$ and therefore it was accepted that the distributions met the normality condition (George and Mallery, 2003; Şencan, 2005). The results were evaluated at 95% confidence interval and $p < 0.05$ was considered significant. In addition, the reliability of the scales was evaluated according to Chronbach's alpha coefficient ($\alpha \geq 0.70$; Eymen, 2007; Şencan, 2005).

Data collection tools

Three different scales were used in the study. Information about the scales is as follows:

The short transformational leadership scale was developed by Berger et al. (2012), and adapted into Turkish by Okan and Okan (2021). The scale consisted of 8 items and one dimension, and the scale was prepared in a five-point Likert-type scale including “Strongly disagree” (1), “Disagree” (2), “Undecided” (3), “Agree” (4) and “Strongly disagree” (5). There are no reverse items in the scale. First, the linguistic equivalence of the scale was ensured. Then, the researchers conducted validity ($\chi^2 = 2.51$; $p < 0.001$; RMSEA = 0.06; RMR = 0.009; NFI = 0.98; CFI = 0.992; GFI = 0.969) and reliability (Cronbach's Alpha: .97) studies and concluded that the scale was valid and reliable. In the current study, Cronbach's Alpha value was again found to be .97.

The perceived school effectiveness scale was developed by Hoy (2014) and adapted into Turkish by Yıldırım and Ada (2018). The scale consisted of 8 items and a single dimension, and the scale was prepared in a six-point Likert scale including “Strongly Disagree” (1), “Disagree” (2), “Undecided” (3), “Somewhat Agree” (4), “Agree” (5) and “Strongly Disagree” (6). There are no reverse items in the scale. The researchers conducted validity ($\chi^2 = 3.06$; $p < 0.001$; RMSEA = 0.063; RMR = 0.045; NFI = 0.98; CFI = 0.99; GFI = 0.97), language equivalence coefficient (0.708) and reliability (Cronbach's Alpha: .86) studies and concluded that the scale was valid and reliable. In the current study, the Cronbach's Alpha value of the scale was found to be .92.

The workplace exclusion scale was developed by Ferris et al. (2008) and adapted into Turkish by Kurum and Erdemli (2022). The scale consisted of 10 items and a single dimension, and the scale was prepared in a seven-point Likert-type scale including “Strongly Disagree” (1), “Disagree” (2), “Somewhat Disagree” (3), “Neither Agree nor Disagree” (4), “Somewhat Agree” (5), “Agree” (6) and “Strongly Agree” (7). There are no reverse items in the scale. First, the linguistic equivalence of the scale was ensured. Then, the researchers conducted validity ($\chi^2 = 2.03$; $p < 0.001$; RMSEA = 0.06; NNFI = 0.98; NFI = 0.98; AGFI = 0.92; GFI = 0.95) and reliability (Cronbach's Alpha: .88) studies and concluded that the scale was valid and reliable. In the current study, the Cronbach's Alpha value of the scale was found to be 0.93.

When the Cronbach's Alpha values of the scales were analyzed, it was concluded that the reliability levels of the three scales were sufficient (Eymen, 2007; Şencan, 2005).

Findings

The relationship between transformational leadership scale (TLS), school effectiveness scale (SES) and workplace exclusion scale (WES) was analyzed by Pearson Correlation analysis and given in Table 1.

Table 1 shows that teachers' perceptions of transformational leadership ($\bar{x} = 3.78$; $SD = 0.93$) and school effectiveness ($\bar{x} = 4.55$; $SD = 0.92$) are higher than their perceptions of exclusion at workplace ($\bar{x} = 1.40$; $SD = 0.52$). Correlation coefficient values are also given in Table 1. Correlation coefficient values; 0.10–0.29 is interpreted as small, 0.30–0.49 as medium, and 0.50–1.00 as large effect (Cohen, 1988; Cohen, 1992). Accordingly, when Table 1 is analyzed, it is concluded that there is a negative and low level relationship between transformational leadership and workplace exclusion ($r = -0.153$; $p < 0.01$), a positive and medium level relationship between transformational leadership and school effectiveness ($r = 0.474$; $p < 0.01$), and a negative and low level relationship between school effectiveness and workplace exclusion ($r = -0.289$; $p < 0.01$).

TABLE 1 The relationship between the scales.

Variable	Descriptive statistics					Correlations		
	N	Min.	Max.	$\bar{x}$	SD	1	2	3
1. TLS	410	1.00	5.00	3.78	0.93	1		
2. WES	410	1.00	3.80	1.40	0.52	−0.153*	1	
3. SES	410	1.00	6.00	4.55	0.92	0.474**	−0.289**	1

*Correlation significant at 0.05 level. **Correlation significant at 0.01 level. n, sample number, X, mean, SD, standard deviation.

Reliability analysis

The reliability of the scales in the model was evaluated with Cronbach's Alpha coefficient, McDonald's Omega (ω) and Composite Reliability (CR) internal consistency coefficients. The internal consistency reliability of the scales in the model was evaluated with Cronbach's Alpha Coefficient and Cronbach's alpha values greater than 0.70 at 95% confidence interval for each of the constructs were taken as a reference (Eymen, 2007; Şencan, 2005). It is stated that the internal consistency value should be 0.70 and above to ensure the reliability of a scale. As a result of the analysis, the internal consistency coefficient of the Transformational Leadership Scale was 0.97, McDonald's Omega (ω) = 0.97, CR (Composite Reliability) = 0.70, the internal consistency coefficient of the Workplace Exclusion Scale was 0.93, McDonald's Omega (ω) = 0.94; CR (Composite Reliability) = 0.94; and the internal consistency coefficient of the School Effectiveness Scale was 0.92, McDonald's Omega (ω) = 0.94, CR (Composite Reliability) = 0.94 (Table 2). When the Cronbach's Alpha values of the scales were analyzed, it was concluded that the reliability levels of the three scales were sufficient (Büyüköztürk, 2010; DeVellis, 2017; Eymen, 2007; Kline, 2015; Şencan, 2005).

Validity analysis

It is important to provide the required sample size for structural equation modeling. Sample size affects the correct estimation of the model and the detection of specification error (Teo et al., 2013). The KMO test is the test that measures the correlations between variables and the suitability of factor analysis, and the value of the KMO test should be between 0 and 1 (Yaşlıoğlu, 2017). For this purpose, KMO sampling criterion was used for the validity analysis of the model and the KMO test result of 0.94 showed that the sample size was very suitable for the analysis. In addition, Bartlett's Test of Sphericity was found as 11,602,302, $p < 0.05$.

Then, factor loadings and average variance explained (AVE) values of the variables were evaluated for convergent validity. Since there were no items with factor loadings below 0.40, no item was removed from the analysis. It was determined that the item factor loadings of the TLS scale ranged between 0.89 and 0.93, the item factor loadings of the SES scale ranged between 0.75 and 0.88, and the WES scale ranged between 0.64 and 0.89 (Table 2). AVE values are expected to be above 0.50. However, if the factor loadings of the items were less than 0.70, the AVE value was required to be 0.50 (Hair et al., 2017). Although the item factor loading was lower than 0.70 (0.64) in item 1 of the Workplace Exclusion Scale, the

TABLE 2 Validity and reliability of the scales.

Scale	Item	Factor Loading	Cronbach's Alpha	ω	AVE	CR
Transformational leadership scale (TLS)	TLS 1	0.89				
	TLS 2	0.91				
	TLS 3	0.90				
	TLS 4	0.89				
	TLS 5	0.90	0.97	0.97	0.88	0.70
	TLS 6	0.93				
	TLS 7	0.92				
	TLS 8	0.91				
School effectiveness scale (SES)	SES 1	0.75				
	SES 2	0.78				
	SES 3	0.84				
	SES 4	0.88	0.92	0.94	0.72	0.94
	SES 5	0.85				
	SES 6	0.85				
	SES 7	0.84				
	SES 8	0.82				
Workplace exclusion scale (WES)	WES 1	0.64				
	WES 2	0.71				
	WES 3	0.70				
	WES 4	0.80				
	WES 5	0.88	0.93	0.94	0.64	0.94
	WES 6	0.81				
	WES 7	0.89				
	WES 8	0.87				
	WES 9	0.89				
	WES 10	0.76				

TABLE 3 Model goodness-of-fit results.

Goodness of fit indices	Good fit value	Acceptable fit value	Structural model
p value	$0.05 \leq p \leq 1.00$	$0.01 \leq p \leq 0.05$	$p < 0.01$
χ^2/df (sd)	$0 \leq \chi^2/df \leq 2$	$2 \leq \chi^2/df \leq 3$	1,86
NFI	$0.95 \leq NFI \leq 1.00$	$0.90 \leq NFI \leq 0.95$	0.99
TLI	$0.95 \leq TLI \leq 1.00$	$0.90 \leq TLI \leq 0.95$	0.99
CFI	$0.95 \leq CFI \leq 1.00$	$0.90 \leq CFI \leq 0.95$	0.99
SRMR	$0 < SRMR \leq 0.05$	$0.05 < SRMR \leq 0.10$	0.04
RMSEA	$0 \leq RMSEA \leq 0.05$	$0.05 \leq RMSEA \leq 0.08$	0.04

*RMSEA, root mean square error of approximation, SRMR, standardized root mean squared residual; CFI, comparative fit index; TLI, Tucker-lewis index. Cited in [Erkorkmaz et al., 2013](#); [İlhan and Çetin, 2014](#).

AVE value was found to be 0.80 (Table 2). In this case, it was seen that all scales met the convergent validity.

Structural model evaluation

The concept of model goodness shows whether the constructed structural model reflects the data situation positively. Poor model fit reduces the reliability of the results ([Kang and Ahn, 2021](#)). In the model fit evaluation of structural equation modeling; χ^2/df , NFI, TLI, CFI, SRMR and RMSEA fit indices were included. Since the chi-square statistic is easily affected by sample size, the χ^2/df ratio, which is less affected by sample size, can be used ([Yazıcıoğlu and Erdoğan, 2014](#)). Therefore, first the χ^2/df value of the structural equation model was found to be 1.86. Since this result is less than 2, it can be said that the model provides a good fit ([Tabachnick and Fidell, 2007](#)). Then, other fit values of the model were calculated. Table 3 shows the NFI, TLI, CFI, SRMR, and RMSEA values of the model and the model was accepted because the results obtained were between good and acceptable fit values.

When Table 3 is examined, it is seen that the model fit is good because the SRMR value is below 0.05 (0.04) in the model goodness of fit indices ([Teo et al., 2013](#)). In addition, an NFI value above 0.90 indicates the acceptability of the model and an NFI value of 0.99 indicates the validity of the model (Table 3).

As a result of the analysis, it was seen that the models established in the planning stage of the research were valid $p < 0.01$. It can be said that school effectiveness is a mediating variable in the effect of transformational leadership on workplace exclusion. Because while the relationship between transformational leadership and workplace exclusion was $\beta = -0.08$ at the beginning, this relationship became $\beta = -0.18$ when school effectiveness was added (Table 4). This situation is also shown in Figure 2.

Conclusion, discussion, and recommendations

This section of the present study presents the results, discussion and recommendations in the context of the results.

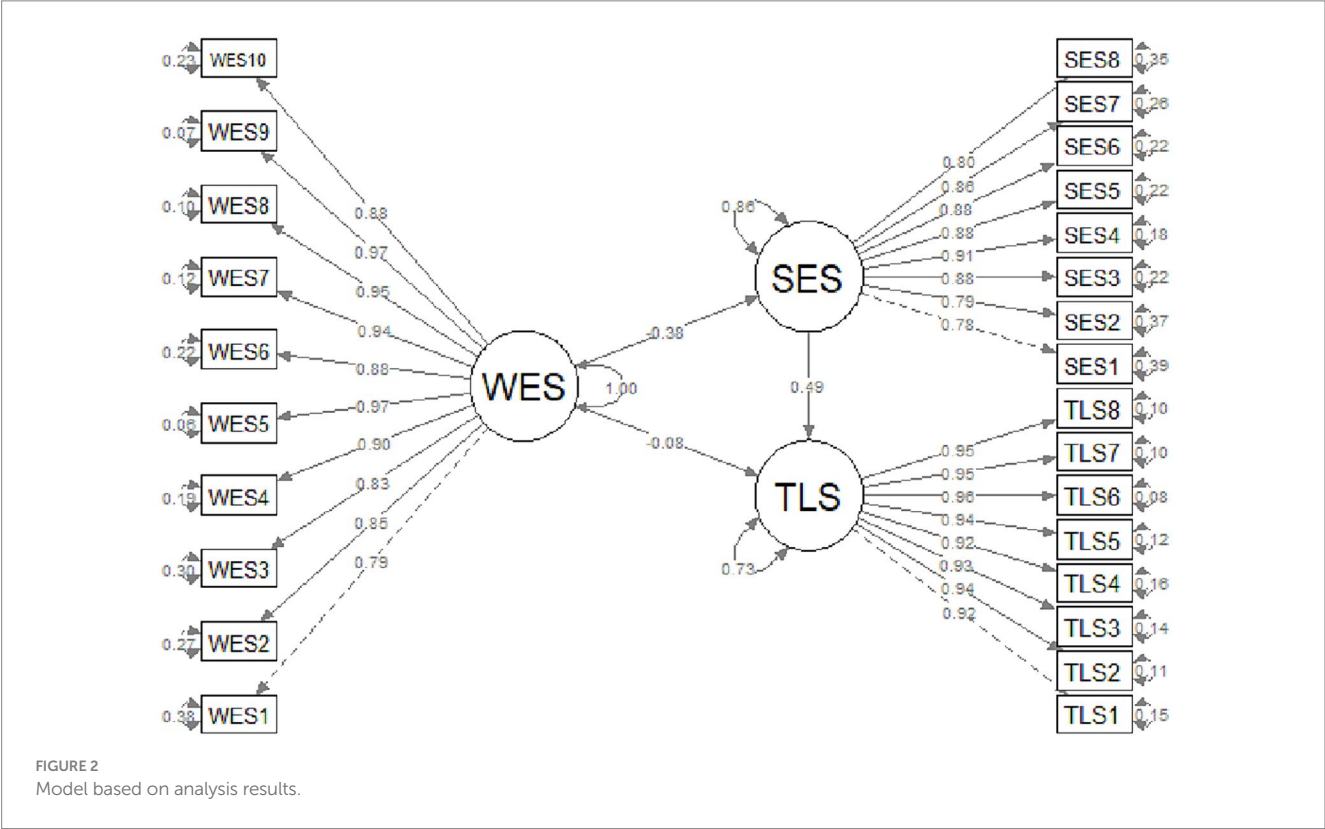
In Hypothesis 1, it was assumed that transformational leadership has a positive and significant effect on school effectiveness and when the results were analyzed, Hypothesis 1 was confirmed ($\beta = 0.47$; $R^2 = 0.22$; $p < 0.001$). [Ermeydan and Can \(2020\)](#) found that transformational leadership is a significant predictor of school effectiveness, and [Sesli \(2023\)](#) found that transformational leadership characteristics applied in schools positively affect school effectiveness in his study. When the related literature is examined, it is seen that there are different studies that are similar to the research results ([Abdurrezzak, 2015](#); [Akçay Güngör, 2018](#); [Dufour et al., 2004](#); [Tuncel, 2013](#)). In order for schools to be effective schools and to bring about the intended changes, school leaders should have sufficient knowledge of transformational leadership principles ([Dufour et al., 2004](#); [Marks and Nance, 2007](#)). Because school leadership is seen as one of the characteristics of effective schools ([Javornik and Klemenčič Mirazchiyski, 2023](#); [Sammons, 2010](#); [Weindling, 1989](#); cited in, [Al-Mekhlafi and Osman, 2022](#)). It is seen that it will be easy for schools to reach their mission and vision if school administrators have transformational leadership characteristics. In this way, it can be thought that the administrator will have the opportunity to transform the school in line with the goals by meeting the needs of teachers, parents and students, thus increasing school effectiveness. Therefore, it can be concluded that the positive and significant effect of transformational leadership on school effectiveness is a natural result.

In Hypothesis 2, it was hypothesized that school effectiveness has a significant negative effect on workplace exclusion and the hypothesis was confirmed as a result of the study ($\beta = -0.28$; $R^2 = 0.08$; $p < 0.001$). An effective school is a school that increases the learning outcomes and quality of students, responds to the educational needs of the society ([Yumuşak and Korkmaz, 2024](#)), and adds value to the results of students when compared to similar schools ([Mortimore, 1991](#); as cited in [Lafci-Tor and Yavuz, 2020](#)). The concept of school effectiveness is affected differently by many variables such as school, administrators, teachers and students ([Yumuşak and Korkmaz, 2024](#)). [Mortimore \(1988; as cited in Al-Mekhlafi and Osman, 2022\)](#) also states that the main determinants of school effectiveness are the leadership of school administrators and the participation of teachers in the decision-making process. Therefore, it can be said that teachers, who are seen to have an impact on school effectiveness, should have positive motivation towards the school they work for. Because teachers' motivation has an important role on teacher performance and thus on students ([Gemedá and Tynjälä, 2015](#)). It is seen that teachers' having positive motivation towards school will increase their success and thus school effectiveness. Thus, in effective schools, it can be thought that exclusion, which causes negative situations such as depression, thoughts of uselessness, anxiety, violence ([Yang, 2012](#)), inability to express their views ([Luo et al., 2023](#)), will decrease. Because it can be said that having employees who have high job satisfaction and organizational citizenship and who can express their opinions openly will make it easier for the school to be an effective school. Therefore, in the current study, it can be thought that school effectiveness has a negative effect on exclusion at work.

In Hypothesis 3, it was hypothesized that transformational leadership has a significant negative effect on workplace exclusion and the hypothesis was confirmed in the context of the results ($\beta = -0.15$; $R^2 = 0.02$; $p < 0.001$). [Robbins and Judge \(2012\)](#) state that transformational leaders have a significant impact on their followers

TABLE 4 Research model structural equation analysis results.

Relationship	β	R^2	p -value	Hypothesis	Result
TLS → SES	0,47	0,22	<0.001	H1	Verified
SES → WES	−0,28	0,08	<0.001	H2	Verified
TLS → WES	−0,15	0,02	<0.001	H3	Verified
WES → SES → TLS	−0,18	0,08	<0.001	H4	Verified



by integrating the goals of the followers and the goals of the organization, and that they care about and support the individual development of their subordinates (Robbins and Judge, 2012). Yukl (2018) states that transformational leaders are leaders who develop the skills and confidence of their followers. Subordinates who have such leaders in organizations increase their organizational commitment and satisfaction levels (McShane and Von Glinow, 2016) and their organizational citizenship is positively affected (Li et al., 2023). Because transformational leaders have a vision for the future and can see the changes in the environment. They motivate and inspire their members and help them achieve higher goals (Andoka et al., 2024). It can be said that this situation will reduce the perception of exclusion at work, which is defined as a form of exploitation (Lance Ferris et al., 2019; Wu et al., 2019) that causes negative situations such as a decrease in job satisfaction, an increase in thoughts of leaving the job, and deterioration in sleep quality. Therefore, it can be said that the significant negative effect of transformational leadership on workplace exclusion in the current study is a normal situation.

The mediating role of school effectiveness in the effect of transformational leadership on workplace exclusion constituted the 4th hypothesis of the study, and the hypothesis was confirmed in the

context of the results obtained ($\beta = -0.18$; $R^2 = 0.08$; $p < 0.001$). Transformational leaders enable the psychological, managerial, and work-oriented development of their environment, thus enabling their personal development. In addition, in this process, they provide a sustainable feedback mechanism that is important in the development of their environment (Jung et al., 2009; as cited in Yılmaz and Kasımoğlu, 2024). They encourage and inspire people to achieve goals (Florek-Paszkowska and Hoyos-Vallejo, 2023). It is seen that this situation plays an important role in the emergence of effective schools (Çevik, 2023) where the views of stakeholders are valued, ideas are clearly put forward, and the school culture supports personal and social development. In this case, it is seen that the transformational leadership characteristics of school administrators have a positive effect on schools to be effective schools by influencing the teachers around them. Javornik and Klemenčič Mirazchiyski (2023) also stated that factors such as strong leadership, positive school climate, etc. contribute to effective schools. It can be thought that this situation will reduce teachers' perceptions of exclusion in the workplace (Hitlan et al., 2006; Mohsin et al., 2022; Qian et al., 2019; Zhang et al., 2023), which negatively affects their perceptions of job success, positive relationship, reputation, group commitment, job satisfaction and

organizational citizenship. Thus, it can be interpreted that transformational leadership plays a mediating role of school effectiveness on workplace exclusion.

As a result of the study, it can be said that the fact that transformational leadership is effective on workplace exclusion and school effectiveness makes the study important. The fact that leadership is among the characteristics of effective schools (Javornik and Klemenčič Mirazchiyski, 2023) can bring transformational leadership to the forefront in policies and practices in Türkiye. It can be said that with the development of policies for transformational leadership, negative situations in schools will be eliminated and it will be easier for schools to become effective schools. This situation may lead decision makers in Türkiye to develop policies to equip school administrators with the characteristics of being transformational leaders. In fact, in the “2023 Vision” (2023 Eğitim Vizyonu, 2018), it is stated that postgraduate education will be given importance for the professional development of administrators and teachers. It can be said that by directing administrators to graduate education, administrators will have more knowledge about leadership and their awareness of transformational leadership will increase. In the same document, the fact that the goals for the development of teachers and students along with administrators are also stated can be interpreted as giving importance to school effectiveness. The result that both transformational leadership and school effectiveness reduce exclusion in the workplace can also guide future education policies. It can be interpreted that these issues will be given more importance in future education policies.

In the context of these results, suggestions can be made for practitioners to provide in-service courses for school administrators on transformational leadership and school effectiveness, to prevent exclusion in the workplace by giving teachers the opportunity to develop themselves and participate in the decisions taken. For practitioners, suggestions can be made to conduct similar studies in preschool schools or in different provinces.

Limitations

Although the study has reached important conclusions, it also has some limitations. First of all, only Bolu province center was taken as the study population. This does not represent the whole of Türkiye. Therefore, future studies can be expanded to include different provinces. Secondly, only transformational leadership was included among leadership types in the study. Considering that there are many different types of leadership, studies can be conducted on different leadership styles. Finally, this study is related to transformational leadership, school effectiveness and workplace exclusion. Considering

that many factors are important on schools, studies on different subjects can be included.

Data availability statement

The raw data supporting the results of the article can be made available if there is a request.

Ethics statement

The research data were collected face-to-face from volunteer teachers with the permission of Bolu Abant İzzet Baysal University Ethics Committee for Human Research in Social Sciences protocol No. 2024/69. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AK: Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Conceptualization.

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The author declares 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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Corrigendum: The mediating role of school effectiveness in the relationship between transformational leadership and workplace exclusion

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KEYWORDS

school, school effectiveness, teacher, transformational leadership, Türkiye, workplace exclusion

A Corrigendum on

The mediating role of school effectiveness in the relationship between transformational leadership and workplace exclusion

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In the published article, there were several errors. In the sections *Method*, and *Conclusion, discussion, and recommendations*, a comma (,) was mistakenly used in several places instead of a period (.) in some places to indicate numerical data.

Additionally, in section *Method, Findings, Paragraph 2*, the *r* number stated as “474” was incorrect. The corrected sentence should be written as shown below.

“Accordingly, when Table 1 is analyzed, it is concluded that there is a negative and low level relationship between transformational leadership and workplace exclusion ($r = -0.153$; $p < 0.01$), a positive and medium level relationship between transformational leadership and school effectiveness ($r = 0.474$; $p < 0.01$), and a negative and low level relationship between school effectiveness and workplace exclusion ($r = -0.289$; $p < 0.01$).”

Additionally, in section *Method, Validity Analysis, and Paragraph 2*, some values were written incorrectly. Instead of “Then, factor loadings and average variance explained (AVE) values of the variables were evaluated for convergent validity. Since there were no items with factor loadings below 0.40, no item was removed from the analysis. It was determined that the item factor loadings of the TLS scale ranged between 0.89 and 0.93, the item factor loadings of the SES scale ranged between 0.75 and 0.88, and the WES scale ranged between 0.69 and 0.089 (Table 2). AVE values are expected to be above 0.50. However, if the factor loadings of the items were less than 0.70, the AVE value was required to be 0.50 (Hair et al., 2017). Although the item factor loading was lower than 0.70 (0.65) in item 1 of the Workplace Exclusion Scale, the AVE value was found to be 0.80 (Table 2). In this case, it was seen that all scales met the convergent validity.”

The corrected text is shown below:

“Then, factor loadings and average variance explained (AVE) values of the variables were evaluated for convergent validity. Since there were no items with factor loadings below 0.40, no item was removed from the analysis. It was determined that the item factor loadings of the TLS scale ranged between 0.89 and 0.93, the item factor loadings of the SES scale ranged between 0.75 and 0.88, and the WES scale ranged between 0.64 and 0.89

(Table 2). AVE values are expected to be above 0.50. However, if the factor loadings of the items were less than 0.70, the AVE value was required to be 0.50 (Hair et al., 2017). Although the item factor loading was lower than 0.70 (0.64) in item 1 of the Workplace Exclusion Scale, the AVE value was found to be 0.80 (Table 2). In this case, it was seen that all scales met the convergent validity.”

Lastly, the **Author Contributions** were not complete in the published article. Instead of “AK: Writing – original draft.”

This section should be written as shown below:

Author contributions

AK: Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Conceptualization.

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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Do scientific attitude and intelligence affect motivation towards STEM? Structural equation modelling

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Introduction: The aim of this study is to reveal the effect of scientific attitude and intelligence on STEM (science, technology, engineering and mathematics) motivation using Structural Equation Modelling (SEM). It is possible to say that there is a reciprocal relationship between attitudes towards science, intelligence and motivation towards STEM. Motivation is closely and positively related to STEM, scientific attitude, intelligence and organizational development. When female students are supported and motivated positively, it is possible for them to be successful in STEM. It is possible to say that female students are the female leadership candidates of the future. Female leader candidates can play a role in future organizational development. Female leader candidates who are supported and motivated by their environment can take their place in organizational development. There is a gap in the research literature on this subject in Türkiye. This study fills an important gap in terms of sampling, research method and data analysis.

Method: In the study, personal information form, Attitude Towards Scientific Research Scale, Multiple Intelligences Self-Perception Scale and STEM Value-Expectation Rating Scale were applied to 159 female undergraduate students who are disadvantaged in STEM field and studying at Ege University Ödemiş Faculty of Health Sciences.

Results: It is possible to say that most female students have positive attitudes towards scientific research. According to the research results, as the reluctance to help researchers and negative attitudes towards research increase, motivation towards STEM decreases. As positive attitudes towards research and researchers increase, motivation towards STEM increases. In addition, increases in verbal-linguistic intelligence, logical-mathematical intelligence, spatial intelligence, interpersonal intelligence, intrapersonal intelligence and natural intelligence lead to an increase in positive attitudes towards research and thus STEM motivation.

Conclusion: When the value expectations of future female leadership candidates for the STEM field were evaluated, it was found that 81.13% of the students had a medium level of value expectation evaluation level for the STEM field. This situation suggests that female students are not positively motivated for STEM in the family, school and peer environment.

KEYWORDS

STEM, scientific attitude, multiple intelligence, motivation, female leader candidate

1 Introduction

Technology spreads rapidly in the 21st century. It is possible to evaluate the 21st century as the age of knowledge, information and space (UN, 2021; UNESCO, 2023). There are new developments every day in all fields of science (Shelley and Kiray, 2018). Technological advancements contribute to the economic development of countries (OECD, 2024). Various sectors and working areas have emerged thanks to economic and technological progress (Zohuri, 2020). The 21st-century education model focuses on cultivating productive, inquisitive, critical thinking, and problem solving students. As technology advances in all societies, students' fundamental life skills become compatible with the age of space and information (Alpaydin and Demirli, 2022; Paechter et al., 2020).

STEM (science, technology, engineering, and mathematics) provides opportunities for students to address problems from an interdisciplinary perspective (Freeman et al., 2019; Kennedy and Odell, 2024). It is aimed to provide knowledge and skills with a holistic educational approach covering the entire education process from preschool to higher education (Titrek et al., 2023; Yan et al., 2024). Different disciplines are brought together with STEM education. It becomes possible to achieve an inclusive education that supports quality learning, the application of existing knowledge to daily life, the development of life skills and high-level critical thinking. The STEM approach is important in terms of enabling the transformation of theoretical knowledge in the fields of science, technology, engineering and mathematics into practice and products (Kennedy and Odell, 2024; OECD, 2024; Sheth, 2023).

STEM education aims at economic progress (Hu and Guo, 2021; Yan et al., 2024). Countries are adopting various approaches to address gender divides. However, while 68% of countries globally have policies to support STEM education, only half of these policies specifically support girls and women. The United States has set a goal to increase the number of STEM bachelor's degrees by one million over a 10-year period (Young et al., 2018). In Kenya, the Ministry of Education has organized STEM boot camps in schools, aiming to encourage and empower girls to pursue STEM studies and careers. In Namibia, it has mandated Goal 4 of the National Science and Technology Innovation Policy. It has improved gender inequality in STEM and the participation of women in science education. It has established programs that support the participation of girls as leaders and decision-makers in science careers. Zambia's Technical Education, Vocational and Entrepreneurship Training Authority has established a platform that offers free digital skill courses targeted, among others, at women. In Bangladesh, the Eighth Five Year Plan 2020–25 has a dedicated section on STEM education for girls. During its G20 presidency, India launched the Tech Equity platform to empower women with digital literacy skills (UNESCO, 2024). Türkiye is one of the countries with the lowest rate of STEM graduates.

STEM fields are frequently promoted due to the high labour-market demand for graduates (Bybee, 2010). However, these fields also show gender disparities, with women under-represented in many STEM disciplines due to societal norms and educational biases. Progress in encouraging more women to pursue STEM-related fields has been slow. Across OECD countries, the proportion of female new entrants choosing to study STEM fields increased by less than 1 percentage point between 2015 and 2022 (OECD, 2024). It can be said

that there is a strong positive correlation between individuals' inclination towards STEM and their motivation (Master et al., 2017).

1.1 Motivation and STEM

Literature suggests that positive correlations between motivation and STEM, scientific attitude, intelligence and organizational development. According to Bandura's Social Cognitive Theory, an individual's performance and internal processes are combined. The individual's behaviour is influenced by his/her cognitive level and environment (Schunk and DiBenedetto, 2019). Bandura explained how individuals are motivated, how they can motivate others, their performance and behaviours. The theory states that people influence others and are influenced by others. According to Bandura, individual factors and the environment mutually influence the behaviour of the individual (Koutroubas and Galanakis, 2022). When the interactions are positive, the subsequent behaviour of the individual is positively affected. In order to regulate behaviour, the individual first observes his/her own performance. He compares his performance with his standards. When he/she evaluates it positively, he/she is motivated to repeat the behaviour. Social environment plays an important role in motivating the individual (Fryling et al., 2011). It can be said that female students are the female leader candidates of the future. Motivation is an important factor in the orientation of female students towards STEM education (Dönmez, 2020).

Maslow's theory forms the basis of motivation theories. It leads the way in explaining motivation in organizational development (Şengöz, 2022). Female leadership candidates will take their place in organizational development in the future. Therefore, the motivation of female students is important.

Motivation is the mediator between supportive environmental environment and entrepreneurial intention. It focuses on organization management. Its main purpose is to facilitate effective functioning and growth in an organization (Anbarasu, 2011; Singh and Ramdeo, 2020). In organizational development, leaders who can lead, produce both attitudes and creative ideas, and collaborate across disciplines are an important need (Pedraza-Rodríguez et al., 2023).

In organizational development, women's leadership in STEM fields is based on motivation. When female students are positively motivated in STEM by their families, peers and school environment, they can assume strong female leadership roles in the future. A positive and supportive environment will motivate female students to STEM. It will be possible for female students to show motivated female leader characteristics in organizational development. Additionally, there is a positive relationship between STEM and attitudes toward science.

1.2 Attitudes towards science and STEM

In this study, it was first hypothesized that positive attitudes towards science would positively predict STEM motivation. Science stands out as a distinct field in the STEM approach. Science involves conducting experiments, making discoveries through observations, and conducting ethical research by wondering about the causes of events while following scientific procedures (Da Silva, 2022). Science is a dynamic process that explains observable phenomena directly or

indirectly. It shows continuity, encompassing logical thinking processes. They can be defined as universal truths that do not change from one person to another or from observation to observation (Erduran and Dagher, 2014).

Attitudes toward science refer to positive attitudes toward science and scientists. There is a positive relationship between an individual's attitudes toward science and their belief that they will be successful in science. Attitudes toward science are related to an individual's interest and motivation to learn science (Cheung, 2017; Elliniadou and Sofianopoulou, 2022).

When individuals are positively motivated in scientific subjects, they are more successful in science and mathematics. Chang and Cheng (2008), focused on approximately 1,044 students in Taiwan. As a result, it was found that students are more successful in science when they are positively supported in science. Chiu and Klassen (2010), studied 88,590 students who participated in the PISA of the OECD. Positive correlations were found between students growing up in a motivating, tolerant environment and their success in mathematics. According to Bronfenbrenner's ecological systems theory, family, peers, school, teachers, culture, and developed policies shape the future of the individual. For example; families who take their children to science museums at an early age encourage their children to develop positive attitudes towards science subjects (Tong and An, 2024). It is important for individuals to have sufficient intelligence potential for scientific studies (Limeri et al., 2020).

1.3 Multiple intelligence and STEM

In this study, it was secondly hypothesized that multiple intelligence areas would positively predict STEM motivation. Gardner (1993) based his theory of multiple intelligences on eight types: verbal-linguistic, logical-mathematical, musical, bodily-kinesthetic, spatial, interpersonal, intrapersonal, and naturalist intelligence. It is possible to say that biological and cultural dimensions are at the basis of her theory. It argues that different types of learning occur in different regions of the brain. In addition to biological factors, the development of intelligence is associated with culture. It is suggested that the types of intelligence and behavioral patterns valued by cultures are more developed (Morgan, 2021). Gardner proposes four criteria for a characteristic to be considered intelligence: symbols, being valued by the culture, being instrumental in producing goods or services, and problem-solving abilities (Davis et al., 2011). As society, economic policies and culture place more value on one of the multiple intelligence sub-dimensions, it may cause the individual to turn to that field as a profession.

Knowing the intelligence areas of students can help them to be successful in science, technology, engineering and mathematics. Determining the academic tendencies of STEM students provides opportunities for them to be motivated. Cabuquin (2022) examined the performance of students receiving STEM education in multiple intelligence areas and specialty subjects. For this purpose, he focused on 94 male and 99 female, 193 STEM students in total. According to the results; students who are motivated by their parents and teachers are more willing to learn and succeed in the STEM field. For example; students who are positively motivated by their families and teachers to solve mathematical problems are more likely to be successful in mathematics (Saadati and Celis, 2023). In addition, there are studies

in the literature focusing on gender differences in STEM, which is approached from different perspectives.

1.4 Gender and STEM

This study focused only on female students. Because it can be said that girls are more disadvantaged than boys in STEM. Identifying the disadvantages of female students is important for the well-educated female leadership candidates who will take their place in organizational development in the future.

It is possible to say that the academic performance of female students is related to the motivation of the environment in which they grow up (Chiu and Klassen, 2010). While the low participation of women in STEM fields is generally explained by women's lack of interest and skills in these fields, statistics contradict this. A study covering 67 countries through an international database published in the journal *Studies in Psychology* in 2018 showed that in two out of every three countries, girls outperform or perform equally with boys in STEM fields. In almost every country, it has been recognized that girls are more likely to pursue higher education in STEM fields than boys enrolled in these fields (Stoet and Geary, 2020). It can be said that female students are disadvantaged in STEM fields due to reasons such as family attitude, educational opportunities, and sexist approach (Huang et al., 2022).

Being exposed to gender stereotypes in society from an early age causes girls to avoid STEM fields. The idea that boys will be more successful than girls in mathematics is a social gender stereotype. The concept of "Leaky Pipeline" in the literature is defined as the negative impact of family-teacher-peers, as well as the lack of a female model that students can choose as a mentor in their educational life, and the fact that girls do not choose STEM fields or give up after choosing them due to their self-perception (Jakobs, 2022).

Female students who have a supportive environment with their parents, teachers and peers will be highly motivated. This will positively affect their academic skills. Supportive peer relationships and teacher behaviours provide students with the opportunity to be motivated (Kruse et al., 2024; Xu et al., 2023; Woreta, 2024). A supportive environment positively affects an individual's entrepreneurial behavior. Motivation is a mediator between the environmental environment that positively supports female students and entrepreneurial intention. An individual's entrepreneurial characteristics depend on being motivated for success (Lin et al., 2024). Family ties are the strongest bonds that most individuals have. Regardless of the type of bond, family ties are deep. This bond affects an individual's behavior and decisions. An individual's family can be encouraging or restrictive. An individual is motivated by family factors when making decisions. An individual's motivation plays a mediating role between family ties and reaching a decision (Chauhan et al., 2024). When female students are motivated by their families, peers and school environment in STEM fields, they can assume leadership roles in these fields.

On average, women are overrepresented in education, but they are underrepresented in some fields. Only 15% of women STEM as a career, compared to 41% of men. These percentages have not changed since 2015 (OECD, 2024). According to the GEM report, the proportion of women among STEM graduates is 35% and has remained stable over the last 10 years (UNESCO, 2024). As norms

around gender roles change, women may feel relatively more empowered in traditionally male-dominated fields such as STEM. Policies need to evolve to address women's place in STEM (OECD, 2024).

Studies have been conducted with disadvantaged groups in the STEM field (Ertl et al., 2017; Kaplan and Yilmaz, 2021; Mutlu-Çaykuş and Korkut-Owen, 2017). However, the focus has not been on female undergraduate students. There is no study in the literature in Türkiye focusing on disadvantaged female undergraduate students in the STEM field (Karşlı-Baydere et al., 2021; Lai and Cheng, 2023; Özkurt and Yakın, 2020). No previous research has been found that aims to develop a structural equation model to determine the effect of female undergraduate students' scientific attitudes and intelligence on their motivation towards STEM (STEM Girls, 2020). This research will fill the gap in the literature. It is possible to say that the current research is pioneering. There are strong correlations between female students' attitudes towards science, intelligence and motivation towards STEM. This relationship can be considered a guiding factor for students' scientific progress.

There are STEM studies developed for disadvantaged girls and women in Türkiye. Some of the studies encouraging women to become engineers can be listed as follows; My Madame Curie,¹ Stem for Disadvantaged Students Especially Girls,² Sting,³ Honey Bees Become Engineers,⁴ Stem: Engineers of the Future, Türkiye's Engineer Girls,⁵ Aziz Sancar Stem Camps for Girls Project,⁶ Science and Technology Seminar for Girls,⁷ Girls in Science and Technology,⁸ Girls Meet Science, My Steam Network,⁹ Stem School Project for Girls.¹⁰

This research aims to indicate the impact of scientific attitudes and intelligence on motivation towards STEM (science, technology, engineering, and mathematics) using Structural Equation Modeling (SEM). SEM is a statistical method based on explaining the causal and relational correlations between latent variables and observed variables in theoretical models. It allows for simultaneous evaluation of multiple dependent and independent variables and includes error values in the analysis process. It has numerous application examples in various fields, particularly in social and behavioral sciences (Savalei and Bentler, 2010).

2 Materials and methods

2.1 Population

The study focused on female students perceived as disadvantaged in terms of STEM. The population of the study consisted of 159 female students enrolled in Ödemiş Faculty of Health Sciences at Ege University during the 2023–2024 academic year.

2.2 Sample

The study used purposeful sampling. Purposive sampling procedures are used in most research papers. Because they are found in any research paradigm and help in ensuring that quality sample is located without biases so as to increase the reliability and trustworthiness of the findings (Nyimbili and Nyimbili, 2024). It employed a personal information form, the Scale of Attitude Towards Scientific Research, the Multiple Intelligence Self-Perception Scale, and the STEM Value-Expectancy Assessment Scale. Correlation analysis was utilized to examine the correlation between the scale scores used in the study. To decide on appropriate correlation analysis, the normal distribution status of the scale scores was first examined. As the scale scores showed a normal distribution, the Pearson correlation analysis was used. The SEM analysis was employed to examine the intermediary model established in the study.

2.3 Study group

The study focused on female students who were perceived as disadvantaged in terms of STEM. A total of 159 female students registered at Ege University Odemis Faculty of Health were included in the study. The group selected for SEM has high representativeness (Jobst et al., 2023). At the end of the semester, when the final exams were over, the female students were administered a personal information form, the Attitude Scale Towards Scientific Research, the Multiple Intelligence Self-Perception Scale and the STEM Value-Expectation Rating Scale online via Google Form. The responses of the students who volunteered to participate in the study were transferred to the data set. Table 1 shows attributes of the participants.

According to Table 1, the ages of the participants in the study range from 18 to 29 years, with an average of 20.57 years. Of the participants ($n = 49$), 30.82% are first grade, 37.74% ($n = 60$) are second grade, 23.27% ($n = 37$) are third grade, and 8.18% ($n = 13$) are fourth grade students. Of them, 5.03% ($n = 8$) have no siblings, 1.89% ($n = 3$) have one sibling, 34.59% ($n = 55$) have two siblings, 31.45% ($n = 50$) have three siblings, and 27.04% ($n = 43$) have four or more siblings. Among them, 7.55% ($n = 12$) have illiterate mothers, 42.14% ($n = 67$) have mothers with primary education, 16.98% ($n = 27$) have mothers with middle school education, 22.64% ($n = 36$) have mothers with high school education, and 10.69% ($n = 17$) have mothers with undergraduate and higher education. Of the participants' fathers, 29.56% ($n = 47$) have primary education, 20.13% ($n = 32$) have middle school education, 34.59% ($n = 55$) have high school education, and 15.72% ($n = 25$) have university and higher education. Considering the settlement units where the participants spend most of their lives, 15.72% ($n = 25$) of them spend most of their lives in villages, 1.89%

1 <https://ucansupurge.org.tr/benim-madame-curiem-projesi-2015-2016/> (Accessed September 5, 2024)

2 <https://www.aydin.edu.tr/tr-tr/arastirma/arastirmamerkezleri/cocuk/Pages/Projeler.aspx> (Accessed September 5, 2024)

3 <https://stingeuproject.wordpress.com/> (Accessed September 5, 2024)

4 <https://www.rmkmarmine.com.tr/bal-arilari-muhendis-oluyor-projesi.html> (Accessed September 5, 2024)

5 <https://www.turkiyeninmuhendiskizlari.com/> (Accessed September 5, 2024)

6 <https://e-dergi.tubitak.gov.tr/edergi/yazi.pdf?dergiKodu=4&cilt=49&sayi=911&sayfa=66&yaziid=38892> (Accessed September 5, 2024)

7 <https://buyukcekmece.meb.gov.tr/www/kizlar-icin-stem-robotik-open-lab-projesi-egitimlerine-basvurular-basladi/icerik/813> (Accessed September 5, 2024)

8 <https://www.spacecampsturkey.com/bilim-ve-teknolojide-kiz-cocuklari-uzayi-kesfetti> (Accessed September 5, 2024)

9 https://www.youtube.com/channel/UC_bGKm63kD4Y4ESeHYMahqw;
<https://www.youtube.com/@ucansupurgedernegi/featured> (Accessed September 5, 2024)

10 <https://www.skdtrkiye.org/esit-adimlar/guncel/kizlar-icin-stem-okulu-> (Accessed September 5, 2024)

TABLE 1 Attributes of participants.

Variable	Min.	Max.	$\bar{X}$
Age	18	29	20.57

Variable	Variable level	<i>n</i>	%
Grade	1st Grade	49	30.82
	2nd Grade	60	37.74
	3rd Grade	37	23.27
	4th Grade	13	8.17
Number of siblings	No siblings	8	5.03
	One sibling	3	1.89
	Two siblings	55	34.59
	Three siblings	50	31.45
	Four siblings and more	43	27.04
Mother's education background	Illiterate	12	7.55
	Primary school	67	42.14
	Secondary school	27	16.98
	High school	36	22.64
	University or higher	17	10.69
Father's education background	Primary school	47	29.56
	Secondary school	32	20.13
	High school	55	34.59
	University or higher	25	15.72
What is the accommodation unit where you spend most of your life?	Village	25	15.72
	Town	3	1.89
	District	55	34.59
	Province	76	47.80
Do you study your department willingly?	Yes	139	87.42
	No	20	12.58
Have you previously received STEM education?	Yes	6	3.77
	No	153	96.23
Have you previously participated in a study related to STEM education?	Yes	10	6.29
	No	149	93.71

n: Number of individuals; %, Percentage; Min., Minimum value; Max., Maximum value; $\bar{X}$, Mean.

(*n* = 3) in small towns, 34.59% (*n* = 55) in districts, and 47.80% (*n* = 76) in cities. Among participants, 87.42% (*n* = 139) stated that they study their department willingly. Of the participants, 96.23% (*n* = 153) stated that they had not received STEM education before and 93.71% (*n* = 149) stated that they had not participated in a study on STEM education before.

2.4 Data analysis

Prior to the study analysis, incorrect data entry and missing data situations in the dataset were examined using frequency analysis. As

a result of the examination, there were no missing data in the dataset. The identified incorrect data entries were corrected. To determine the participation levels of the participants to scale scores, they were classified into classes using k-means clustering analysis and the classes obtained based on class averages were named as low-medium-high. Correlation analysis was utilized to examine the correlation between the study's scale scores. To decide on appropriate correlation analysis, the normal distribution status of the scale scores was first examined. Skewness and kurtosis coefficients were examined for the assumption of normal distribution and the results are presented in Table 2. For all scale scores, kurtosis values fell between -1 and $+1$, and for skewness values, except for the positive attitude towards researchers and interpersonal intelligence subscales, these values were between -1 and $+1$. For the positive attitude towards researchers and interpersonal intelligence subscales, the skewness values were -1.169 and -1.067 , respectively. Although this showed a slight deviation from the threshold range, considering the low kurtosis values and the small size of the sample, these subscales were also deemed to exhibit normal distribution. As the scale scores showed a normal distribution, the Pearson correlation analysis was used. The SEM analysis was employed to examine the intermediary model established in the study.

2.5 Measurement tools

The disadvantaged female undergraduate students were administered a personal information form, the Scale of Attitude Towards Scientific Research, the Multiple Intelligence Self-Perception Scale, and the STEM Value-Expectancy Assessment Scale. The scales used were selected because they cover current approaches and issues in education. The tools assess the skills emphasized in international education programs (OECD, 2024; UNESCO, 2024). The scales used in this study were selected because they are suitable for measurement and evaluation in education (Kitchen et al., 2019), valid, and reliable.

- 1 *Personal Information Form*: The form includes questions about students' grade, age, number of siblings, parents' education level, whether they study in the department willingly, where they spend most of their lives, whether they have received STEM education before, and whether they have participated in STEM-related studies.
- 2 *The Scale of Attitude Towards Scientific Research*: The Scale of Attitude Towards Scientific Research was developed by Korkmaz et al. (2011). It was submitted to expert opinion for content validity. To determine the validity of the scale, item discrimination powers and exploratory and confirmatory factor analyses were calculated. To determine its reliability, internal consistency and stability levels were calculated. As a result of the confirmatory factor analysis of The Scale of Attitude Towards Scientific Research, the goodness of fit values were found as [χ^2 (401, *N* = 372) = 830.28, $p < 0.001$, RMSEA = 0.054, SRMR = 0.051, GFI = 0.90, AGFI = 0.85, CFI = 0.95, NNFI = 0.95, IFI = 0.94]. The study found that the Scale for Attitudes Toward Scientific Research, consisting of four factors and 30 items, is a valid and reliable tool that can be used to assess undergraduate students' attitudes toward scientific research. The five-point Likert-type scale consists of 30 items that can be grouped under four factors. Each item in

TABLE 2 Skewness and kurtosis values for the scale scores.

	<i>n</i>	Skewness		Kurtosis	
		Statistics	Std. error	Statistics	Std. error
Reluctance to help researchers	159	0.497	0.192	−0.115	0.383
Negative attitude towards research	159	0.65	0.192	0.041	0.383
Positive attitude towards research	159	−0.209	0.192	−0.231	0.383
Positive attitude towards researchers	159	−1.169	0.192	0.861	0.383
Verbal–linguistic intelligence subscale	159	−0.109	0.192	−0.044	0.383
Logical-mathematical intelligence subscale	159	0.183	0.192	−0.185	0.383
Musical intelligence subscale	159	0.117	0.192	−0.525	0.383
Bodily-kinesthetic intelligence subscale	159	0.037	0.192	−0.318	0.383
Spatial intelligence subscale	159	0.056	0.192	−0.331	0.383
Interpersonal intelligence subscale	159	−1.067	0.192	0.718	0.383
Intrapersonal intelligence subscale	159	−0.821	0.192	0.395	0.383
Naturalist intelligence subscale	159	−0.235	0.192	0.256	0.383
STEM value-expectancy assessment scale	159	0.471	0.192	−0.172	0.383

the factors is rated as follows: Strongly Disagree (1), Disagree (2), Undecided (3), Agree (4), Strongly Agree (5). The increase in scores obtained in reply to students' responses to the five-point Likert-type scale indicates an increase in negative attitude for the first factor (Reluctance to help researchers) and second factor (negative attitude towards research), while it indicates an increase in positive attitude for the third (positive attitude towards research) and fourth (positive attitude towards researchers) factors.

- 3 *The Multiple Intelligence Self-Perception Scale*: It is a Likert-type scale developed by Yeşil and Korkmaz (2010). For its content validity, expert opinion was obtained. To determine its validity, factor analysis, item-total correlations, and item discrimination power were calculated. Based on the data obtained, the 143-item scale consisting of eight subscales was found to be a valid and reliable tool for determining undergraduate students' individual intelligence profiles. Regarding the internal consistency coefficients for the subscales of the scale, Cronbach's Alpha ranged from 0.785 to 0.926. Considering the overall reliability coefficient of the Multiple Intelligence Self-Perception Scale, Cronbach's alpha was 0.957. Confirmatory factor analysis was not included in the study on the development of the Multiple Intelligence Self-Perception Scale. The results of the exploratory factor analysis for this scale show that the Logical-Mathematical Intelligence dimension subscale consists of two different factors and the explained variance rate is 55.59%. The Linguistic Intelligence self-perception subscale was divided into three different factors. It explained 48.682% of the total variance. The Musical Intelligence self-perception subscale is further divided into two different factors, which account for 53.813% of the total variance. The Bodily-Kinesthetic Intelligence self-perception subscale is further divided into two different factors, which account for 51.410% of the total variance. The Spatial Intelligence self-perception subscale is further divided into two different factors, which account for 54.622% of the total variance. The Interpersonal

Intelligence self-perception subscale is further divided into three different factors, which explain 43.529% of the total variance. The Intrapersonal Intelligence Subscale is divided into three factors explaining 42.942% of the total variance. The Naturalistic Intelligence subscale is divided into two different factors, which account for 48.528% of the total variance. The items were rated as follows: Never (1), Rarely (2), Sometimes (3), Often (4), Always (5). The results obtained from the subscales can be graded as follows: 20–35: Very low level, 36–51: Low level, 52–67: Moderate level, 68–83: High level, 84–100: Very high level. The lowest obtainable score from the scale is 20 and the highest is 100.

- 4 *The STEM Value-Expectancy Assessment Scale*: This scale was developed by Appianing and Van Eck (2018) to determine undergraduate students' motivation towards STEM. The validity and reliability studies of the Turkish version of the STEM Value-Expectancy Assessment Scale were conducted by Aciksoz et al. (2020). Confirmatory factor analysis was conducted to verify the validity of the scale administered to 196 science teacher candidates selected through purposeful sampling and Cronbach's alpha internal consistency coefficients were calculated for reliability assessment. In the reliability analysis, Cronbach's alpha internal consistency coefficients were calculated as 0.87 for the whole scale, 0.82 for the perceived value component, and 0.82 for achievement expectations in the STEM career component. The scales used in this study were chosen because they are valid and reliable in the field. According to the CFA results of the STEM Value-Expectation Rating Scale, a good fit for all index values ($\chi^2/df=2.1$, RMSEA = 0.075, CFI = 0.97, GFI = 0.90, AGFI = 0.85, SRMR = 0.058, IFI = 0.97, NFI = 0.94, NNFI = 0.96) and confirmed that the data obtained from the Turkish version of the scale were compatible with the theoretical structure of the original instrument. Considering validity and reliability results together, the scale adapted to Turkish society is a highly valid and reliable measurement tool that can be administered to

TABLE 3 The reliability of scale scores.

		Cronbach's alpha
The scale of attitude towards scientific research	Reluctance to help researchers	0.89
	Negative attitude towards research	0.90
	Positive attitude towards research	0.92
	Positive attitude towards researchers	0.93
The multiple intelligence scale	Verbal–linguistic intelligence subscale	0.89
	Logical-mathematical intelligence subscale	0.94
	Musical intelligence subscale	0.93
	Bodily-kinesthetic intelligence subscale	0.91
	Spatial intelligence subscale	0.96
	Interpersonal intelligence subscale	0.97
	Intrapersonal intelligence subscale	0.97
	Naturalist intelligence subscale	0.96
STEM value-expectancy assessment scale		0.84

undergraduate students. The instrument that uses a five-point Likert scale consists of 14 items, including seven reversed items. With a two-factor structure, the first seven items of the instrument measure the perceived value of STEM fields, while the next seven items measure expectations of success in STEM professions. The lowest score obtainable from the measurement tool is 14, while the highest is 70.

To determine the reliability of the scores obtained from the scales used in the study, Cronbach's alpha reliability coefficient was calculated. The results are presented in [Table 3](#).

According to [Table 3](#), the Cronbach's alpha values range from 0.89 to 0.93 for the subscales of the Scale of Attitude Towards Scientific Research, from 0.89 to 0.97 for the subscales of the Multiple Intelligence Scale, while the Cronbach's alpha value is 0.84 for the STEM Value-Expectation Assessment Scale. The Cronbach's alpha value for each scale score is above 0.70, indicating that the scale scores are reliable ([Taber, 2018](#)).

3 Results

Clustering analysis was conducted for each subscale to classify attitude levels of female health sciences faculty students, considered disadvantaged in terms of STEM, towards scientific research. The results are presented in [Table 4](#).

[Table 4](#) indicates that the results of the clustering analysis for all scale scores are statistically significant ($p < 0.05$), indicating that the classification is interpretable. According to the clustering analysis results for the subscale scores of reluctance to help researchers, 42.77% of the participants ($n = 68$) have a low level of reluctance to help researchers, 53.46% ($n = 85$) have a moderate level, and 3.77% ($n = 6$) have a high level. According to the clustering analysis results for the subscale scores of negative attitudes towards research, 50.31% of the participants ($n = 80$) have a low level of negative attitude towards research, 47.80% ($n = 76$) have a moderate level, and 1.89% ($n = 3$) have a high level. Regarding the positive attitude towards research subscale

scores, the clustering analysis results indicate that 8.81% of the participants ($n = 14$) have a low level of positive attitude towards research, 67.30% ($n = 107$) have a moderate level, and 23.90% ($n = 38$) have a high level. Regarding the positive attitude towards researchers subscale scores, the clustering analysis results indicate that 3.14% of the participants ($n = 5$) have a low level of positive attitude towards researchers, 27.67% ($n = 44$) have a moderate level, and 69.18% ($n = 110$) have a high level. In general, the majority of female students enrolled in the health sciences faculty have low to moderate levels of reluctance to help researchers and negative attitudes towards research, while having moderate levels of positive attitudes towards research and high levels of positive attitudes towards researchers.

Clustering analysis was conducted for each subscale to determine intelligence levels in the multiple intelligence subscales of female health sciences faculty students, considered disadvantaged. The results are presented in [Table 5](#).

[Table 5](#) indicates that the results of the clustering analysis for all scale scores are statistically significant ($p < 0.05$), indicating that the classification is interpretable. According to the clustering analysis results for the verbal–linguistic intelligence subscale scores, 3.77% of the participants ($n = 6$) have low verbal–linguistic intelligence level, 74.21% ($n = 118$) have a moderate level, and 22.01% ($n = 35$) have a high level. Regarding the logical-mathematical intelligence subscale scores, the clustering analysis results indicate that 8.81% of the participants ($n = 14$) have low logical-mathematical intelligence level, 73.58% ($n = 117$) have a moderate level, and 17.61% ($n = 28$) have a high level. The clustering analysis of the musical intelligence subscale scores reveal that 16.98% of the participants ($n = 27$) have low musical intelligence level, 67.30% ($n = 107$) have a moderate level, and 15.72% ($n = 25$) have a high level. Regarding the bodily-kinesthetic intelligence subscale scores, the clustering analysis indicates that 5.66% of the participants ($n = 9$) have low bodily-kinesthetic intelligence level, 75.47% ($n = 120$) have a moderate level, and 18.87% ($n = 30$) have a high level. For the spatial intelligence subscale scores, the clustering analysis results show that 17.61% of the participants ($n = 28$) have low spatial intelligence level, 71.07% ($n = 113$) have a moderate level, and 11.32% ($n = 18$) have a high level. Regarding the interpersonal intelligence subscale scores, the clustering analysis reveals that 3.77% of the participants ($n = 6$) have low interpersonal intelligence level, 42.77% ($n = 68$) have a moderate level, and 53.46% ($n = 85$) have a high level. The clustering analysis of intrapersonal intelligence subscale scores indicates that 5.03% of the participants ($n = 8$) have low intrapersonal intelligence level, 49.69% ($n = 79$) have a moderate level, and 45.28% ($n = 72$) have a high level. For the naturalist intelligence subscale scores, the clustering analysis results show that 6.29% of the participants ($n = 10$) have low naturalist intelligence level, 74.21% ($n = 118$) have a moderate level, and 19.50% ($n = 31$) have a high level. Overall, the majority of female students have moderate levels of verbal–linguistic, logical-mathematical, musical, bodily-kinesthetic, spatial, and naturalist intelligence, while their interpersonal and intrapersonal intelligence levels are moderate to high.

To determine the STEM value-expectancy assessment levels of female students, considered disadvantaged groups in terms of STEM, classification was performed through clustering analysis for scale scores. The results are presented in [Table 6](#).

[Table 6](#) indicates that the results of the clustering analysis for scale scores are significant ($p < 0.05$), indicating that the classification is interpretable. According to the clustering analysis results for STEM

TABLE 4 Participants' attitude levels towards scientific research.

		<i>n</i>	%	Min.	Max.	$\bar{X}$	Statistics
Reluctance to help researchers	Low	68	42.77	8.00	15.00	11.31	$F(2,156) = 340.432$ $p = 0.000$
	Moderate	85	53.46	16.00	31.00	22.69	
	High	6	3.77	33.00	40.00	37.50	
Negative attitude towards research	Low	80	50.31	9.00	17.00	11.91	$F(2,156) = 334.834$ $p = 0.000$
	Moderate	76	47.80	18.00	34.00	24.11	
	High	3	1.89	40.00	45.00	42.00	
Positive attitude towards research	Low	14	8.81	7.00	14.00	10.43	$F(2,156) = 313.601$ $p = 0.000$
	Moderate	107	67.30	15.00	28.00	22.36	
	High	38	23.90	29.00	35.00	33.08	
Positive attitude towards researchers	Low	5	3.14	6.00	10.00	8.20	$F(2,156) = 383.149$ $p = 0.000$
	Moderate	44	27.67	13.00	23.00	18.86	
	High	110	69.18	24.00	30.00	28.02	

n, Number of individuals; %, Percentage; Min., Minimum value; Max., Maximum value; $\bar{X}$, Mean; sd, Standard deviation.

TABLE 5 Multiple intelligence of the participants.

		<i>n</i>	%	Min.	Max.	$\bar{X}$	Statistics
Verbal-linguistic intelligence subscale	Low	6	3.77	19.00	31.00	26.67	$F(2,156) = 148.552$ $p = 0.000$
	Moderate	118	74.21	32.00	56.00	45.79	
	High	35	22.01	57.00	69.00	61.86	
Logical-mathematical intelligence subscale	Low	14	8.81	21.00	42.00	37.35	$F(2,156) = 207.686$ $p = 0.000$
	Moderate	117	73.58	44.00	84.00	64.44	
	High	28	17.61	85.00	105.00	95.32	
Musical intelligence subscale	Low	27	16.98	19.00	37.00	29.56	$F(2,156) = 242.280$ $p = 0.000$
	Moderate	107	67.30	38.00	71.00	53.97	
	High	25	15.72	73.00	91.00	80.56	
Bodily-kinesthetic intelligence subscale	Low	9	5.66	14.00	27.00	21.89	$F(2,156) = 149.537$ $p = 0.000$
	Moderate	120	75.47	28.00	55.00	42.47	
	High	30	18.87	56.00	70.00	62.80	
Spatial intelligence subscale	Low	28	17.61	16.00	31.00	23.11	$F(2,156) = 228.085$ $p = 0.000$
	Moderate	113	71.07	32.00	64.00	47.65	
	High	18	11.32	65.00	80.00	73.39	
Interpersonal intelligence subscale	Low	6	3.77	16.00	28.00	18.00	$F(2,156) = 346.898$ $p = 0.000$
	Moderate	68	42.77	33.00	64.00	52.18	
	High	85	53.46	65.00	80.00	74.60	
Intrapersonal intelligence subscale	Low	8	5.03	20.00	39.00	27.13	$F(2,156) = 264.500$ $p = 0.000$
	Moderate	79	49.69	40.00	79.00	64.43	
	High	72	45.28	80.00	100.00	90.01	
Naturalist intelligence subscale	Low	10	6.29	22.00	44.00	31.20	$F(2,156) = 211.596$ $p = 0.000$
	Moderate	118	74.21	46.00	88.00	70.01	
	High	31	19.50	90.00	110.00	101.03	

n, Number of individuals; %, Percentage; Min., Minimum value; Max., Maximum value; $\bar{X}$, Mean; sd, Standard deviation.

Value-Expectancy Assessment Scale scores, 6.92% of the participants ($n = 11$) have a low level of STEM value-expectancy assessment, 81.13% ($n = 129$) have a moderate level, and 11.95% ($n = 19$) have a high level.

To examine the correlation between scores of the Scale of Attitude Towards Scientific Research, the Multiple Intelligence Scale, and the STEM Value-Expectancy Assessment Scale, the Pearson correlation analysis was conducted. The results are presented in [Table 7](#).

Correlation coefficients <0.20 are considered very weak, $0.20\text{--}0.39$ is considered weak, $0.40\text{--}0.59$ is considered moderate, $0.60\text{--}0.79$ is considered strong and >0.80 is considered very strong (Papageorgiou, 2022).

The study findings first examined whether female leadership candidates' positive attitudes toward science positively affected their STEM motivation. It is then determined whether the multiple intelligence areas of female undergraduate students positively affect their STEM motivation. Table 7 shows that there is no significant correlation between the subscales of unwillingness to help researchers, negative attitudes towards research and logical-mathematical intelligence, musical intelligence, bodily-kinesthetic intelligence and spatial intelligence ($p > 0.05$). However, there are significant negative medium-level correlations between the subscales of unwillingness to help researchers and interpersonal intelligence, interpersonal intelligence ($r = -0.363$; $r = -0.383$) and a significant negative low-level correlation with naturalistic intelligence ($r = -0.194$) ($p < 0.05$). Positive attitude towards research has moderately significant positive correlations with verbal-linguistic intelligence, logical-mathematical intelligence, spatial intelligence, interpersonal intelligence and naturalistic intelligence subscales ($r = 0.491$; 0.375 ; 0.342 ; 0.352 ; 0.309 , respectively) and slightly significant positive correlations with musical intelligence, bodily-kinesthetic and interpersonal intelligence subscales ($r = 0.219$; 0.168 ; 0.293 , respectively) ($p < 0.05$). However, there is no significant correlation between the positive attitude towards researchers subscale and the musical intelligence subscale ($p > 0.05$). The positive attitude toward researchers subscale has significant positive moderate correlations with verbal-linguistic, interpersonal, and intrapersonal intelligence subscales ($r = 0.512$; 0.525 ; 0.475 , respectively) and significant positive moderate correlations with logical-mathematical, bodily-kinesthetic, spatial, and naturalistic intelligence subscales ($r = 0.190$; 0.208 ; 0.206 ; 0.215 , respectively) ($p < 0.05$). In addition, there are significant negative moderate correlations between the STEM Value-Expectation Evaluation Scale and the unwillingness to help researchers and negative attitudes toward researchers subscales ($r = -0.356$; $r = -0.348$, respectively) ($p < 0.05$). In addition, there are significant positive moderate correlations between STEM Value-Expectations Assessment Scale and positive attitudes towards researchers and its subscales ($r = 0.446$; $r = 0.313$, respectively) ($p < 0.05$). However, there is no significant correlation between STEM Value-Expectations Assessment Scale and musical intelligence subscale ($p > 0.05$). There are significant positive low correlations between STEM Value-Expectations Assessment Scale and bodily-kinesthetic, spatial and interpersonal intelligence subscales ($r = 0.211$, 0.254 , 0.299 , respectively) ($p < 0.05$). There are significant positive moderate correlations between the STEM Value-Expectation Assessment Scale and the verbal-linguistic, logical-mathematical, interpersonal and naturalistic intelligence subscales ($r = 0.324$; 0.328 , 0.401 , 0.354 , respectively) ($p < 0.05$). In

summary, there is no correlation between STEM values and expectations and musical intelligence. However, as verbal-linguistic, logical-mathematical, bodily-kinesthetic, spatial, interpersonal, interpersonal and naturalistic intelligence levels increase, STEM values and expectations also increase. In addition, as verbal-linguistic, interpersonal, interpersonal intelligence and naturalistic intelligence increase, reluctance to help researchers and negative attitudes towards research decrease, and positive attitudes towards research and researchers increase. As reluctance to help researchers and negative attitudes towards research increase, expectations towards STEM decrease. As positive attitudes towards research and researchers increase, expectations towards STEM also increase. According to the results, as the reluctance to help researchers and negative attitudes towards research increase, motivation towards STEM decreases. This finding shows that as the positive attitudes of female leadership candidates towards helping researchers and research increase, motivation towards STEM increases. In Table 7, the insignificant relationships presented regarding the mediating effect of attitude towards scientific research on the effect of multiple intelligences on STEM value expectation were removed from the model. The models examined within this scope are presented below.

The results of the mediator variable analysis for the models shown in Table 8 are presented in Table 9. In addition, the path diagrams for the mediator models are given in Figure 1. Model 1 shows the mediating effects of unwillingness to help researchers, negative attitudes toward research, positive attitudes toward research, and positive attitudes toward researchers on the relationship between verbal-linguistic intelligence and STEM value expectation evaluations. When all four mediator variables are included in the model, the path coefficients from unwillingness to help researchers, negative attitudes toward research, and positive attitudes toward researchers to STEM value expectation evaluations are not significant ($p > 0.05$). Therefore, unwillingness to help researchers, negative attitudes toward research, and positive attitudes toward researchers do not mediate the correlation between verbal-linguistic intelligence and STEM value expectation evaluations. Therefore, these variables are removed from the model. As a result, only the variable positive attitudes toward research remains as the mediator variable. The value RMSEA = 0.109 for this model indicates that there is no model-data fit. The values of $\chi^2/df = 2.890$, GFI = 0.921, NFI = 0.928, CFI = 0.951 indicate that there is an acceptable model fit. In the analysis, when there is no mediator variable, the standardized path coefficient from verbal-linguistic intelligence scores to STEM value expectation assessment scale scores is 0.32 and is significant ($p < 0.05$). In Model 1, where positive attitudes towards the research variable are included as a mediator variable, the standardized path coefficient from verbal-linguistic intelligence scores to positive attitudes towards research scores ($\beta = 0.52$) and the standardized path coefficient from positive attitudes towards research scores to STEM value expectation assessment scale scores ($\beta = 0.41$)

TABLE 6 The participants' levels of STEM value-expectancy assessment scale.

		<i>n</i>	%	Min.	Max.	$\bar{X}$	Statistics
STEM value-expectancy assessment	Low	11	6.92	26.00	37.00	34.00	F (2,156) = 114.722 $p = 0.000$
	Moderate	129	81.13	38.00	59.00	46.61	
	High	19	11.95	60.00	70.00	63.26	

n, Number of individuals; %, Percentage; Min., Minimum value; Max., Maximum value; $\bar{X}$, Mean; sd, Standard deviation.

TABLE 7 Correlations between scale scores.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Reluctance to help researchers	1												
2. Negative attitude towards research	0.673**	1											
3. Positive attitude towards research	−0.356**	−0.276**	1										
4. Positive attitude towards researchers	−0.387**	−0.525**	0.414**	1									
5. Verbal–linguistic intelligence subscale	−0.334**	−0.212**	0.491**	0.512**	1								
6. Logical-mathematical intelligence subscale	−0.149	−0.003	0.375**	0.190*	0.480**	1							
7. Musical intelligence subscale	0.033	0.138	0.219**	−0.026	0.426**	0.470**	1						
8. Bodily-kinesthetic intelligence subscale	−0.045	0.016	0.168*	0.208**	0.432**	0.409**	0.443**	1					
9. Spatial intelligence subscale	−0.129	−0.145	0.342**	0.206**	0.399**	0.285**	0.344**	0.349**	1				
10. Interpersonal intelligence subscale	−0.363**	−0.461**	0.293**	0.525**	0.266**	0.169*	0.042	0.145	0.351**	1			
11. Intrapersonal intelligence subscale	−0.383**	−0.389**	0.352**	0.475**	0.497**	0.299**	0.136	0.274**	0.426**	0.732**	1		
12. Naturalist intelligence subscale	−0.194*	−0.166*	0.309**	0.215**	0.352**	0.268**	0.228**	0.161*	0.524**	0.454**	0.578**	1	
13. STEM value-expectancy assessment scale	−0.356**	−0.348**	0.446**	0.313**	0.324**	0.328**	0.142	0.211**	0.254**	0.299**	0.401**	0.354**	1

0.05; ** $p < 0.01$.

are significant ($p < 0.05$). When the mediator variable is included in the model, the standardized path coefficient from verbal–linguistic intelligence to STEM value expectation assessments is 0.11 and is not significant ($p > 0.05$). After the mediator variable is included in the model, the predictor variable does not have a significant effect on the predicted variable, so the mediator variable has a full mediation effect. Therefore, the effect of verbal–linguistic intelligence on STEM value expectation for female health sciences faculty students is fully mediated by positive attitudes towards research. In addition, the indirect effect of verbal–linguistic intelligence scores on STEM value expectation assessment scale scores through positive attitudes towards research is 0.21. In other words, as the verbal–linguistic intelligence level increases for female health sciences faculty students, it increases STEM value expectations through the effect of positive attitudes towards research.

As seen in Table 8, Model 2 examines the mediating effect of positive attitudes toward research and positive attitudes toward researchers on the effect of logical-mathematical intelligence on STEM value expectation evaluations. When both mediating variables are included in the model, the path coefficients from positive attitudes toward researchers to STEM value expectation evaluations are not significant ($p > 0.05$). Therefore, positive attitudes toward researchers

are removed from the model because there is no mediating effect on the effect of logical-mathematical intelligence on STEM value expectation evaluations. Finally, only positive attitudes toward the research variable remain as the mediating variable. As seen in Table 9, the model fit index for this model, RMSEA = 0.114, indicates that there is no model-data fit; while the values of $\chi^2/df = 3.051$, GFI = 0.917, NFI = 0.922, CFI = 0.946 indicate that there is an acceptable model fit. As a result of the analyses, the standardized path coefficient from logical-mathematical intelligence to value-expectation evaluations towards STEM is 0.33 and this effect is statistically significant ($p < 0.05$). In Model 2, where positive attitude towards research is included as a variable in the model, the standardized path coefficient from logical-mathematical intelligence dimension scores to positive attitude towards research dimension scores ($\beta = 0.39$) and the standardized path coefficient from positive attitude towards research dimension scores to value-expectation evaluations towards STEM scale scores ($\beta = 0.40$) are seen to be statistically significant ($p < 0.05$). When the mediator variable is included in the model, the standardized path coefficient from logical-mathematical intelligence to value-expectation evaluations towards STEM is 0.17 and is statistically significant ($p < 0.05$). The fact that the significant effect from the predictor variable to the predicted variable continues after the

TABLE 8 The intermediary variable models examined in the study.

	Predictor variable	Intermediary variable	Predicted variable
Model 1	Verbal-linguistic intelligence	Reluctance to help researchers	STEM value-expectancy assessment
		Negative attitude towards research	
		Positive attitude towards research	
		Positive attitude towards researchers	
Model 2	Logical-mathematical intelligence	Positive attitude towards research	STEM value-expectancy assessment
		Positive attitude towards researchers	
Model 3	Bodily-kinesthetic intelligence	Positive attitude towards research	STEM value-expectancy assessment
		Positive attitude towards researchers	
Model 4	Spatial intelligence	Positive attitude towards research	STEM value-expectancy assessment
		Positive attitude towards researchers	
Model 5	Interpersonal intelligence	Reluctance to help researchers	STEM value-expectancy assessment
		Negative attitude towards research	
		Positive attitude towards research	
		Positive attitude towards researchers	
Model 6	Intrapersonal intelligence	Reluctance to help researchers	STEM value-expectancy assessment
		Negative attitude towards research	
		Positive attitude towards research	
		Positive attitude towards researchers	
Model 7	Naturalist intelligence	Reluctance to help researchers	STEM value-expectancy assessment
		Negative attitude towards research	
		Positive attitude towards research	
		Positive attitude towards researchers	

mediator variable is included in the model indicates that the mediator variable has a partial mediator effect. Accordingly, it can be said that the positive attitude towards the research variable has a partial mediating effect on the effect from logical-mathematical intelligence to STEM value expectation for women's health sciences faculty students. In addition, the indirect effect from logical-mathematical intelligence dimension scores to STEM-focused value expectation assessment scale scores via positive attitude towards the research variable was determined as 0.16. In other words, the increase in the logical-mathematical intelligence level of women's health sciences faculty students increases their value expectations towards STEM with the effect of positive attitude towards research. As seen in [Table 8](#), Model 3 examines the mediating effect of positive attitudes towards research and positive attitudes towards researchers on the effect of bodily-kinesthetic intelligence on STEM value expectation evaluations. When both mediating variables are included in the model, the path coefficients from bodily-kinesthetic intelligence to positive attitudes towards research and from positive attitudes towards researchers to STEM value expectation evaluations are not significant ($p > 0.05$). This suggests that positive attitudes toward research or positive attitudes toward researchers do not have a mediating effect on the relationship between bodily-kinesthetic intelligence and STEM value expectancy assessments.

As seen in [Table 8](#), Model 4 examines the mediating effect of positive attitudes towards research and positive attitudes towards researchers on the effect of spatial intelligence on STEM value expectation evaluations. When both mediation variables are included

in the model, the path coefficients from positive attitudes towards researchers to STEM value expectation evaluations are not significant ($p > 0.05$). Therefore, positive attitudes towards researchers do not have a mediating effect on the effect of spatial intelligence on STEM value expectation evaluations and therefore it was removed from the model. As a result, only positive attitudes towards the research variable remained as a mediating variable. As seen in [Table 9](#), the model fit index for this model, RMSEA = 0.110, indicates that there is no model-data fit; while the values of $\chi^2/df = 2.900$, GFI = 0.920, NFI = 0.925, CFI = 0.949 indicate that there is an acceptable model fit. As a result of the examination, it is seen that the standardized path coefficient from spatial intelligence to value-expectation evaluations towards STEM is 0.25 and this effect is statistically significant ($p < 0.05$). Positive attitude towards research is included as a variable in the model. In Model 2, the standardized path coefficient from spatial intelligence dimension scores to positive attitude towards research dimension scores ($\beta = 0.36$) and the standardized path coefficient from positive attitude towards research dimension scores to value-expectation evaluations scale scores for STEM ($\beta = 0.43$) are statistically significant ($p < 0.05$). When the mediator variable is included in the model, the standardized path coefficient from spatial intelligence to value-expectation evaluations towards STEM is 0.10 and is not statistically significant ($p > 0.05$). The fact that the significant effect from the predictor variable to the predicted variable does not continue after the inclusion of the mediator variable in the model shows that the mediator variable has a full mediator effect. Accordingly, it is seen that the positive attitude towards the research variable has a full mediation effect on the effect

TABLE 9 Intermediary variable results.

	Type	Effect	Estimate	β	z	p
Model 1	Indirect effect	Verbal-linguistic intelligence $\Rightarrow$ AYOT $\Rightarrow$ STEM	0.18	0.21		
	Component	Verbal-linguistic intelligence $\Rightarrow$ AYOT	0.05	0.52	6.598	<0.05
		AYOT $\Rightarrow$ STEM	3.76	0.41	4.498	<0.05
	Direct effect	Verbal-linguistic intelligence $\Rightarrow$ STEM	0.10	0.11	1.347	0.178
	Total effect	Verbal-linguistic intelligence $\Rightarrow$ STEM	0.28	0.32	4.302	<0.05
Model Fit indices: $\chi^2/df=2.890$, GFI=0.921, NFI=0.928, CFI=0.951, RMSEA=0.109						
Model 2	Indirect effect	Logical-mathematical intelligence $\Rightarrow$ AYOT $\Rightarrow$ STEM	0.08	0.16		
	Component	Logical-mathematical intelligence $\Rightarrow$ AYOT	0.02	0.39	4.816	<0.05
		AYOT $\Rightarrow$ STEM	3.67	0.40	4.804	<0.05
	Direct	Logical-mathematical intelligence $\Rightarrow$ STEM	0.08	0.17	2.259	<0.05
	Total	Logical-mathematical intelligence $\Rightarrow$ STEM	0.16	0.33	4.363	<0.05
Model Fit indices: $\chi^2/df=3.051$, GFI=0.917, NFI=0.922, CFI=0.946, RMSEA=0.114						
Model 4	Indirect effect	Spatial intelligence $\Rightarrow$ AYOT $\Rightarrow$ STEM	0.09	0.16		
	Component	Spatial intelligence $\Rightarrow$ AYOT	0.02	0.36	4.495	<0.05
		AYOT $\Rightarrow$ STEM	3.95	0.43	5.146	<0.05
	Direct effect	Spatial intelligence $\Rightarrow$ STEM	0.05	0.10	1.275	0.202
	Total effect	Spatial intelligence $\Rightarrow$ STEM	0.14	0.25	3.306	<0.05
Model Fit indices: $\chi^2/df=2.900$, GFI=0.920, NFI=0.925, CFI=0.949, RMSEA=0.110						
Model 5	Indirect effect	Interpersonal intelligence $\Rightarrow$ AYOT $\Rightarrow$ STEM	0.07	0.12		
	Component	Interpersonal intelligence $\Rightarrow$ AYOT	0.02	0.30	3.646	<0.05
		AYOT $\Rightarrow$ STEM	3.80	0.42	5.510	<0.05
	Direct effect	Interpersonal intelligence $\Rightarrow$ STEM	0.10	0.18	2.386	<0.05
	Total effect	Interpersonal intelligence $\Rightarrow$ STEM	0.16	0.30	3.938	<0.05
Model Fit indices: $\chi^2/df=3.134$, GFI=0.913, NFI=0.920, CFI=0.943, RMSEA=0.116						
Model 6	Indirect effect	Intrapersonal intelligence $\Rightarrow$ AYOT $\Rightarrow$ STEM	0.06	0.13		
	Component	Intrapersonal intelligence $\Rightarrow$ AYOT	0.02	0.36	4.444	<0.05
		AYOT $\Rightarrow$ STEM	3.39	0.37	4.636	<0.05
	Direct effect	Intrapersonal intelligence $\Rightarrow$ STEM	0.12	0.27	3.645	<0.05
	Total effect	Intrapersonal intelligence $\Rightarrow$ STEM	0.18	0.40	5.505	<0.05
Model Fit indices: $\chi^2/df=3.168$, GFI=0.913, NFI=0.920, CFI=0.943, RMSEA=0.117						
Model 7	Indirect effect	Naturalist intelligence $\Rightarrow$ AYOT $\Rightarrow$ STEM	0.06	0.12		
	Component	Naturalist intelligence $\Rightarrow$ AYOT	0.02	0.32	3.890	<0.05
		AYOT $\Rightarrow$ STEM	3.61	0.39	4.946	<0.05
	Direct effect	Naturalist intelligence $\Rightarrow$ STEM	0.10	0.23	3.135	0.005
	Total effect	Naturalist intelligence $\Rightarrow$ STEM	0.16	0.35	4.758	<0.05
Model Fit indices: $\chi^2/df=2.826$, GFI=0.922, NFI=0.927, CFI=0.951, RMSEA=0.107						

from spatial intelligence to the value-expectation towards STEM for female health sciences faculty students. In addition, the indirect effect from the spatial intelligence dimension scores to the value-expectation assessment scale scores for STEM through the positive attitude towards research variable was determined as 0.16. In other words, the increase in the spatial intelligence level of female health sciences

faculty students increases their value-expectation towards STEM with the effect of the positive attitude towards research.

In Model 5, the mediating effect of unwillingness to help researchers, negative attitude towards research, positive attitude towards research and positive attitude towards researchers on the effect of interpersonal intelligence on value-expectation evaluations

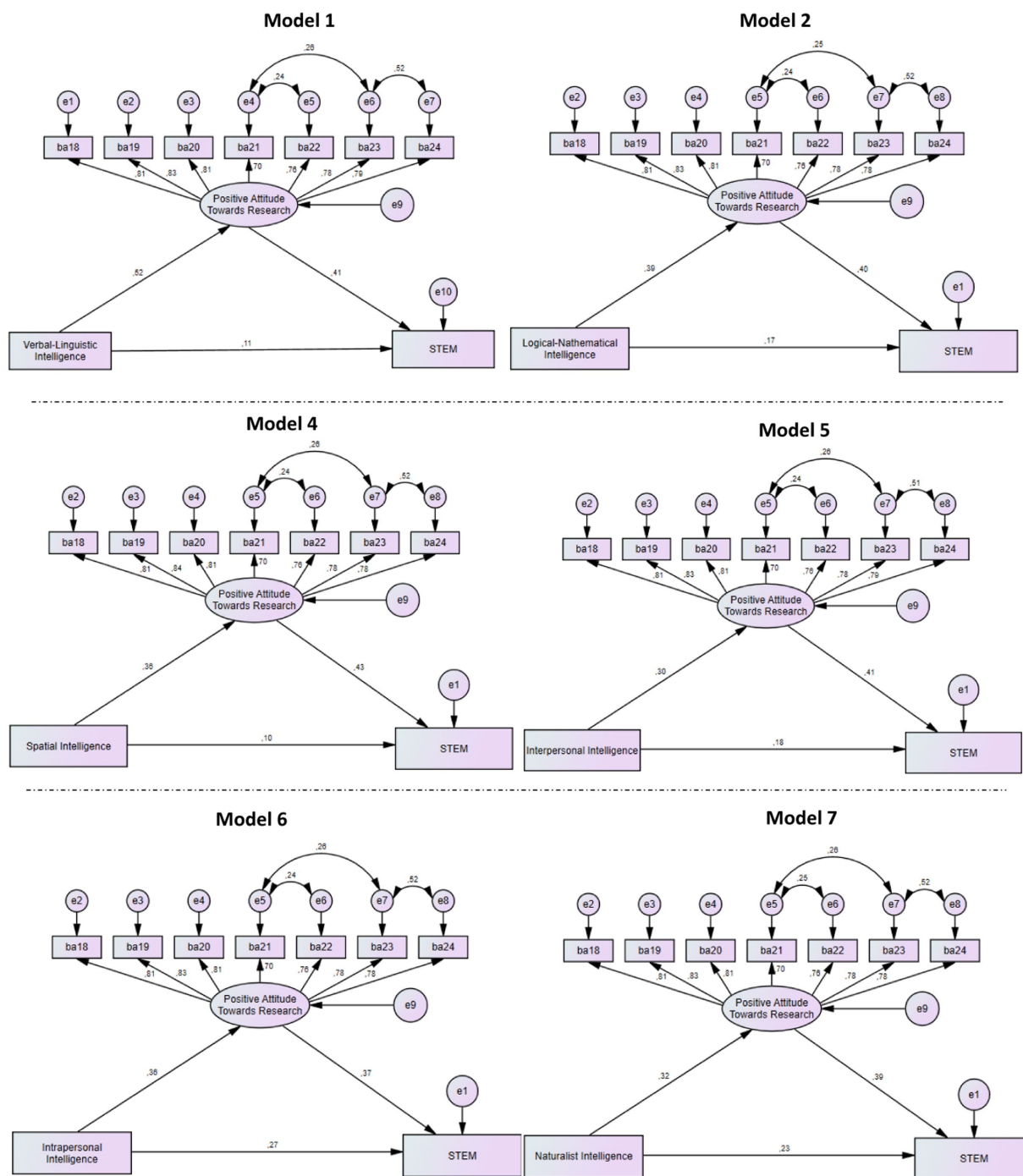


FIGURE 1
 Path diagram of the effect of scientific attitude and intelligence on motivation towards STEM.

towards STEM is examined. When four mediator variables are included in the model, the path coefficients from the variables of unwillingness to help researchers, negative attitude towards research and positive attitude towards researchers to value-expectation evaluations towards STEM are not statistically significant ($p > 0.05$). In this case, the variables of unwillingness to help researchers, negative attitude towards research and positive attitude towards researchers do not have a mediating effect on the effect of interpersonal intelligence on value-expectation evaluations towards

STEM and are removed from the model. In the last case, only the variable of positive attitude towards research is included as a mediator variable. As seen in Table 9, the value of RMSEA = 0.116 among the model fit indices for this model shows that there is no model data fit; $\chi^2/df = 3.134$, GFI = 0.913, NFI = 0.920, CFI = 0.943 values indicate that there is an acceptable model fit. As a result of the examination, the standardized path coefficient from interpersonal intelligence to value-expectation evaluations for STEM is 0.30 and this effect is statistically significant ($p < 0.05$). When positive attitude

towards research is included in the model as a variable, the standardized path coefficient from interpersonal intelligence dimension scores to positive attitude towards research dimension scores in Model 5 is ($\beta=0.30$), and the standardized path coefficient from research attitude dimension scores for STEM to value-expectation evaluation scale scores is ($\beta=0.42$) and this effect is statistically significant ($p<0.05$). When the mediator variable is included in the model, the standardized path coefficient from interpersonal intelligence to value-expectation evaluations for STEM is 0.18 and this effect is statistically significant ($p<0.05$). After the mediator variable is included in the model, the significant effect from the predictor variable to the predicted variable continues, indicating that the mediator variable has a partial mediator effect. Accordingly, it can be said that the positive attitude towards the research variable has a partial mediator effect in the effect of interpersonal intelligence on the value-expectation towards STEM for female health sciences faculty students. In addition, it is determined that the indirect effect of the interpersonal intelligence dimension scores on the STEM-focused value-expectation assessment scale scores through the positive attitude towards the research variable is 0.12. In other words, the increase in the interpersonal intelligence level of female health sciences faculty students increases their value-expectations towards STEM with the effect of the positive attitude towards research.

In Model 6, the variables of unwillingness to help researchers, negative attitude towards research, positive attitude towards research and positive attitude towards researchers are found to mediate the effect of interpersonal intelligence on value-expectation evaluations towards STEM. When four mediator variables are included in the model, the path coefficients from the variables of unwillingness to help researchers, negative attitude towards research and positive attitude towards researchers to value-expectation evaluations towards STEM are not statistically significant ($p>0.05$). In this case, the variables of unwillingness to help researchers, negative attitude towards research and positive attitude towards researchers do not mediate the effect of interpersonal intelligence on value-expectation evaluations towards STEM and are removed from the model. In the last case, only the variable of positive attitude towards research is included as a mediator variable. As seen in Table 9, the value of RMSEA = 0.117 among the model fit indices for this model indicates that the model data do not fit; $\chi^2/df=3.168$, GFI = 0.913, NFI = 0.920, CFI = 0.943 values indicate acceptable model fit. As a result of the examination, the standardized path coefficient from personal intelligence to value-expectation evaluations towards STEM is 0.40 and this effect is statistically significant ($p<0.05$). In Model 6, where positive attitude towards research is included as a variable in the model, the standardized path coefficient from personal intelligence dimension scores to positive attitude towards research dimension scores ($\beta=0.36$) and the standardized path coefficient from research attitude dimension scores for STEM to value-expectation evaluations scale scores ($\beta=0.37$) are statistically significant ($p<0.05$). When the mediator variable is included in the model, the standardized path coefficient from personal intelligence to value-expectation evaluations towards STEM is 0.27 and is statistically significant ($p<0.05$). The fact that the significant effect from the predictor variable to the predicted variable continues after the mediator variable is included in the model shows that the mediator variable has a partial mediator effect. Accordingly, it can be said that the positive attitude towards the research variable has a

partial mediator effect on the effect coming from personal intelligence on the value expectation towards STEM for women health sciences faculty students. In addition, it is determined that the indirect effect from the personal intelligence dimension scores to the STEM-focused value expectation assessment scale scores through the positive attitude towards the research variable is 0.13. In other words, the increase in the personal intelligence level of women health sciences faculty students increases their value expectations towards STEM with the effect of the positive attitude towards research.

In Model 7, the mediating effects of the variables of unwillingness to help researchers, negative attitude towards research, positive attitude towards research and positive attitude towards researchers on the effect of natural intelligence on value-expectation evaluations towards STEM are analyzed. In the case of including four mediator variables in the model, the path coefficients from the variables of negative attitude towards diseases and positive attitude towards diseases to value-expectation evaluations towards STEM are significant ($p>0.05$). In this case, the effect of helping with health improvements, negative attitude towards conditions and positive attitudes towards improvements on the effect of natural intelligence on value-expectation evaluations towards STEM is not specified and is removed from the model. In the last case, only the positive attitude variable is included as a mediator variable. Table 9 shows that there is no model-data fit with the model fit index RMSEA = 0.107 for modifying this model. The values of $\chi^2/df=2.826$, GFI = 0.922, NFI = 0.927, CFI = 0.951 indicate an acceptable model fit. As a result of the examination, when there is no mediator variable, the standardized path from naturalistic intelligence to value-expectation evaluations towards STEM is 0.35 and this effect is consistently significant ($p<0.05$). In Model 7, where positive attitudes towards research are included as model variance, the standardized paths from naturalistic breadth dimension scores to positive attitudes towards customers dimension scores ($\beta=0.32$) and the standardized path from positive attitudes towards standards dimension scores to range scores of value-expectation evaluations towards STEM are consistently significant overall ($p<0.05$) ($\beta=0.39$). The change in the standardized path from naturalistic intelligence to value-expectation evaluations towards STEM is 0.23 and is permanently significant ($p<0.05$). The fact that the significant effect from the predictor variable to the predicted variable continues after the inclusion of the mediator variable into the model shows that the mediator variable has a partial mediator effect. Accordingly, it can be said that the positive attitude towards research variable has a partial mediator effect in the effect of naturalistic intelligence on value-expectations towards STEM among female health sciences faculty students. In addition, the indirect effect of the positive attitude towards research variable from the naturalistic intelligence dimension scores to the value-expectation evaluation scale scores towards STEM is determined as 0.12. In other words, the increase in the intrapersonal intelligence levels of female health sciences faculty students increases their value-expectations towards STEM with the effect of the positive attitude towards research.

In conclusion, musical intelligence does not affect STEM values and expectations. An increase in bodily-kinesthetic intelligence enhances STEM values and expectations; however, no mediating effect was detected on attitudes towards scientific research. An increase in linguistic, logical-mathematical, spatial, interpersonal, intrapersonal, and naturalist intelligence increases STEM values and expectations, with only the positive attitude towards research acting as a mediating

role in this relationship. In other words, high scores in verbal-linguistic intelligence, logical-mathematical intelligence, spatial intelligence, interpersonal intelligence, intrapersonal intelligence, and naturalistic intelligence lead to positive attitudes toward research. This positively affects female students' STEM values and expectations.

4 Discussion

This study found that most female leadership candidates had low-moderate reluctance to help researchers and negative attitudes toward research, moderate positive attitudes toward research, and high positive attitudes toward researchers. It suggests that female leadership candidates who are likely to take part in organisational development in the future will exhibit high level positive attitudes towards research. Çelik et al. (2015) investigated nursing students' anxiety levels and attitudes towards scientific research and various variables affecting them. As a result, it was found that the anxiety level of the students towards doing research was not very high and their attitudes towards doing research were positive. Björkström et al. (2003) investigated Swedish undergraduate nursing students' attitudes towards and awareness of research and development in nursing. They focused on 201 students. As a result, they stated that nursing students' attitudes towards research were positive. Kes and Öztürk-Şahin (2019) worked with nursing students. They worked with 162 students to determine students' anxiety and attitudes towards scientific research. According to the results of the study, it was found that students' attitudes towards research were positive. Korkmaz et al. (2011) developed an attitude scale to determine pre-service teachers' attitudes towards scientific research. There were a total of 1,085 students in the study group. According to the results of the study, it was found that pre-service teachers' attitudes towards research were positive. Ercoşkun (2019) examined pre-service teachers' attitudes towards scientific research with various variables. In the study, 381 students were studied. Attitudes Towards Scientific Research Scale (ATSRS) was used as a data collection tool. According to the results of the study, it was found that pre-service teachers' attitudes towards research were positive. Çakmak et al. (2015) examined pre-service social studies teachers' attitudes towards scientific research. They worked with 259 students in the study in which the survey model was used. According to the results of the study, it was found that pre-service social studies teachers' attitudes towards research were positive. Yılmaz et al. (2020) studied 57 undergraduate students to determine their attitudes towards scientific research. As a result, it was found that the students' attitudes towards scientific research were positive. Halabi (2016) investigated the attitudes of nursing students in Saudi Arabia towards research. The study was conducted with 244 final year students in a three-campus nursing college in three regions of Saudi Arabia. As a result of the study using the survey model, it was found that the students' attitudes towards scientific research were positive. Halabi and Hamdan-Monsour (2010) evaluated Jordanian nursing students' attitudes towards nursing research. The study included 612 senior nursing undergraduate students studying in Oman, Jordan. As a result of the research using the survey model, it was determined that nursing students had positive attitudes towards research. Studies in the field overlap with the finding in this study. It was also found that different results were obtained in different studies. Polat (2014) aimed to examine the attitudes of education faculty students towards scientific

research. In the research conducted with 417 students in total, a survey model was established. Attitudes Towards Scientific Research Scale (ATSRS) and a questionnaire were used as data collection tools. At the end of the study, it was seen that students' attitudes towards scientific research were at a moderate level. Biçer et al. (2013) investigated the willingness of prospective Turkish teachers to scientific research. The study focused on 312 prospective teachers studying at two different state universities. At the end of the research, it was seen that the students' attitudes towards scientific research were at a moderate level. A lack of self-belief in terms of mathematics and science aptitude limits girls' and women's science aspirations much more than their performance. A survey of more than 2,000 girls aged 15 to 19 in the Asia-Pacific region suggested that only 12% continued to study science subjects even though more than 50% were considering them when they were younger. It suggested that female students made these decisions due to gender discrimination, the difficulty of the courses, and their perception that they received inadequate social support from their families and teachers. Girls are more likely to experience math anxiety than boys. Mothers are also likely to be more anxious than fathers. They may be more likely to transmit math anxiety to their children, especially girls (UNESCO, 2024). These findings are consistent with the findings of this study. There are a number of challenges to women's advancement in academic leadership. Some of these are unconscious biases and deep-rooted gendered expectations against women. Cultural beliefs about gender and gender biases that stem from workplace structures, practices, and interaction patterns that unintentionally favor men. Unconscious gender bias is a powerful but often invisible barrier to women's advancement. Men have characteristics that are socially and anthropologically more adaptable to leadership roles, while women have poorer self-images, greater lack of confidence in women than men, and less career orientation and less interest in pursuing a career (Ayyildiz and Banoglu, 2024; Gamero, 2024; Marques et al., 2024).

It can be said that the verbal-linguistic, mathematical-logical, musical, bodily-kinesthetic, spatial-kinesthetic, spatial, naturalistic intelligence levels of most of the female students studying at the Faculty of Health Sciences are at medium level, while their interpersonal intelligence and intrapersonal intelligence levels are medium-high. Studies supporting the findings of these studies are frequently found in the literature. Mathematical ability and knowledge are critical for developing STEM skills and working in STEM fields. However, girls' confidence in these subjects tends to be lower than boys', even when they perform well. It is estimated that one in five people feel anxious about maths, but anxiety levels are higher among girls. In all educational systems participating in TIMSS in 2019, except Bahrain and Egypt, male students were found to be significantly more confident in mathematics than female students (UNESCO, 2024). One factor that has been shown to negatively affect mathematics performance and acquisition is mathematics anxiety. Math anxiety is generally more pronounced in women than in men. Gender stereotypes are believed to play a role in the high levels of mathematics anxiety (MA) reported by female students. Justicia-Galiano et al. (2023) examined gender stereotypes about mathematics anxiety (MA), its ability and affective components. It was investigated whether gender differences in MA were associated with gender stereotype beliefs in both ability and affective aspects. A total of 257 secondary school students completed measures of mathematics-related and gender

stereotypes. It was examined whether there was a stereotypical belief that male and female adolescents experience mathematics anxiety to different degrees. The results clearly show that both gender groups believed that female students experience higher levels of mathematics anxiety than male students. The results regarding beliefs about mathematics anxiety are consistent with the pattern of gender differences found for beliefs about anxiety in general. Both male and female students believe that girls are more likely than boys to experience general anxiety-related emotions such as tension and worry. These findings suggest that negative emotions such as distress, sadness, fear, shame, and guilt in mathematics performance are experienced more by women. Regarding the emotional aspect of math anxiety experienced by both boys and girls, it was found that girls believed that they experienced math anxiety more than boys. The results showed that women tended to experience more negative emotions than men. It was concluded that gender differences in math anxiety may reflect actual levels of math anxiety rather than gender bias. Regarding the math ability stereotype, both girls and boys held egalitarian or pro-female views. It could be argued that being aware of the stereotype that boys will perform better than girls may have negative consequences for some girls, as the perception of these ideas may lead them to feel insecure and anxious in math situations. This finding shows that the traditional stereotype that positively discriminates against boys is gradually decreasing in Western societies. Girls who held the traditional math ability stereotype exhibited lower math self-confidence, lower math performance, and higher math anxiety. This finding highlights the relationship between gender, mathematical ability, self-confidence, beliefs about success, and mathematical anxiety. This suggests that female students who are likely to be future leaders should be more motivated to be successful in mathematical fields. Developing girls' math skills is crucial to STEM. Van Mier et al. (2019) assessed the mathematics anxiety and mathematics performance of 124 s and fourth grade children, 67 girls and 57 boys. Although boys and girls showed roughly equal levels of mathematics anxiety and performed similarly on the arithmetic task, correlation analyses revealed that only in girls did mathematics anxiety correlate significantly with mathematics performance. Higher levels of math anxiety only significantly and negatively moderated math performance in girls. The results showed that math anxiety is already negatively linked to math performance in girls as early as second grade. Math anxiety has lifelong consequences on girls' math performance, causing them to later avoid STEM careers. Preventing the development of math anxiety, especially in girls, from early childhood is essential. For girls who have encountered the negative consequences of math anxiety on math performance it is imperative to reduce the level of math anxiety. Therefore, intervention studies should be conducted to reduce girls' mathematics anxiety. Gender-related effects of intervention programs implemented from an early age should be taken into account. İzci and Sucu (2014) examined the multiple intelligence profiles of university students. A total of 722 undergraduate students studying at a state university were included in the study. In the study, the intelligence areas of university students were evaluated with the "Multiple Intelligences Questionnaire." Significant differences were found between the intelligence areas of university students in terms of gender variable. It was observed that female students had higher mean scores in

visual-spatial and musical-rhythmic intelligence than male students. Pehlivan (2008) worked with 934 students to examine the differences between intelligence areas according to gender. The Multiple Intelligences Inventory was used to determine multiple intelligence areas. It was found that female students were more developed in verbal-linguistic, visual-spatial, musical-rhythmic and self-directed intelligence areas than male students. Looori (2005) examined the differences in the intelligence preferences of male and female students learning English as a second language in higher education institutions in the United States. In the study, it was found that female students' interpersonal intelligence and intrapersonal intelligence levels were medium-high. İzci et al. (2007) examined the scores of the students enrolled in the dershanes in various intelligence areas in terms of their gender. A total of 387 students were included in the study and the Multiple Intelligences Scale was used. When the multiple intelligence areas of female students were examined, it was observed that they had high levels of linguistic, physical, musical, social and introverted intelligence areas. Altınok (2008) determined the multiple intelligence areas of students studying at the school of physical education and sports according to various variables. It was found that women's musical-rhythmic intelligence levels were higher than men's musical-rhythmic intelligence levels. In addition, it was determined that women's visual-spatial intelligence and bodily-kinesthetic intelligence levels were higher than men's visual-spatial intelligence and bodily-kinesthetic intelligence levels. These findings are similar to the findings of the study. Participating in physical exercises protects young people's mental health and increases their motivation. Exercises can be said to improve mood and cognitive function. It reduces depressive symptoms, increases self-efficacy and improves emotional regulation (Li Z. et al., 2024). In addition, physical activities have positive effects on health motivation, appearance motivation, leisure motivation, ability motivation and social motivation of young people (Li J. et al., 2024). Teachers play a critical role in learning activities using multiple intelligence systems. It has been found that when teachers motivate their students to arts and sports, students' motivation to study is also high. Making music has also been found to increase motivation (Immerz et al., 2024). This suggests that participation in physical and artistic activities would be beneficial for the motivation of female leadership candidates.

When the value expectations of future female leadership candidates for the STEM field were evaluated, it was found that 81.13% of the students had a medium level of value expectation evaluation level for the STEM field. This situation suggests that female students are not positively motivated for STEM in the family, school and peer environment. It is possible to say that males are less motivated in social sciences and females are less motivated in math-oriented fields such as physical sciences, technology, engineering and mathematics. It was determined that girls had a negative self-perception especially in mathematics. Therefore, it negatively affects girls' motivation towards STEM. Female students negatively evaluate their skills, competencies and potential in mathematics. The negative motivation of female students causes them to move away from STEM fields in their career expectations and plans (Lazarides and Lauermaun, 2019; Lazarides et al., 2016). Dietrich and Lazarides (2019) examined the development of motivational belief patterns in mathematics by gender over a school year and

career plans in mathematics-related fields. They found that girls' STEM motivation was not at a high level. This finding is in line with the research finding. This suggests that female leadership candidates who will take their place in organizational development need more motivation in STEM. The study showed that musical intelligence does not affect STEM values and expectations. A measurement tool measuring STEM values and expectations was used in this study. A measurement tool regarding STEAM motivation was not used. STEM is based on technical and cognitive skills such as science, technology, engineering and mathematics. STEM education programs focus only on the technical aspects of their disciplines. STEAM (STEM+Arts) is based on science, technology, engineering, mathematics and art-creativity. STEAM Education is a learning approach that uses Science, Technology, Engineering, Art and Mathematics as access points to guide students' questioning, dialogue and critical thinking. Musical tendencies are related to art. The instrument measuring STEM motivation used in this study did not predict musical intelligence and art. In this case, it is thought that musical intelligence does not predict STEM motivation (Huang, 2020; Özer and Demirbatır, 2023; Turhal, 2020).

5 Recommendations

It is determined that most female leadership candidates have a low-medium level of reluctance to help researchers. It is seen that their positive attitudes towards research are medium and their positive attitudes towards researchers are high. Most of them have medium levels of verbal-linguistic, mathematical-logical, musical, bodily-kinesthetic, spatial and naturalistic intelligence. It is determined that their interpersonal intelligence and interpersonal intelligence levels are medium-high. 81.13% of female students in the Faculty of Health Sciences have a medium level of value-expectation evaluation level towards STEM. It can be said that it is possible to improve women's skills towards STEM. Recommendations for parents, teachers, researchers, policy makers and female students are presented below for future women leaders to take a strong role in organisational development.

Suggestions for families;

- Girls should be positively motivated in STEM fields from an early age. Their mistakes should be tolerated and their successes should definitely be rewarded,
- Gender inequality in the family should be eliminated. The idea that "boys are better in mathematics and physics, girls are better at housework" should be abandoned,

Suggestions for teachers;

- Activities and opportunities that include teaching science, technology, engineering and mathematics together in an integrated manner in terms of application and concept can be offered to girls,
- Scientific study opportunities for girls in schools should be increased. Access to technology should be provided. The idea that "if you touch a computer, it will break, if it breaks, it cannot be repaired" should be abandoned,
- Educational programs that support mathematical-logical and spatial intelligence areas can be created in order to increase the motivation of female leadership candidates,

- Teachers should direct students to sports and art activities including music, physical-kinesthetic activities in order to increase the motivation of future female leaders.
- Female leadership candidates need to be motivated not only in social sciences but also in STEM,
- Gender norms in educational institutions should not be a disadvantage for female students. The prejudice that boys are better at solving problems and girls are not good should be eliminated,
- Future female leadership candidates need mentors who can act as positive role models. Therefore, female teachers should be able to act as role models,
- Various studies can be conducted to develop the leadership qualities of female students.

Suggestions for researchers.

- A "Leaky Pipeline" study can be conducted with women leaders in organizational development,
- This study was implemented only in the Faculty of Health Sciences. It is possible to implement it in other faculties at different scales,
- STEM is the subject of this study; STEAM may be the subject of another study.

Recommendations to policy makers;

- To promote non-discrimination and gender balance in technology and to motivate female leaders, investment should be made in programs that enable girls and young women to study and work in STEM fields,
- Work should be done to ensure female leadership in AI and technology development, gender-sensitive digital transformation, and address gender stereotypes in algorithms.

Recommendations for female leadership candidates;

- It is recommended that female leadership candidates participate in STEM education programs,
- Need to believe that they will be successful in STEM subjects and need to be able to motivate themselves to do so.

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

The studies involving humans were approved by Ege University Institute of Social and Human Sciences Directorate Ethics Committee with the decision dated 24/04/2024 and numbered 2428. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

ZD: Writing – original draft, Writing – review & editing, Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization.

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Women football observers' experiences: a perspective from system justification and glass ceiling

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Introduction: The legitimization theory of the system explains that despite people's inherent drive towards personal and group interests, they tend to support social systems. Understanding the sources of social pressure and the glass ceiling perceptions of female football observers is the main aim of this study in terms of examining attitudes within the legitimized system. To this end, the study sought to answer how female football observers are constructed in a marginalized position within the male-dominated football culture through sources of social pressure, and how they accommodate the acceptance of legitimizing the system despite encountering glass ceiling barriers in the context of Turkey.

Method: Data for the research were collected through in-depth individual interviews (9 female observers) using qualitative research methods. The collected data were analyzed using thematic analysis. After a comprehensive analysis of the interview transcripts, four themes emerged:

Findings: Gender-based positive and negative experiences; Glass Ceiling: Organizational Factors; Legitimization of Hierarchy-Reducing Myths; and Hope for Future Intragroup Progress within the Current System.

Recommendations: Our analysis reveals that female football observers, identified as match officials, indicate changes in authoritarian attitudes within recent institutional policies during their stadium experiences, characterized towards a more rational, female observer, and referee-focused stance. Additionally, entrenched stereotypes and legitimizing myths reducing hierarchy appear to generally establish legitimacy for female match officiating within the legitimization process. The research results suggest the importance for policymakers in the central referee committee in Turkey to consider the dimensions of legitimization both verbally and in writing when creating policies regarding women.

KEYWORDS

football female observers, system justification, glass ceiling, organizational psychology, social pressure

1 Introduction

The increase in the popularity of women's football over the past 20 years, within the historically male-dominated world of football, has been documented in various academic studies (Cleland et al., 2020; Bell, 2019). Against this backdrop, the progress women have made in football in recent years is remarkable, and the participation of girls and women in the game has seen impressive growth (Clarkson et al., 2020). Despite these developments, an examination of women's presence in football, both globally and in Turkey, reveals that the representation of women in leadership, management, and decision-making positions remains significantly low (Caudwell, 2011; Clarkson et al., 2019). Football has a history of structurally excluding women (Williams, 2003) and plays a major role in producing and reinforcing dominant concepts of masculinity in contemporary popular culture (Cleland et al., 2020).

Women have been marginalized within the football community due to gender-based power dynamics and continue to be underrepresented in roles such as refereeing, observation, and other leadership positions. However, their presence and success can challenge the masculinity of sports environments and the historically gendered nature of sports, inspiring innovative changes in leadership approaches (Nordstrom et al., 2016). Success in sports is often attributed to excellence in both the physical and mental domains of performance (Metin and Eratlı, 2022). By overcoming biases and breaking stereotypes, female referees and observers can contribute to a more inclusive and progressive sports environment. Through these prevailing ideologies and stereotypes, female observers, particularly those from disadvantaged groups, internalize their status during the process of legitimizing the system, perceiving the existing structure as legitimate and fair. System justification theory posits that supportive ideologies and stereotypes are used to maintain the status quo in society. When men who support the system feel threatened by women's structural empowerment, they may resort to various strategies to reaffirm the legitimacy of the gender hierarchy (Şeker and Direkçi, 2022).

In addition to the obstacles arising from the male-dominated nature of football culture, women in decision-making positions face various challenges due to the glass ceiling and societal pressures (Flint, 2012). The glass ceiling, an invisible barrier that prevents women from advancing beyond a certain level in their careers, is one of the most significant factors limiting the professional development of female football referees. The perception of the glass ceiling among female football referees often revolves around gender discrimination and the struggle to exist in a male-dominated sector (Tingle et al., 2014).

The high number of male referees and their more frequent assignments to top-level matches are factors that hinder the progress of female referees. Regardless of their abilities and achievements, female referees often do not officiate important matches or are assigned to less prestigious leagues. For instance, when examining the number of referees and observers in the league categories of the Turkish Football Federation's 2023–2024 football season Central Referee Board; out of a total of 1,345 referees, 102 (7.6%) were female, and 1,243 (92.4%) were male. Among the 509 observers, 2.82% were female, and 97.2% were male (TFF, 2024). In the top-tier Super League, while 26 male referees were assigned, no female referees were represented in this category. When examining the role of football observers, it was found that

no female observers were present in the Super League, and only one female referee observer was present in the A class. These results indicate that women face the glass ceiling in decision-making positions and are not adequately represented in decision-making mechanisms. Lale Orta, Turkey's first female football coach and first female football referee, became the first female president of the Turkish Football Federation's Central Referee Board in January 2023. However, her tenure lasted only 6 months, and she was dismissed in July 2023. Her short tenure serves as evidence of the difficulties women face in maintaining upper management positions in sports. Similarly, in the context of refereeing and observation within the English Premier League, despite a 72% increase in the number of qualified female referees between 2016 and 2020 (Stimpson, 2020), there remains a significant underrepresentation of women, particularly in male football. Rebecca Welch made national headlines in early 2021 as the first female referee to officiate a men's match in the English Premier League (MacInnes, 2021).

Previous studies on women in football have predominantly focused on the opportunities for girls and women to play the game (Pfister, 2015; Black and Fielding-Lloyd, 2019) and the representation of women in coaching (Burton, 2015; Norman et al., 2018). Few studies have addressed the experiences of women in football refereeing and observation. Jones and Edwards (2013), Forbes et al. (2015), and Reid and Dallaire (2019) have highlighted the conspicuous absence of women in refereeing and observation roles, suggesting that gender inequalities in refereeing may be even more pronounced than those in coaching. It is assumed that women lack the knowledge required to make correct decisions, do not embody the assertive tendencies needed to control the game, and lack the physical abilities to "keep up" with the game, especially in elite men's football.

Based on the results of these studies, it is evident that while women have undoubtedly made significant progress in terms of participation as players, the same cannot be said for their involvement in decision-making roles (refereeing, observation, etc.) in football. These studies represent a small body of work on female referees and observers, and there are very few studies on female football observers, particularly in Turkey. This research will address the underrepresentation of female football referee observers, aiming to both uncover the reasons for their minority status and develop strategies for addressing the pressures and challenges they face, thus promoting gender equality in football environments. The guiding questions of this research on female football observers are as follows:

1. What are the experiences of female football observers regarding social pressure and system legitimization within the male-dominated football culture?
2. What are the perceptions of the glass ceiling among female referees in the football refereeing community?

In light of these questions, the research aims to explore how female football observers in Turkey adapt to the acceptance of system justification in their experiences of social pressure and the glass ceiling. For this reason, this study focuses on the experiences of women referees and, particularly, observers in football, emphasizing the insidious and persistent nature of system justification, the sources of social pressure inherent in football culture, and their struggles with glass ceiling barriers.

1.1 Literature

1.1.1 System justification theory (SJT)

System Justification Theory suggests that individuals are motivated to justify existing social inequalities and legitimize the socio-political system that governs them (Jost et al., 2004). When the system is perceived as stable and legitimate, it is highly supported, and dominant group members adopt hierarchy-enhancing attitudes as long as they see their socio-political system as legitimate, as this helps protect their group-based interests (Laurin et al., 2013). The theory explains why people tend to sustain the existing system, even when it harms them or their group, and how they perceive the system as legitimate and fair (Jost et al., 2014). During the process of system justification, individuals—especially disadvantaged group members—internalize their own status through existing ideologies and stereotypes, perceiving the current structure as legitimate and fair (Jost and ve Hunyady, 2005). Individuals' evaluations of the system are influenced by their existential, epistemic, and social needs (Jolley et al., 2018).

When individuals perceive threats that could disrupt the structure of the system they live in, they experience negative emotions such as fear and anxiety. A high tendency to justify the system brings about negative attitudes toward change. Moreover, advantaged group members rationalize their privileged positions through a strong tendency to justify the system, while disadvantaged group members tend to blame themselves rather than the system for their circumstances, accepting inequality (Wakslak et al., 2007).

System Justification Theory uses ideologies and stereotypes that support the maintenance of existing systems in society. In this context, women should demonstrate the strongest system defense when the hierarchy is perceived as stable. Furthermore, System Justification Theory proposes that when people face socio-political threats, they engage in psychological processes to restore the legitimacy of the status quo (Lau et al., 2008). Therefore, dominant group members (men) may display heightened system defenses when the gender hierarchy is threatened, as this helps preserve the status quo. Men who defend the system might employ various strategies to re-legitimize the gender hierarchy when they feel threatened by women's structural empowerment. Potential defense mechanisms include showing anger and resentment towards women (hostile sexism), attributing positive traits to their own group that legitimize existing gender roles (benevolent sexism), and adopting polarized views about traditional and non-traditional women. These views might include negative stereotypes about women fighting for social change (e.g., feminists) and positive stereotypes about stay-at-home mothers (Kuchynka, 2015).

1.1.2 Social pressure in sport

Social Dominance Theory is a framework based on the fundamental observation that all human societies tend to establish group-based social hierarchies. It aims to explain why societies are organized around group-based social hierarchies. The theory focuses on the role of intergroup prejudice, social roles, cultural ideologies, and psychological tendencies in sustaining social hierarchies through discriminatory behaviors (Pratto et al., 2000).

According to Social Dominance Theory, intergroup inequalities are shaped not only by power but also by legitimizing myths that influence the behaviors of institutions, groups, and individuals.

Legitimizing myths are a set of shared values, attitudes, beliefs, stereotypes, and cultural ideologies (Sidanius et al., 2000). Social Dominance Theory categorizes legitimizing myths into two types: hierarchy-enhancing legitimizing myths and hierarchy-attenuating legitimizing myths. Hierarchy-enhancing legitimizing myths include all moral and intellectual doctrines that justify group-based oppression and inequalities. Examples of hierarchy-enhancing myths include racism, sexism, stereotypes, the belief in a just world, nationalism, and the belief in karma (Sidanius et al., 2004).

On the other hand, certain ideologies and approaches challenge social dominance. These ideologies are known as hierarchy-attenuating legitimizing myths. Examples of hierarchy-attenuating legitimizing myths include political doctrines such as social democracy, socialism, and communism, religious teachings that advocate for the protection of the poor, and humanistic teachings like feminism and human rights (Pratto et al., 2006). The maintenance of hierarchy-enhancing legitimizing myths is associated with a high social dominance orientation, whereas the maintenance of hierarchy-attenuating legitimizing myths is related to a low social dominance orientation (Pratto et al., 1994).

Based on these explanations, social pressure has always played a critical role in shaping individuals' behavior across various domains and has influenced the outcome of important events. One of the environments where the phenomenon of social interaction and pressure is most evident is in sports. For instance, the preferences of a specific group, such as the crowd in a football match, can significantly impact the behavior and decisions of the referee or observer. In many cases, individuals are encouraged by social pressure to make decisions that may go against their personal inclinations. These decisions aim to align with the expectations of the group and avoid criticism. Generally, a referee is under more scrutiny than the players on the field, and when the outcome is not accepted by a team and its supporters, the referee figure is questioned and can become a scapegoat. Therefore, referees become targets of social pressure from players, coaches, and especially spectators (Corrado, 2011).

1.1.3 The Glass Wall

The term "Glass Wall" typically refers to an invisible artificial barrier that prevents individuals with the appropriate qualifications from advancing into leadership positions within organizations (Baumgartner and Schneider, 2010). It has been described as a strong and invisible barrier that hinders women's career progression and their achievement of equality with men (Khalid and Aftab, 2023). These barriers have been categorized into three main areas (Karaca, 2007). These categories include:

- *Barriers arising from individual factors:* These involve women's multiple roles and personal preferences and perceptions (e.g., women's roles related to home responsibilities, the challenges of balancing work and family life, role conflicts, internalizing societal values without questioning, the belief that the system cannot be changed, and feeling obligated to support the system).
- *Barriers arising from organizational factors:* Organizational culture and policies, lack of mentors, and exclusion from communication networks form the organizational barriers.
- *Barriers arising from societal factors:* Stereotypes and professional segregation form the societal barriers.

The “Glass Ceiling” refers to all invisible barriers that prevent women from reaching senior management positions due to their gender. Since the inclusion of women in top management implies a power-sharing dynamic between men and women, male-dominated organizational cultures resist women gaining power. Thus, senior management levels are blocked off for women by a transparent glass ceiling (Singh et al., 2023). One of the primary institutions where male-dominated organizational culture prevails in top management and throughout the ranks is sports organizations. Cunningham and Sagas (2008) argued that women in various sports environments often face hostile, adversarial, and discriminatory work conditions. Researchers have suggested that power within sports organizations is gendered and typically operates in favor of men (Sartore and Cunningham, 2007). Status and power are influenced by the behaviors and attitudes of group or society members, and when arranged around a primary social theme, they can lead to the development of stereotypes and often continue traditional social arrangements and structures (Sartore and Cunningham, 2007). Therefore, sports have played a significant role in the development and perpetuation of gender stereotypes and discrimination. Clopton and Sagas (2009) explored various aspects of the glass ceiling, investigating the perceptions of male and female coaches regarding career and promotion opportunities. Their research revealed that even the perception of career and promotion limitations could be a predictor of leaving the profession.

There are very few studies in the literature that examine female coaches and women in leadership roles in sports and provide a critical perspective on the institutional and organizational structures of sports (Norman, 2014). Additionally, only a few studies (Jones and Edwards, 2013; Drury et al., 2022) have highlighted the noticeable absence of women in football refereeing and observer roles, suggesting that gender inequalities in refereeing and observing may be even more pronounced than those in coaching and managerial positions.

2 Method

This research was carried out in the phenomenology design, one of the qualitative research designs, using the semi-structured individual interview technique. The phenomenon investigated was “being a female observer in football.” Phenomenology design reveal people’s experiences, attitudes, the meaning of this phenomenon in the individual itself, and the structure and essence of the phenomenon (Creswell, 2007; Merriam, 2009).

2.1 Participants

Data for the research were collected through 9 female observers in Turkey. The schools were selected using purposeful sampling method, which is of the purposeful sampling methods.

During the six-month data collection process, a total of 9 certified female observers, aged between 37 and 54, with a minimum of 5 years and a maximum of 13 years of experience (an average of 9.2 years) as observers, were included in the study. Two women had been observers for 5–6 years, four women for 8–10 years, and three women for 11–13 years. Regarding the participants’ marital status, it was found that 4 participants were married and 5 were single. All 9 female

observers had served in various leagues in Turkey, including the Amateur League, BAL League, Women’s Super League, 3rd League, and 2nd League (see Table 1).

2.2 Data collection

The research data were collected using a semi-structured interview form. Accordingly, female observers answered open-ended questions, and further inquiry questions were used to encourage detailed answers. The interview questions were created after reviewing the relevant literature on system justification, glass ceiling and social pressure, and receiving the opinions of an expert. Interviews were held after making appointments with the female observers. All interviews were conducted online on the date determined by the participants (Whatsapp Web). Interviews lasted approximately 45 min. The participants’ identities were kept secret in the study, and code names were used. The interviews were audio-recorded after getting the permission of the participants. Some interview questions are as follow:

- What does it mean to be a female football observer in Turkey? How do you evaluate the meaning of being a female football observer in Turkey in terms of opportunities and challenges?
- Could you talk about the social pressures related to your profession (such as pressure from the crowd, coaches, players, etc.)? What kind of difficulties do these pressures cause while performing your job?
- As a female observer, what obstacles have you faced while climbing the career ladder?
- In your opinion, what is society’s perspective on women and men? (What do you think about gender equality?)
- When comparing female football referees and observers to their male counterparts, what do you think are the advantages and disadvantages in your profession?
- Do you feel that you do not have equal access to rights and opportunities in the football observing profession due to your gender? How?

2.3 Data analysis

The collected data were analyzed using thematic analysis. We used the six steps proposed by Braun and Clarke (2006) to conduct an interpretive thematic analysis. First, familiarization with data—the data were organized in the transcripts. Then authors read and re-read transcripts to become familiar with the content. Second, the generation of initial codes—authors and two colleagues from the sports sciences field (one sport management, and one gender studies researcher) separately identified features in a systematic manner using general codes across the data set. Third, searching for themes—the researchers met and discussed their preliminary codes and compared interpretations of further themes. Fourth, reviewing themes—the coded data were developed by consensus into a thematic map, whereby the researchers considered the arrangement of themes and subthemes. Fifth, defining and naming themes—to refine all themes, definitions were derived for each label. Sixth, producing the report—each

TABLE 1 The demographic information of the participants is presented in the table below.

Pseudonym	Age	Interview duration	Educational status	Marital status	Number of years officiated	level officiated	Number of years observership	Leagues in which he worked as an observer
Nilay	53	50 min	Bachelor degree	Single	9 years	Class C 1.2.3. League RAL League	12 years	Amateur League RAL League Women's Super League 3rd League 2nd League
Oya	51	01.15	Bachelor degree	Single	11 years	Regional RAL Women Super League	11 years	Amateur League Youth Teams RAL League 3rd League
Mine	46	01.20	Bachelor degree	Married	12 years	Regional RAL League Women Super League 3rd League	13 years	Amateur League RAL League Women's Super League 3rd League
Zeynep	38	01.10	Bachelor degree	Married	10 years B	Matches in all provinces Regional RAL League Women Super League	10 years	Amateur League RAL League Women's Super League
Simge	37	01.15.	Bachelor degree	Single	15 years C	Regional RAL Women Super League	5 years	Amateur League RAL League Women's Super League
Ecem	54	55 min	Bachelor degree	Married	6 years	Regional RAL Women Super League	8 years	Amateur League RAL League Women's Super League 3rd League
Sude	43	50 min	Bachelor degree	Married	10 years	Regional RAL	6 years	Amateur League RAL League
Ayşe	48	30 min	Bachelor degree	Single	16 years	FIFA MHK Regional RAL Women Super League	8 years	RAL League Women's Super League 3rd League
Nükhet	46	01.00.	Master's degree	Single	8 years	Regional RAL Women Super League	10 years	RAL League Women's Super League 3rd League Women 1st League 2nd League

theme's title was amended to reflect the study's data and these were related to the research questions and the literature (Braun and Clarke, 2006). The study received ethical approval from the Ethics Committee of Çukurova University (23/02/2024 and decision number 141).

2.4 Credibility

Before the interviews, we made them sign a voluntary participation form and asked them again during the interviews. We explained their rights to end the interview at any time and to skip any question they did not want to answer. We kept the identities of all participants secret and gave them pseudonyms. We shared the transcripts of the research with them and told them that we would remove any parts they did not want us to use in the analysis. We used triangulation researcher (two researchers made independent evaluations during the analysis of data) to ensure the credibility of the study (Denzin, 2012). Expert opinions were obtained in creating the form, and pilot applications were made to ensure the face and content validity of the interview forms. The pilot applications were not included in the study; they were only performed to test whether the questions were easy to understand or not.

3 Findings and results

The findings obtained from the study are presented under four themes. These are:

Theme 1: Gender-based positive and negative experiences.

Theme 2: Glass Ceiling: Organizational Factors.

Theme 3: Legitimization of Hierarchy-Reducing Myths.

Theme 4: Hope for Future Intragroup Progress within the Current System.

3.1 Theme 1: gender-based positive and negative experiences

The findings under this theme suggest that participants have experienced negative situations due to the perception that football refereeing and observation are considered “men's work.” They particularly emphasized that the reactions from fans regarding decisions not made in their favor often involved sexist remarks such as “Go home and wash the dishes.” Ecem mentioned: “For example, during matches: ‘A female observer? How could there be a female observer?’...” Ayşe also added, “... female observers are considered adequate for the profession, but are not assigned to prestigious matches like those in the Super League. While we are accepted into these leagues as regional observers, we are not assigned to major matches such as Fenerbahçe games.”

The fact that female observers are not assigned to prestigious matches due to their gender and are subjected to sexist stereotypes has significant implications, both economically and in terms of their status. Gender stereotypes in sports persist in Turkey, as they do globally. This situation leads to women facing prejudices in sports that are coded as “masculine.” For example, studies in the literature reveal that women are perceived as the “other” gender

in sports such as basketball (Şahin et al., 2020), boxing (Emir et al., 2015), and combat sports (Kavasoğlu and Yaşar, 2016), and that they experience prejudice, inequality, and discrimination. Reid & Dallaire (2018) also stated that the scarcity of female referees puts them in a paradoxical position: they are viewed as a spectacle and a focal point, but at the same time, they are marginalized and discredited.

The findings of this research also show that football referees and observers are subjected to similar gendered prejudices. From the perspective of system justification theory, these findings remind us that instead of questioning the legitimacy of roles or positions assigned by the system, individuals often define themselves and others based on characteristics that align with these roles or positions, whether positive or negative. Therefore, stereotypes that emerge at this stage serve as a tool for legitimizing the system (Jost and Banaji, 1994). For example, stereotypes such as “incompetent, dirty, unintelligent, untrustworthy” directed at individuals in a certain profession are used to justify their unequal economic share and their lower status in the hierarchy (Jost and Banaji, 1994). These mechanisms also require women athletes to adopt and conform to masculine sports culture and continually prove themselves in order to advance in the hierarchy. Meanwhile, the competence of their male counterparts is typically taken for granted (Walker and Bopp, 2011). McKay (1997) in his study examining gender relations in sports organizations where masculine norms are highly valued, explained that women constantly have to perform ‘gender’ under disadvantaged conditions and deal with gendered structures and norms through strategies of adaptation and acceptance. Consequently, female football referees and observers, like other female athletes, may struggle to question the normalized patriarchal and masculine structures and practices associated with their roles and the sports culture itself. As a result, they may adopt gendered practices that are valued in order to gain acceptance and recognition (Welford, 2011).

Despite the above-mentioned prejudices, participants also believe they have certain opportunities due to being women. These include positive experiences such as being treated more hospitably, not being subjected to violence, and being appreciated for making bold decisions in challenging matches, compared to their male counterparts. They specifically mentioned receiving support from male referee colleagues, who also acted as mentors when needed. For instance, Simge described her positive experiences, which she believes are due to her gender, as follows: “...we are welcomed more politely by field managers, commissioners, facility supervisors, and football representatives compared to men. There is positive discrimination.”

“...We can also observe positive changes in the Turkish Football Federation's policies towards women, which are reflected in both the fields and management. For example, having a female representative in the Central Referee Committee, and having a female president of the federation in the past, along with a female member in the committee, and female observers in C and A classifications and female FIFA referees, are indicators of this positive change (Sude).”

International sports organizations (such as IOC, FIFA, UEFA) are conducting significant efforts to ensure gender equality in sports (Şirin, 2021). These efforts assign responsibilities to national sports organizations, such as increasing the number of women in various

sports positions. The positive experiences mentioned by the participants may stem from the Turkish Football Federation's efforts to align with the gender equality policies of organizations like UEFA and FIFA.

3.2 Theme 2: glass ceiling: organizational factors

In this theme, participants emphasized that they climbed the career ladder more slowly than their male colleagues due to their gender, were assigned fewer matches, and had significantly lower chances of being appointed to higher league matches. They expressed these experiences of being held back as follows:

Oya: "As women, we are like stepchildren; we have never reached the positions we deserved... those who received worse ratings than me (men) always became Super League assistants."

Sude also noted: "There is no place for female observers in the stands. Governors and other officials come to the stands, but no specific area is arranged for us to watch the matches. Sometimes we end up sitting among the fans. This is an institutional shortcoming, and as a result, we occasionally feel more pressure from the fans. There have been many instances where I just sat wherever I could find a spot to watch the match."

The participants stressed that they were institutionally marginalized in the profession of football refereeing and observation due to their gender and that they could not rise to the positions they deserved at the pace they were entitled to. Similar to the findings of this study, the literature also highlights the "glass ceiling" (Claringbould and Knoppers, 2012) encountered by women in sports management positions, the neoliberal approach adopted by sports organizations toward gender equality (Hovden, 2015), and the resistance shown by (male) boards in sports organizations to embracing and maintaining gender balance in sports governance (Knoppers et al., 2022), emphasizing the lack of women in these upper echelons.

3.3 Theme 3: legitimization of hierarchy-reducing myths

In the findings discussed above, despite participants expressing that they experienced gender-based prejudice and faced institutional "glass ceiling" barriers, this theme suggests that they do not believe there is institutional gender discrimination. For instance, Oya expressed her thoughts on the matter: "I do not think there is discrimination; I think everyone is evaluated equally. There's no inequality or discrimination." Furthermore, in these findings, participants highlighted that compared to previous years, there have been improvements in women's football in Turkey, with women being in better positions in their profession, and that gender-based prejudice in societal perspectives has decreased. Simge commented on this:

"It's in a much better position than before. So, people no longer have the same level of prejudice as they used to. Now, women can play football, women can commentate on football, and women can referee."

Hierarchy-enhancing myths support the continuity of hierarchical structures by portraying inequalities in the distribution of social values as normal, moral, and just, thereby promoting the belief that inequality is legitimate. These myths can include any form of sexism, belief in a just world, heterosexism, nationalism, racism, and stereotypes (Pratto et al., 2006). On the other hand, hierarchy-attenuating myths advocate for equality within the social structure and oppose the inequalities in distribution. Examples include democracy, socialism, communism, humanism, human rights, and feminism (Pratto et al., 2006). This theme reflects participants' observations of the increasing number of female referees and observers, indicating a shift towards greater representation compared to the past.

3.4 Theme 4: Hope for future intragroup progress within the current system

In this theme, the findings reveal that participants believe female referees and observers currently have better rights and opportunities and are more represented than before. Additionally, participants expressed optimism that conditions for female referees and observers will improve even further in the future. They emphasized the increasing presence of women in the leadership roles of the Turkish Football Federation. For instance, X shared their thoughts on this issue:

"I think women now have more of a voice. For instance, we even have a female member on the Central Referee Committee. This wasn't the case in the past. It shows that women are being valued and that they also have a say. I hope this continues."

These findings indicate that participants have aligned with a system-justifying tendency. According to the theory of system justification, disadvantaged individuals or groups may internalize their conditions and perceive the existing structure as legitimate and fair through prevailing ideologies and stereotypes (Jost and ve Hunyady, 2005). Although participants previously acknowledged being marginalized due to their gender, in this theme, they perceive no institutional discrimination and believe future conditions will be more advantageous for women. This reflects their tendency to justify the system.

Many referees have other full-time careers and often referee "for the love of the sport." Therefore, the belief that the structure will continue to improve may help referees remain committed to their profession and cope with the occasional challenges and barriers they face.

After identifying the main emerging themes, the researchers re-examined all transcripts to identify other transcripts that fit the new themes. As a result of this process, four themes emerged that were present in 100% of the interviews. A full list of stated and illustrated themes and first-level codes is shown in Table 2.

4 Conclusions and recommendations

This study examines how female football observers in Turkey adapt to societal pressures and the glass ceiling barriers through tendencies to legitimize the system, despite experiencing these challenges. Football has historically been a male-dominated field, creating an environment that shapes institutions, including sports refereeing, and reinforces traditional power structures that limit

TABLE 2 Examples of codes and themes used during thematic analysis of the study.

TEMA	CODE	EXCERPT
The hope that future intra-group advancement will be possible within the current system.	• Positive change Female member in MHK and Federation support is equal and fair • There are no institutional barriers, there is development, there will be further development, rapid acceleration • This was not the case in the past (more obstacles and pressure in the past), Equal opportunities now compared to the past • TFF to publish equal instructions for men and women without discrimination,	Nilay: "I mean, I think women have more say now. For example, we even have a woman member in the Central Referee Board, which was not the case in the past, this shows that women are valued and they have a say. Therefore, I want this practice to continue." Oya: "If women's football develops, women's refereeing develops and at some point women's football also develops, so the federation is doing its part and supporting women. It puts women managers in every organization, so I think the situation is much better now than before."
Legitimizing Myths That Reduce Hierarchy	• A more moderate point of view of fans, managers, coaches and athletes and a little bit of fan pressure • Societal perspective: more rigid in the past, more constructive now, better than before • There are positive developments. Women have been recognized in this field. • No prejudice like before. More polite welcome and acceptance by field managers, field commissioners, facility supervisors, football representatives than men	Zeynep: ... "but in the past it was different, now those taboos have been broken, so the trend is good": Breaking down sexist taboos over time In the past, of course, there were more spatial problems, but now we see that they have been overcome, now that there is a women referee dressing room, I think this is a great start. Simge: It is in a much better position than it used to be, so people do not have as much prejudice as before, so now women can play ball, women can comment on football, women can referee.
Glass Ceiling: Organizational Factors	• Not wanting female referees and observers in men's matches (club pressure, obstacles) • Not getting match assignments in top leagues; Stepchild treatment, discrimination, being put in the second plan (subordination, marginalization), Taking a long time to climb the career ladder	Ecem: "no coach used to want a woman referee" Sude: "There is gender-based injustice, I was always offered but not taken up"
Gender-based positive and negative experiences	• Gender advantages: more positive approach, no swearing • Courageous refereeing Celebrating bravery (players); Bias	Oya: "we female football observers trivialize or ignore sexist abuse by accepting (legitimizing) gender stereotypes as a fundamental part of the game."

women's participation (Fields, 2005). Being present in this male-dominated domain is challenging for women, as evidenced by Nordstrom et al. (2016) work, which highlights the difficulties faced by female football referees. Similarly, this study reveals that female observers encounter comparable experiences, framed within the theories of system justification, social pressure, and the glass ceiling.

The results of this study highlight four main themes that emerged from the participants' experiences in line with the aforementioned theories: gender-based positive and negative experiences; the glass ceiling and organizational factors; hierarchy-reducing legitimizing myths; and hope for future intragroup progress within the current system. The findings demonstrate that women's experiences as football observers are strongly aligned with the general norms of system justification, particularly in relation to gender-based system legitimization. The research shows that sexist discourse and behaviors, as well as institutional policies and practices, are legitimized within this context.

Theberge (1993) in her research on female sports coaches, notes that many women working in sports are aware of their minority status and face problems, such as negative stereotypes and biases from male athletes, coaches, and referees. This study also finds that what is legitimized here is the entrenched and accepted status of female referees and observers within the male-dominated football culture.

Two key themes emerged as part of this legitimizing action: *gender-based positive and negative experiences* and *hope for future intragroup progress within the current system*. Hacıcaferoğlu and Ve Gündoğdu (2014) research on referees shows that female football referees are subjected to more suppressive behaviors compared to their male counterparts.

Moreover, other studies indicate that women often downplay sexist remarks, describing them as jokes or light-hearted, even when they recognize the sexist nature of the comments. This trivialization allows sexist interactions to persist without challenge, reinforcing male dominance (Forbes et al., 2015). Webb et al. (2020) suggest in their research that some referee participants believe football has developed a culture where such actions by players, coaches, and managers are understood as a normal part of football culture.

The findings of this study also show that participants experienced social pressure, particularly from fans and coaches, during the early stages of their refereeing and observing careers. Any negative decision against a team would lead fans to turn immediately to the observer in the stands, directing negative remarks at them. This was especially true for female referees, as many believed women should not officiate men's matches. Participants expressed that they had to fight for acceptance in this male-dominated space. This aligns with Cleland

et al. (2018) research, which found that female referees, operating in a domain dominated by men and masculinity, often had to continually negotiate their identity as women in the face of mistreatment from managers, players, coaches, and spectators. However, as their refereeing skills improved, they began to receive more recognition for their abilities from players, coaches, and spectators. Similarly, female observers noted that they now receive more positive support from their colleagues and institutions than in the past.

Kellett and Shilbury (2007) and Kellett and Warner (2011) emphasize that the strength of social experiences and relationships within institutions is crucial for referees' career sustainability and ongoing participation, contributing to enduring connections and commitment. Given the male-dominated nature of refereeing (Todey, 2011), participants mentioned that, despite social pressures from spectators and coaches, the support they received from colleagues and institutions increased their motivation for their work.

In terms of glass ceiling barriers, the study finds that the obstacles female referees face are primarily rooted in organizational factors. One of the key findings is that it is much more difficult for female referees to officiate in higher leagues compared to their male counterparts, highlighting the components of the glass ceiling that prevent women from advancing to higher ranks. Participants noted that they progress through their careers much more slowly than their male colleagues and that women's presence is often overlooked when it comes to top-league assignments, where decisions are frequently based on gender rather than ability.

Another significant finding of the research is that participants believe that being a female referee or observer was much more challenging in the past. However, they also recognize that important progress has been made in women's football in Turkey, leading to better representation in their professions. In other words, participants indicated that they are now in a better position, with increased representation, greater societal and institutional acceptance, but that organizational factors still perpetuate glass ceiling barriers.

The authors suggest that by identifying elements involved in legitimizing actions, a better understanding of sports policy processes may emerge. Therefore, the authors encourage the identification of legitimizing actions and associated elements across various contexts. Consistent examination and implementation of positive policies for female football referees can increase their level of empowerment, reduce the gender gap, and create a productive force in challenging traditional gender inequalities by reducing or even eliminating tendencies to legitimize them.

The findings of this study help us understand the challenges faced by female observers and propose policies that could minimize the loss of human resources in the field of sports refereeing and observing. Consistent examination and implementation of positive policies for female football referees can increase their empowerment, reduce gender disparities, and create a productive force in addressing traditional gender inequalities (Kim and Hong, 2016). To ensure equal advancement within the system for female football referees and observers in Turkey and to prevent glass ceiling barriers, it is recommended that the Turkish Football Federation develop institutional policies aimed at gender equality. Furthermore, developing strategies to attract more female athletes, especially those participating in sports at high schools and universities, to the refereeing role would be beneficial.

Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: Since this research is a qualitative study, the interviews were recorded and later reported. Therefore, the data of the participants are limited because they are their personal opinions. Requests to access these datasets should be directed to Yeliz Eratlı Şirin, yelizsirin75@gmail.com.

Ethics statement

The studies involving humans were approved by Çukurova University Faculty of Medicine Non-Invasive Clinical Research Ethics Committee with the decision dated 0.23/02/2024 and numbered 141. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

YE: Methodology, Writing – original draft, Writing – review & editing. GÖ: Conceptualization, Data curation, Investigation, Writing – original draft.

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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.

The reviewer İK declared a shared affiliation with the authors to the handling editor at the time of review.

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The association between transformational leadership and teachers' creativity: professional resilience and job satisfaction as mediators

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This study investigated the associations between transformational leadership, teachers' job satisfaction, professional resilience, and creativity. The sample included 417 teachers of public and private schools in Istanbul. The data collection tools were "Transformational Leadership Scale", "Teachers' Professional Resilience Scale", "Job Satisfaction Scale", and "Organizational Creativity Scale". The data analysis was conducted on SPSS and AMOS. A structural equation model (SEM) was employed to test the research hypotheses. The findings suggested that transformational leadership significantly predicted teachers' job satisfaction and professional resilience. However, transformational leadership did not have a statistically significant effect on teachers' creativity. Additionally, teachers' professional resilience was a significant predictor of creativity while job satisfaction was not. Lastly, professional resilience mediated the association between transformational leadership and creativity. Drawing on these findings, it can be concluded that the prevalence of transformational leadership in schools could foster teachers' creativity and professional resilience. Thus, principals should improve their transformational leadership skills and develop strategies to enhance teachers' creative potential. Transformational leadership plays a critical role in fostering teachers' job satisfaction and professional resilience and encourage creativity.

KEYWORDS

transformational leadership, teachers' creativity, creativity, professional resilience, resilience, job satisfaction, teacher

Introduction

The association between transformational leadership and teachers' creativity is multifaceted, as it is significantly influenced by professional resilience and job satisfaction. Creativity in education is essential for fostering innovative teaching methods, enriching learning processes, and enhancing student outcomes (Zhang and Bartol, 2010; Hidayat and Tjahjono, 2023). Transformational leadership plays a crucial role in this process by enhancing teachers' performance and motivation through the articulation of a shared vision, values, and goals in an inspiring manner. First conceptualized by Bass (1990), transformational leadership encompasses four key components: individualized consideration, intellectual stimulation, inspirational motivation, and idealized influence. These dimensions enable leaders to inspire employees by fostering innovation and creativity within the workplace (Bass and Avolio, 1994; Leithwood and Sun, 2012). This leadership style is particularly relevant in educational settings where innovation and

adaptability are critical for addressing the dynamic needs of teachers and students (Tse et al., 2018; Zhang et al., 2018). The existing literature highlights that transformational leadership not only enhances teachers' creativity but also addresses critical professional outcomes such as resilience and satisfaction. For example, Avolio and Gardner (2005) emphasize that transformational leadership cultivates a positive organizational climate, which is conducive to creativity and innovation. Furthermore, it fosters an environment where teachers feel empowered to take initiative and experiment with new teaching methods, thereby promoting professional growth and development (Shin and Zhou, 2003; Herman and Chiu, 2014). This supportive environment not only encourages individual creativity but also contributes to building a collaborative and innovative school culture where collective growth becomes possible. While transformational leaders help teachers discover and develop their individual potential, they also turn school culture into positive (Sui et al., 2012). On the other hand, teachers' creativity is of great importance to developing innovative and effective teaching methods. Teachers' creativity enables them to teach more interactively and interestingly, which in turn fosters students' academic achievement. The influence of transformational leadership on teachers' creativity is mediated by factors such as job satisfaction and professional resilience. While job satisfaction refers to the teachers' satisfaction out of teaching, professional resilience refers to the capacity to work under stressful and challenging conditions (Promchart and Potipiroon, 2020). Professional resilience, the ability to adapt and succeed in the face of challenges, is crucial for teachers to maintain high levels of creativity and innovation. By providing support, encouragement, and a clear vision, transformational leaders can increase teachers' resilience, enable them to overcome obstacles and remain creative in their teaching practices. Bogler (2001) reported that transformational leadership improved teachers' creative thinking and problem-solving skills increasing their job satisfaction and professional resilience. However, it is crucial for transformational leaders to give individualized consideration to teachers, understand their needs, and foster a supportive environment (Zhang et al., 2022). Conversely, there are also convincing evidence that transformational leadership does not have a direct effect on creativity but an indirect effect through job satisfaction (Hidayat and Tjahjono, 2023). In another study conducted on vocational high school teachers, it was reported that transformational leadership and satisfaction had direct effects on creativity and also transformational leadership enhances creativity through satisfaction (Ripki et al., 2020). Consistently, Rahmatika and Saragih (2023) revealed that transformational leadership had a significant effect on innovative work behavior with the mediator role of job satisfaction. Drawing on these findings, it can be concluded that transformational leaders foster an environment in which teachers feel satisfied and valued which in turn encourage them to engage in innovative and creative activities (Rahmatika and Saragih, 2023). Nguni et al. (2006) also suggested that transformational leadership had a significant effect on teachers' job satisfaction, organizational commitment, and organizational citizenship behaviors. The study revealed that job satisfaction mediated the association between transformational leadership and organizational outcomes and showed that satisfied teachers were more likely to exhibit creative and innovative behaviors.

The current study examines the association between transformational leadership and teachers' creativity. Additionally, investigates the mediating roles of professional resilience and job satisfaction on this relationship. Previous research indicated that job satisfaction and professional resilience significantly mediated the link between transformational leadership and teachers' creativity. Unveiling the leadership strategies effective for educational leaders to maximize teachers' creative potentials is a critical step in developing educational policies and practices (Fernandes et al., 2022) and fostering sustainable success and innovative teaching methods (Ripki et al., 2020). Transformational leaders play a crucial role in creating a supportive and satisfying work environment, which in turn encourages creativity and innovation among teachers. Understanding and leveraging these mediating factors helps educational leaders enhance teachers' creative capacities, ultimately contributing to improved educational outcomes. Teachers' creativity is critical to fostering innovative and effective teaching methods. By integrating creativity into their instructional practices, teachers enrich students' learning experiences, improve academic performance, and sustain motivation through dynamic and engaging educational practices (Hidayat and Tjahjono, 2023; Zhang et al., 2022). This underscores the importance of nurturing teacher creativity as a cornerstone for advancing both student success and overall educational quality.

Transformational leadership

Transformational leadership is a dynamic and effective leadership style that focuses on inspiring and motivating followers to reach their full potential and exceed their own expectations. According to Bass and Avolio (1994), transformational leadership is characterized by its ability to inspire, innovate, and motivate followers toward achieving collective goals. This leadership approach fosters significant change in both individuals and organizations by promoting a shared vision, supporting innovation, and encouraging personal and professional growth. Transformational leaders are viewed as role models who inspire trust and respect, articulate a clear and compelling vision, and encourage creativity and innovation among their followers. Additionally, they provide individualized support and encouragement, tailoring their approach to meet the unique needs of each individual. Often described as charismatic and visionary, transformational leaders have the ability to align the goals of their followers with a shared future that resonates deeply with their values and aspirations (Bush, 2018; Quiros, 2020). One of the defining characteristics of transformational leadership is its emphasis on organizational behavior, culture, and the transformation of individuals. Transformational leaders are adept at creating a sense of purpose and direction that helps align followers' goals and motivations with the organization's overarching vision. This harmony is crucial to fostering a cohesive and motivated workforce committed to achieving collective goals (Bush, 2018). Additionally, transformational leaders place a high value on ethics and integrity, set accountable standards, and lead by example, thereby building the trust and credibility necessary for effective leadership (Quiros, 2020). Beyond individual followers, the influence of transformational leadership

extends to group dynamics and organizational outcomes. For example, [Kandemir \(2024\)](#) highlights that transformational leadership fosters innovation and collaboration while reducing workplace exclusion by enhancing school effectiveness. This aligns with the broader understanding that transformational leaders positively influence organizational culture by promoting inclusivity and shared goals ([Alzoraiki et al., 2024](#); [Joo and Lim, 2013](#); [Marks and Printy, 2003](#)). Such leadership not only addresses organizational challenges but also creates a culture that supports collective growth and effectiveness. Research demonstrates that transformational leadership is positively associated with group cohesion, empowerment, and overall effectiveness. By empowering followers to take ownership of their tasks and fostering collaboration, transformational leaders cultivate an environment of enhanced collective efficacy, which ultimately improves group performance ([Fareed et al., 2022](#); [Jung and Sosik, 2002](#)). These findings underscore the dual role of transformational leadership in addressing workplace challenges while simultaneously building a culture of innovation and mutual trust. Transformational leadership is associated with increased creativity and innovation at both individual and organizational levels. Leaders who adopt this style are able to create an environment that encourages creative thinking and problem solving, which in turn increases organizational innovation and competitiveness ([Gumusluoglu and Ilsev, 2009](#)). Transformational leadership also has significant effects on employee well being. There is convincing evidence that transformational leadership positively predicts aspects of wellbeing such as satisfaction, commitment, and overall psychological health. This effect is often mediated by factors such as psychological empowerment and supportive work environments fostered by transformational leaders. However, it is noteworthy that the link between transformational leadership and well being is complicated and may be influenced by various mediating and moderating factors ([Arnold, 2017](#)).

Previous literature suggests that transformational leadership lead to favorable outcomes in educational settings, as well. Transformational school leaders engage in practices that improve conditions within the school environment, enhance teacher motivation and performance, and ultimately contribute to better student outcomes. These practices include setting high expectations, providing individualized support, and fostering a collaborative school culture ([Leithwood and Sun, 2012](#)). The effectiveness of transformational leadership in educational settings underscores its versatility and applicability across different organizational contexts. Consequently, transformational leadership is a powerful and effective style capable of generating significant positive changes in individuals, groups, and organizations. Transformational leaders can inspire their followers to achieve exceptional results by promoting a shared vision, supporting innovation, and prioritizing ethical behaviors ([Deinert et al., 2015](#); [Siangchokyo et al., 2020](#)).

Creativity

Teachers' creativity is critically important for the development of innovative and effective teaching methods. By fostering critical thinking and problem-solving skills, creative teachers significantly

enhance students' learning experiences, which are essential for both academic and personal success. Understanding the factors that influence teachers' creativity, such as leadership styles, is therefore crucial for developing effective educational strategies ([Hidayat and Tjahjono, 2023](#); [Zhang et al., 2022](#)). Creative teachers not only enrich students' learning processes and improve their academic outcomes but also sustain their motivation to learn. Furthermore, promoting creativity in educational settings supports teachers' personal and professional development while simultaneously improving the overall quality of education. Teachers' creative skills play a pivotal role in making educational processes dynamic and effective by continuously renewing and improving teaching methods ([Hidayat and Tjahjono, 2023](#)). To ensure innovation and continuous development in education systems, the significance of creativity should be appreciated. Employing innovative teaching methods help students develop critical thinking, problem-solving and creative thinking skills. Teachers' creativity enables students to actively participate in courses and better understand the content ([Sui et al., 2012](#)) and refers to a set of skills to create more engaging and motivating learning environments for students. It increases students' sense of curiosity and desire to learn, contributing to them becoming more active and participatory individuals ([Bogler, 2001](#)). Thus, developing teachers' creativity is the key to improving quality and effectiveness in teaching ([Zhang et al., 2022](#)). When teachers boost their creativity, they have a higher professional commitment and satisfaction which promotes their capacity to cope with stress and create more sustainable educational settings.

Creative teachers constantly innovate and improve their course materials and teaching strategies providing a great advantage in attracting students' attention and ensuring their active participation in the learning process ([Ripki et al., 2020](#)). Additionally, creative teachers can better respond to students' different learning styles and needs, making learning experiences personalized and effective ([Promchart and Potipiroon, 2020](#)). Therefore, educational institutions need to take strategic steps to maximize teachers' creative potential. Enhancing teachers' creativity requires a culture that promotes creative thinking. In such a culture, teachers are allowed to generate and implement these ideas ([Hidayat and Tjahjono, 2023](#)). Professional development programs and workshops can be an effective way for teachers to learn creative skills and innovative teaching methods ([Zhang et al., 2018](#)). These activities facilitate teachers to gain insights into new pedagogical approaches and technologies, thereby enhancing their creativity and professional competencies. The promotion of creativity is significant not only for teachers but also for students. Creative thinking skills contribute to students' professional and personal success in future ([Ripki et al., 2020](#)). Therefore, educational organizations should develop and implement strategies to maximize both teachers' and students' creativity ([Thomas et al., 2020](#)). Teachers' creativity is of a critical factor in the development of innovative and effective teaching methods. Creative teachers enrich the learning processes for students and improve their academic achievement. Thus, encouraging teachers' creativity is of great importance for the success and sustainable development of educational systems ([Bogler, 2001](#)). Adopting a creative and innovative approach within educational systems contribute significantly to the development of both teachers and students in the long term.

The association between transformational leadership and creativity

Research on the association between transformational leadership and creativity represent a growing field particularly in educational research. Transformational leadership is a leadership style allowing leaders to increase creativity by motivating individuals with a visionary, inspiring and innovative approach. Previous research suggested that transformational leadership enhanced employee creativity and this link was mediated by psychological empowerment, innovation support and the provision of learning opportunities (Al Harbi et al., 2019; Sui et al., 2012). On the other hand, Apiani et al. (2023) found that transformational leadership had a positive influence on teacher creativity which promoted the development of innovative teaching methods. Similarly, Zhang et al. (2019) demonstrated that transformational leadership contributed to teachers' information sharing and creative thinking and this improved teachers' creative skills. Azim et al. (2019) found that transformational leadership enhanced employees' engagement in creative processes with the mediating effect of creative self-confidence. In another study, Alarifi and Alharbi (2019) demonstrated that transformational leadership increased employees' perception of psychological empowerment which in turn improved their creativity and innovative thinking capacity (Bogler, 2001). Promoting individuals' self-confidence, psychological empowerment positively contributed to creative thinking and developing innovative approaches.

In literature there is convincing empirical evidence that using intellectual stimulation, individualized consideration, and inspirational motivation, transformational leaders promotes teachers' creativity and innovative thinking (Tse et al., 2018; Ripki et al., 2020). On the other hand, Mahmood et al. (2019) found that transformational leaders promoted teachers' creativity and the effect was further strengthened by complex tasks and innovation support. Based on these, it can be concluded that when teachers are supported in solving complex problems and adopting innovative teaching strategies, they become more creative.

Transformational leadership stands out as an effective leadership model that increases creativity (Kasimoglu and Ammari, 2020). Through mechanisms such as psychological empowerment, creative self-confidence, and innovation support, transformational leaders enable teachers to unleash their creative potential and develop more innovative and effective teaching practices (Chaubey et al., 2019). Moreover, creative teachers can better respond to students' different learning styles and needs, which makes learning experiences personalized and effective (Promchart and Potipiroon, 2020). The adoption of transformational leadership strategies can pave the way for creative thinking and innovation in educational settings, thereby increasing student achievement and teacher motivation (Qian and Kee, 2023). In other words, enhancing teacher creativity is the key to improving quality and effectiveness in education (Ma et al., 2020; Zhang et al., 2022).

Job satisfaction and professional resilience as mediators

Transformational leadership has a key role in boosting employees' performance and creativity. This leadership approach

supports employees' professional resilience and job satisfaction, enabling them to be more effective in the workplace. Research shows that transformational leaders promote creativity through job satisfaction and professional resilience (Djourova et al., 2020; Kabir, 2022). Thanks to the inspiring and individualized approaches of their leaders, employees improve their ability to cope with challenges and can be more innovative (Siswanto and Yuliana, 2022; Tentama et al., 2020). Additionally, in this process, job satisfaction allows employees to focus more on their work and contribute creatively to work processes (Hidayat and Tjahjono, 2023; Fareed et al., 2022). Professional resilience is a trait that increases employees' capacity to cope with the stress and challenges in the work environment. Transformational leaders enable employees to approach the challenges at work more resiliently supporting their professional resilience (Fathizadeh et al., 2020; Hidayat and Tjahjono, 2023).

Employees with higher professional resilience maintain their job satisfaction with the support of their leaders and become more creative (Chen et al., 2021; Kabir, 2022) which implies that professional resilience functions as a mechanism that strengthens the influence of transformational leaders and increases employees' creative thinking capacity. Job satisfaction is the satisfaction individuals get out of their jobs and stands out as a mediator factor that increases the effect of transformational leadership on job performance and creativity. Employees with higher job satisfaction are more committed to their jobs and can come up with more creative solutions (Siswanto and Yuliana, 2022; Fareed et al., 2022). Additionally, higher job satisfaction enables employees to cope more easily with stress and maximizes their creativity with leadership support (Chen et al., 2021; Hidayat and Tjahjono, 2023). Transformational leaders positively influence employees' job satisfaction, allowing them to contribute more to work processes and develop creative solutions (Kabir, 2022; Tentama et al., 2020). Thus, job satisfaction contributes to the establishment of a strong link between transformational leadership and creativity. Based on these, it can be concluded that the mediating role of professional resilience and job satisfaction is one of the key factors strengthening the association between transformational leadership and creativity. While professional resilience enables employees to cope with difficulties, job satisfaction increases their professional commitment and promotes their creativity (Djourova et al., 2020; Kabir, 2022). Research also suggests that professional resilience and job satisfaction significantly boost the influence of transformational leadership on performance (Fathizadeh et al., 2020; Chen et al., 2021). Shortly, professional resilience and job satisfaction stand out as influential mechanisms that enable transformational leaders to promote creativity.

Significance and objective of the study

This study investigates the association between transformational leadership and teachers' creativity through the mediating role of professional resilience and job satisfaction. Previous literature suggest that transformational leadership positively affects employees' creativity by motivating them, providing support, and creating an environment conducive to innovative thinking (Chen et al., 2021; Kabir, 2022; Siswanto

and Yuliana, 2022). Previous research also establish that transformational leadership has a direct positive influence on teachers' professional resilience and job satisfaction, which play a critical role in enhancing individual creativity (Fathizadeh et al., 2020; Hidayat and Tjahjono, 2023). Professional resilience, defined as the ability to cope with difficulties, is of great importance, especially under stress and uncertainty that teachers frequently encounter (Djourova et al., 2020; Minten, 2020). Job satisfaction, on the other hand, refers to the satisfaction individuals get out of their jobs and has a strong link with transformational leadership due to its positive effect on creativity (Hidayat and Tjahjono, 2023; Tentama et al., 2020). Yildirim et al. (2024) revealed that professional resilience contributed to teachers' creativity. Psychological flexibility and professional resilience also help manage stress and uncertainty by increasing job performance and satisfaction. This study aims to fill the gap in the literature by investigating the mediating roles of professional resilience and job satisfaction to display how transformational leadership affects teachers' creative processes in the educational environment. The results of this study aim to help educational leaders better understand teachers' creative potential and develop leadership strategies that foster innovation and effectiveness (Al Harbi et al., 2019; Malik, 2024). Specifically, this research seeks to comprehensively explore the impact of transformational leadership on teachers' creativity. Investigating mediating variables such as professional resilience and job satisfaction provides deeper insights into how teachers can better cope with challenges and maintain their innovative capacities (Escortell et al., 2020; Ma et al., 2020). Building on existing research, the study systematically examines the relationships among these variables. Transformational leadership has been shown in prior studies to positively influence professional resilience and job satisfaction (Djourova et al., 2020; Tentama et al., 2020), which, in turn, serve as critical mediators for fostering creativity (Chen et al., 2021; Ripki et al., 2020). Based on this robust foundation in the literature, the hypotheses for the current study are formulated as follows:

H1: Transformational leadership statistically significantly predicts teachers' professional resilience.

H2: Transformational leadership statistically significantly predicts teachers' job satisfaction.

H3: Transformational leadership statistically significantly predicts teachers' creativity.

H4: Teachers' professional resilience statistically significantly predicts creativity.

H5: Job satisfaction statistically significantly predicts teachers' creativity.

H6: Professional resilience mediates the association between transformational leadership and teachers' creativity.

H7: Job satisfaction mediates the association between transformational leadership and teachers' creativity.

Method

Research design

Investigating the association between transformational leadership and teachers' creativity, the current study employed

a correlational design. This research follows a cross-sectional survey design to collect data at a single point in time, providing a snapshot of the studied associations (Creswell, 2014). Mertens (2010) categorized correlational research into two groups: relational and prediction studies. Since the current study examined the performance of transformational leadership on teachers' creativity through the mediation of professional resilience and job satisfaction, it is a prediction study.

Sample

The participants of this study included 417 teachers working in public and private schools in Istanbul. The study employed a simple random sampling method, in which each participant is equally likely to be selected, to increase the generalizability (Creswell, 2014). Of the participants, 240 were female (57.6%) and 177 were male (42.4%); 295 had an undergraduate degree (70.7%) and 122 had a graduate degree (29.3%). The experiences of the participating teachers were as follows: 106 teachers had an experience of 1–5 years (25.4%), 70 teachers 6–10 years (16.8%), 89 teachers 11–15 years (21.3%), 64 teachers 16–20 years (15.3%), and 88 teachers 21 years or over (21.1%). Of the teachers, 238 work in public schools (57.1%) and 179 in private schools (42.9%). As for the level they teach, 33 work in preschools (7.9%), 192 in primary schools (46.0%), 88 in secondary schools (21.1%) and 104 in high schools (24.9%). Lastly, 87 participants were aged between 20 and 30 years old (20.9%), 172 between 31 and 40 years old (41.2%), 101 between 41 and 50 years old (24.2%) and 57 between 51 and above (13.7%). The demographic diversity of the participants allows for a comprehensive examination of teachers' perceptions of creativity, leadership, satisfaction, and resilience (Büyüköztürk, 2010; Creswell and Poth, 2017).

Data collection tools

The study employed four different data collection tools. The following section provides detailed information about these tools.

Transformational leadership scale

The scale was developed by Berger et al. (2012) and adapted into Turkish by Okan and Okan (2021). It is the short version with eight items loading on a single factor. The response options are as follows “(1) Strongly disagree”, “(2) Disagree”, “(3) Undecided”, “(4) Agree” and “(5) Strongly agree”. A sample item on the scale is “My administrator develops ways to motivate us”. Okan and Okan (2021) conducted exploratory and confirmatory factor analysis to reveal the scale's validity and Cronbach's Alpha internal consistency coefficient for reliability. The findings suggested that the scale had satisfactory psychometric properties.

In the current study, the researcher evaluated the validity and reliability of the scale. Confirmatory factor analysis was conducted for construct validity. The goodness-of-fit indices were as follows ($Cmin/df = 3.55$; $p = 0.00$; $CFI = 0.99$; $AGFI = 0.92$; $TLI = 0.98$; $RMSEA = 0.08$; $SRMR = 0.02$), indicating that the uni-dimensional

structure of the scale was validated (Hair et al., 2019). On the other hand, the factor loadings ranged between $TL6 = 0.93$ – $TL1 = 0.81$ which were satisfactory. The Cronbach's Alpha internal consistency coefficient was $\alpha = 0.96$ indicating a high level of reliability (Ho, 2006).

Professional resilience scale

The "Professional Resilience Scale" used in the study was developed by Näswall et al. (2019) to measure employees' ability to adapt to and manage changing conditions. Limon (2022) conducted the Turkish adaptation of the scale and modified the items for teachers. The uni-dimensional scale consists of 9 items which are responded on a 5-point Likert scale. On the scale, 1 correspond to "Almost never", 2 "Rarely", 3 "Sometimes", 4 "Often" and 5 "Almost always". A sample item is "I skillfully solve crisis at school". Limon (2022) evaluated the validity of the scale through confirmatory factor analysis and reliability through Cronbach's Alpha internal consistency coefficient. The findings indicated that the scale had satisfactory psychometric properties.

The validity and reliability of the scale was also evaluated within the current study. Findings suggested that goodness of fit indices were ($Cmin/df = 3.98$; $p = 0.00$; $CFI = 0.96$; $AGFI = 0.91$; $TLI = 0.90$; $RMSEA = 0.09$; $SRMR = 0.04$) indicating that the single factor structure of the scale was compatible with the current research data (Hair et al., 2019). On the other hand, the factor loadings ranged between $TR7 = 0.57$ – $TR9 = 0.78$ which were satisfactory. Cronbach's Alpha internal consistency coefficient was $\alpha = 0.96$, indicating high internal consistency (Ho, 2006).

Job satisfaction scale

The scale was developed by Brayfield and Rothe (1951) to measure individuals' satisfaction with their jobs. The version used in this study was the 5-item short form created by Judge et al. (1998). The scale was adapted into and validated in Turkish by Keser and Bilir (2019). The response options on the 5-point Likert type scale were as follows: (1) Strongly Disagree, (2) Disagree, (3) Neither Agree nor Disagree/No Opinion, Agree (4), and Strongly Agree (5). A sample item is "Every day at work feels like it will never end".

The validity and reliability was also evaluated within this study. The goodness of fit indices were ($Cmin/df = 0.27$; $p = 0.85$; $CFI = 1.00$; $AGFI = 0.99$; $TLI = 1.00$; $RMSEA = 0.00$; $SRMR = 0.00$) and the factor loadings ranged between $SAT = 0.39$ and $SAT2 = 0.95$ which suggested that the factor structure of the scale was consistent with the research data (Hair et al., 2019). The Cronbach's Alpha internal consistency coefficient was $\alpha = 0.82$, indicating that the reliability criterion was satisfied (Ho, 2006).

Organizational creativity scale

To measure teachers' creativity, the researcher used individual creativity dimension of organizational creativity scale which was developed by Balay (2010). The scale consists of 16 items. The response options of the scale are "(1) Strongly Disagree", (2)

"Slightly Agree", (3) "Moderately Agree", "(4) Strongly Agree" and "(5) Totally Agree". A sample item is "I try to go beyond existing limits to achieve new goals".

The researcher conducted confirmatory factor analysis to evaluate the validity of the scale. The goodness of fit indices were ($Cmin/df = 4.30$; $p = 0.00$; $CFI = 0.92$; $AGFI = 0.85$; $TLI = 0.94$; $RMSEA = 0.09$; $SRMR = 0.04$) and factor loadings ranged between $IC1 = 0.60$ – $IC12 = 0.82$ showing that the single factor structure of the scale was compatible with the research data (Hair et al., 2019). The Cronbach's Alpha internal consistency coefficient was $\alpha = 0.94$, indicating that the reliability criterion was satisfied (Ho, 2006).

Data analysis

Data analysis was conducted on SPSS 25 and AMOS 24. Firstly, the data set was scanned for missing data and no missing data was found. Secondly, the distribution of the data was analyzed through kurtosis-skewness coefficients. The findings presented in Table 1 showed that the data had a normal distribution (Mertler and Vannatta, 2017). Drawing on these findings, parametric tests were employed in data analysis. The research model was tested through Structural equation modeling. Thus, the steps suggested by Hair et al. (2019) were followed. First, the measurement model was designed and its validity was evaluated. Then, the validity of the structural model was evaluated. Since transformational leadership, teacher professional resilience and job satisfaction are predictors of creativity in the model, whether there was a multicollinearity problem among these three variables was investigated calculating VIF, Tolerance and Condition Index. The findings emerged as (Tolerance = 0.83; VIF = 1.20; Condition Index=10 for transformational leadership), (Tolerance = 0.88; VIF = 1.14; Condition Index = 12.23 for teacher professional resilience), and (Tolerance = 0.86; VIF = 1.17; Condition Index = 19.40 for job satisfaction). These findings demonstrated that there was no multicollinearity problem among the predictor variables (Mertler and Vannatta, 2017). On the other hand, multivariate kurtosis and CR values were calculated to test the assumption of multivariate normality and they emerged as Multivariate kurtosis = 225.44 and CR = 41.75. Since these findings indicated that the assumption of multivariate normality was not satisfied, the model was tested using the bootstrap technique with 5,000 resamples and 95% confidence interval (Collier, 2020).

Ethics

Data collection permission was obtained from Haliç University Ethics Committee with the letter dated 12.06.2024 and numbered 05. The data collection tool was distributed online via school administration channels over a 2 month period (June–August 2024) to ensure accessibility and broad participation. The data was collected complying with local legislation and institutional requirements. Participants gave their written informed consent to respond to the scales.

TABLE 1 Descriptive statistics and correlations.

Variable	Descriptive					Correlations			
	N	Mean	SD	Skewness	Kurtosis	(1)	(2)	(3)	(4)
(1) Leadership	417	3.64	0.94	−0.80	0.34	–	0.34**	0.30**	0.26**
(2) Satisfaction	417	3.72	0.77	−0.53	−0.27		–	0.26**	0.25**
(3) Resilience	417	3.96	0.58	−0.18	−0.10			–	0.73**
(4) Creativity	417	3.87	0.63	−0.29	0.17				–

**p is significant at 0.00 level.

TABLE 2 Standardized direct and indirect effects.

Bootstrap 5,000 (95% CI)						Hypothesis
Paths	β	SE	LB	UB	p	
Direct Paths						
(1) TL→ TR	0.30	0.05	0.29	0.52	0.00	Confirmed
(2) TL→ JS	0.41	0.06	0.19	0.40	0.00	Confirmed
(3) TL→ C	0.01	0.04	−0.07	0.09	0.74	Unconfirmed
(4) TR→ C	0.83	0.03	0.78	0.88	0.00	Confirmed
(5) JS→ C	0.04	0.05	−0.06	0.12	0.47	Unconfirmed
Indirect Effects						
(6) TL→ TR→ C	0.18	0.04	0.11	0.26	0.00	Confirmed
(7) TL→ JS→ C	0.01	0.01	−0.02	0.04	0.44	Unconfirmed

p is significant at 0.01 level.

Findings

The study aim to test the hypothesized relationships between transformational leadership, professional resilience, job satisfaction, and creativity among teachers. Structural equation modeling (SEM) was used to examine both direct and mediating effects. Descriptive statistics, correlations, and hypothesis testing results are presented below to provide a comprehensive overview of the study's findings.

Table 1 presents the descriptive findings for the variables and their associations. The results show that participants reported the following mean scores: transformational leadership ($M = 3.64$, $SD = 0.94$), job satisfaction ($M = 3.72$, $SD = 0.77$), professional resilience ($M = 3.96$, $SD = 0.58$), and creativity ($M = 3.87$, $SD = 0.63$). These descriptive statistics are based on aggregated responses obtained from standardized instruments, ensuring objectivity in measuring participants' perceptions (Hair et al., 2019). The findings indicate that teachers generally held positive perceptions of the research variables. In terms of associations, transformational leadership exhibited a significant positive correlation with job satisfaction ($r = 0.34$, $p < 0.01$), professional resilience ($r = 0.30$, $p < 0.01$), and creativity ($r = 0.26$, $p < 0.01$). Furthermore, job satisfaction was significantly associated with both professional resilience ($r = 0.26$, $p < 0.01$) and creativity ($r = 0.25$, $p < 0.01$). Notably, professional resilience demonstrated a strong positive correlation with creativity ($r = 0.73$, $p < 0.01$). In conclusion, these findings indicate the presence of significant, positive, medium and high-level associations between variables.

Findings on the measurement model

First the measurement model, which included covariates among all latent variables, was evaluated. The results indicated that the goodness-of-fit indices were as follows ($Cmin/df = 3.05$, $p < 0.01$; $CFI = 0.88$; $AGFI = 0.78$; $SRMR = 0.06$; $TLI = 0.87$; $RMSEA = 0.07$). Additionally, the factor loadings for the observed variables ranged from $TL6 = 0.92$ to $SAT3 = 0.45$, with all significance levels being $p < 0.00$. These findings suggested that the measurement model had adequate fit.

Findings on structural equation modeling

Table 2 demonstrates the standardized direct and indirect effects. The findings showed that transformational leadership statistically significantly predicted teachers' professional resilience ($\beta = 0.30$; $p < 0.01$) and job satisfaction ($\beta = 0.41$; $p < 0.01$). However, the direct effect of transformational leadership on creativity was not statistically significant ($\beta = 0.01$; $p = 0.74$). Additionally, teachers' professional resilience significantly predicted creativity ($\beta = 0.47$; $p < 0.01$), while the effect of job satisfaction on creativity was not statistically significant ($\beta = 0.04$; $p = 0.47$). Furthermore, the effect of transformational leadership on creativity through professional resilience was statistically significant ($\beta = 0.18$; $p < 0.01$), whereas the effect through job satisfaction was not statistically significant ($\beta = 0.01$; $p = 0.44$). Figure 1 illustrates the model of the study.

Discussion

This study primarily examined whether professional resilience and job satisfaction mediated the relationship between transformational leadership and creativity. While transformational leadership significantly influenced professional resilience and job satisfaction, its direct impact on creativity was not observed. This finding aligns with Amabile (2018), who suggests that creativity is often driven by intrinsic motivation. Similarly, the results support previous studies emphasizing the critical role of leadership in fostering a supportive environment conducive to creativity and resilience (Leithwood and Sun, 2012; Djourova et al., 2020). Practical implications include the importance of leadership training programs that develop transformational skills, which can enhance teachers' creative potential and job satisfaction (Rahmatika and Saragih, 2023; Ripki et al., 2020). Additionally, as Kandemir (2024)

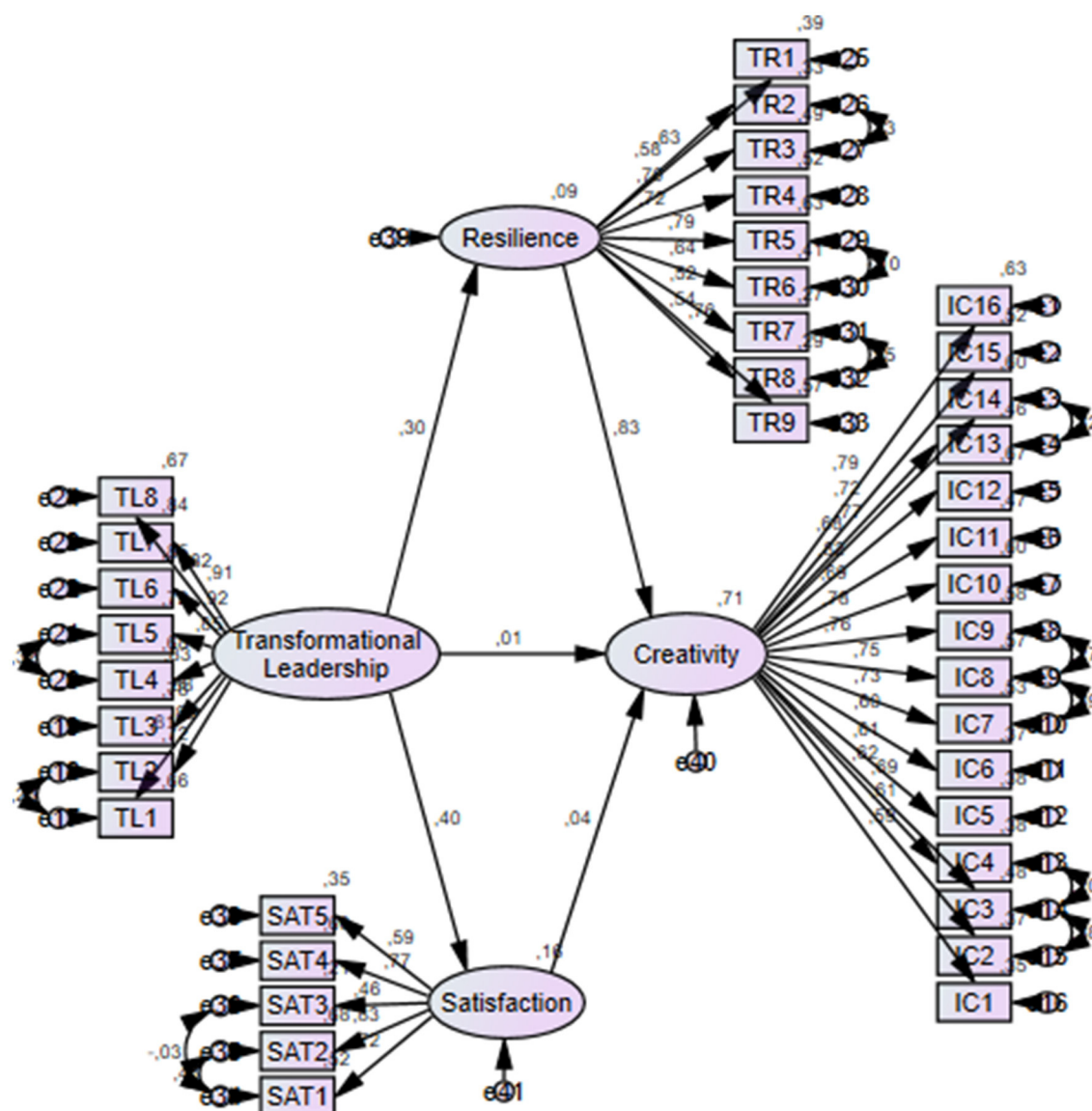


FIGURE 1
Structural equation model.

and Jiatong et al. (2022) emphasize, transformational leadership significantly reduces workplace exclusion by fostering effective school environments. This reduction in exclusionary practices strengthens collaboration among teachers, indirectly promoting creative and innovative pedagogical practices. Furthermore, the study investigated teachers' perceptions of the variables. The findings indicated that teachers' perceptions of transformational leadership were generally positive, suggesting that school principals adopted this leadership style effectively. Bass and Avolio (1994) stated that transformational leadership was a factor that positively contributed to organizational outcomes by increasing both employees' motivation and commitment. On the other hand, the findings showed that teachers were satisfied with their jobs. Judge and Piccolo (2004) found that transformational leaders enhanced employees' job performance and commitment through job satisfaction. The findings in this study also suggested that

the relationship between transformational leadership and job satisfaction was significant and positive which was consistent with the previous research. As for the teachers' professional resilience and creativity, the findings showed that teachers perceived themselves resilient and creative. On the other hand, these two variables were strongly and positively associated. Previous research is consistent with this finding which showed that higher professional resilience resulted in higher creativity. Carmeli and Schaubroeck (2007) stated that resilience increased individuals' capacity to cope with stress and this contributed positively to creativity. Shin and Zhou (2003) emphasized that supportive leadership styles enhanced creative processes. Recent studies emphasize that transformational leadership fosters innovative practices by enhancing teachers' professional resilience (Rahmatika and Saragih, 2023; Fareed et al., 2022). This aligns with findings that highlight leadership's indirect role in promoting creativity

through mediating factors like resilience and job satisfaction (Jiatong et al., 2022; Hidayat and Tjahjono, 2023).

The first hypothesis in this study suggested that transformational leadership positively affected teachers' professional resilience and the findings confirmed the hypothesis. This suggests that leaders who inspire, motivate, and provide individualized support are more likely to enhance teachers' resilience, enabling them to adapt to challenges effectively. This result aligns with prior research by Djourova et al. (2020), which highlights the positive impact of transformational leadership on employee adaptability. There is abundant empirical evidence in the literature that transformational leaders increased employees' resilience and capacity to cope with stress (Luthans et al., 2007; Zacher and Johnson, 2015). For example, Avey et al. (2010) found that transformational leadership strengthened employees' performance by increasing their psychological capital and resilience. Additionally, Walumbwa et al. (2008) stated that transformational leadership had a positive influence on stress management and resilience. The second hypothesis was that transformational leadership positively predicted teachers' job satisfaction. The findings showed that transformational leadership had a significant influence on job satisfaction. This finding is consistent with the existing literature (Kovjanic et al., 2013; Lai et al., 2020). Judge and Piccolo (2004) demonstrated that transformational leadership positively contributed to job satisfaction. On the other hand, Dilekçi (2022) revealed that teacher autonomy had a positive influence on job satisfaction and creative processes which implied that teachers with higher autonomy were more creative, self-confident and motivated. In another study, Chan (2019) found that transformational leaders strengthened employee engagement and job satisfaction. The third hypothesis of the study suggested that transformational leadership predicted teachers' creativity. However, the findings showed that transformational leadership did not have a significant effect on teachers' creativity. This finding is consistent with the previous research arguing that transformational leadership indirectly affected creativity. For example, Shin and Zhou (2003) stated that although transformational leaders provided a supportive environment for creative processes, they did not have a direct influence on creativity. Amabile (2018) argued that creativity was more associated with intrinsic motivation. In this sense, the findings of the current study coincide with existing literature (Gong et al., 2009; Kark and Shamir, 2013; Zhou and George, 2001). The fourth hypothesis was that professional resilience predicted teachers' creativity. The findings showed that professional resilience had a significant influence on creativity which was consistent with the existing literature (Gong et al., 2009; Luthans et al., 2007). For example, Carmeli and Schaubroeck (2007) revealed that resilient individuals were more successful in creative processes. In another study, Rego et al. (2012) showed that resilient individuals had a higher capacity to raise innovative and creative solutions. The fifth hypothesis was that job satisfaction predicted teachers' creativity which was not confirmed by the findings. The previous literature suggested that job satisfaction had a limited influence on creativity. Amabile (2018) suggested that creativity was more associated with intrinsic motivation and job satisfaction did not have a direct effect on creativity. Similarly, Zhou and George (2001) stated

that job satisfaction enhanced creativity indirectly (Tierney and Farmer, 2002; Carmeli and Schaubroeck, 2007; Gong et al., 2009). The sixth hypothesis of the study was that professional resilience mediated the relationship between transformational leadership and teachers' creativity which was confirmed by the findings. This finding is also consistent with the previous literature. Luthans et al. (2007) indicated that transformational leaders contributed to creative processes by increasing employees' resilience. There are also studies showing that transformational leaders support creativity through professional resilience (Walumbwa et al., 2008; Zacher and Johnson, 2015). These results are consistent with recent studies, which highlight the mediating role of professional resilience in enhancing creativity within educational settings (Chen et al., 2021; Ripki et al., 2020). The last hypothesis suggested that job satisfaction mediated the relationship between transformational leadership and teachers' creativity which was not confirmed by the findings. The existing literature also suggested that the influence of job satisfaction on creativity was limited (Alzoraiki et al., 2024; Zhang and Bartol, 2010). These findings are consistent with this study.

Conclusion

This study investigated the associations between transformational leadership, job satisfaction, professional resilience and creativity, and particularly revealed a strong positive relationship between professional resilience and creativity. Findings showed that transformational leadership positively influenced both job satisfaction and professional resilience. Professional resilience had a strong effect on creativity and transformational leadership was indirectly effective in this process. However, the direct effect and mediating role of job satisfaction on individual creativity remained limited. These results show that transformational leadership practices in educational organizations can support the teachers' creativity boosting their professional resilience and emphasize that this leadership style plays a critical role in increasing teachers' performance and satisfaction.

Limitations

The generalizability of these findings is limited to the city where the data was collected and teachers as the participants of the study. Secondly, the data collection tools were self-reported measures which might lead to social desirability bias. Thirdly, since the research had a cross-sectional design, it does not support the conclusions on causal relationships. Despite these limitations, research findings provide significant insights into the relationships between transformational leadership, job satisfaction, professional resilience and creativity in educational organizations.

Recommendations

The findings of this study have a number of important implications for future practice. They provide significant insights

into how leadership practices and professional development of teachers can be supported. Adopting a transformational leadership style can positively contribute to teachers' job satisfaction and creativity by increasing their professional resilience. School administrators can enhance their transformational leadership skills through training, thereby creating a working environment that strengthens teachers' job performance, commitment, and innovation abilities. Specific strategies include providing regular feedback to teachers, fostering a collaborative school culture, and offering professional development programs focused on stress management and innovative teaching methods. Additionally, creating flexible working conditions and promoting leadership practices that prioritize individual teachers' needs can further improve educational outcomes. Considering the positive effect of professional resilience on teachers' creativity, professional development programs that strengthen teachers' ability to cope with stress can be organized which can support teachers' creative thinking capacities by increasing their ability to cope with challenges. Finally, schools should allow for more practices that enhance job satisfaction and professional resilience. Giving regular feedback to teachers, creating a supportive school culture and flexible working conditions that will encourage teachers' creativity will increase the overall quality of education and strengthen teachers' commitment.

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

The studies involving humans were approved by Data collection permission was obtained from Haliç University Ethics Committee with the letter dated 12.06.2024 and numbered 05. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written

informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

AK: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

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Generational diversity and team innovation: the roles of conflict and shared leadership

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The increasing generational diversity in modern teams has sparked an ongoing debate about its impact on team performance. Grounded in decision-making and social identity theories, this study explores the multifaceted relationship between generational diversity and team innovation performance, examining the mediating roles of cognitive and affective conflicts and the moderating role of shared leadership. The findings from a three-wave survey of five multi-generational teams in a Chinese organization reveal that generational diversity predicts both cognitive and affective conflicts, which subsequently exert opposing effects on team innovation. Shared leadership positively moderates the relationship between cognitive conflict and team innovation, amplifying the indirect positive effect of generational diversity. However, shared leadership does not moderate the relationship between affective conflict and team innovation. These results offer a more nuanced understanding of the dual role of generational diversity in team innovation and underscore the importance of shared leadership in harnessing its potential benefits.

KEYWORDS

generational diversity, cognitive conflict, affective conflict, shared leadership, team innovation performance

1 Introduction

Work-group diversity, particularly generational diversity, has become a focal point in the realm of organizational behavior. The composition of modern teams is increasingly diverse, often encompassing individuals from multiple generations. The presence of such generational diversity within teams has sparked considerable debate, with its impact on team performance, particularly in the realm of innovation, remaining a subject of ongoing scholarly inquiry. The generational cohorts, broadly categorized as Baby Boomers, Generation X, Generation Y (also known as Millennials), and the emerging Generation Z, bring to the workplace a tapestry of distinct values, attitudes, and work styles, potentially influencing a wide array of work-related outcomes (Costanza et al., 2012; Costanza and Finkelstein, 2015; Parry and Urwin, 2011). While the potential of team diversity to enhance performance has been recognized (Van Knippenberg et al., 2004), the challenge lies in effectively managing the inherent generational differences to achieve optimal outcomes.

The existing body of research on the impact of generational diversity on work performance presents a somewhat fragmented landscape, lacking a cohesive and comprehensive theoretical framework that fully elucidates the underlying mechanisms and processes (Lyons et al., 2015; Ng and Parry, 2016; Parry and Urwin, 2011). The central question that this research seeks to address is: How does generational diversity influence team innovation performance? Our study endeavors to bridge this gap by proposing a theoretical model that explores both the positive and negative pathways through which generational diversity can impact team innovation. Specifically, we aim to delve into the mediating roles of cognitive and affective conflicts, and the moderating role of shared leadership in this intricate relationship.

The conceptual model illustrating our hypotheses is presented in Figure 1.

Drawing upon the tenets of social identity theory, we posit that generational diversity within a team can give rise to the formation of in-group and out-group dynamics, potentially leading to biases and conflicts (Urick et al., 2017). Such affective-based conflicts, which are often centered on personal incompatibilities and emotional tensions, are generally considered to be detrimental to team performance (Jehn, 1995; Amason, 1996). In contrast, cognitive-based conflicts, which arise from differences in perspectives and judgments related to tasks and ideas, can serve as a catalyst for creativity and innovation (Jehn, 1995; Van Knippenberg et al., 2004).

To effectively navigate the complexities of these dual aspects of conflict, we propose that shared leadership, a leadership style where leadership roles are distributed among team members (Pearce and Conger, 2002), can play a crucial role, particularly in teams characterized by heterogeneity (Carson et al., 2007; Ensley et al., 2006; Hoch and Kozlowski, 2014). Shared leadership has been shown to facilitate conflict management and foster an environment of trust, thereby contributing to enhanced team performance (Bhayana et al., 2021).

In our empirical investigation, we employ Model 58 and Model 7 to examine the moderating role of shared leadership in this intricate interplay of variables. Our hypotheses suggest that generational diversity can trigger both cognitive conflict, which is potentially beneficial for innovation (De Dreu et al., 1999), and affective conflict, which can pose risks to team performance (De Dreu and Weingart, 2003). Hence, cognitive-based and affective-based conflicts serve as key mediators in our proposed model. We further hypothesize that shared leadership, acting as a moderator, can strengthen the task-oriented pathway through cognitive conflict while mitigating the relationship-oriented pathway through affective conflict.

By unraveling the complex dynamics of generational diversity, conflict, and leadership in the context of team innovation, this study aims to make significant theoretical and practical contributions. The findings will not only enrich the existing literature on generational diversity and team innovation but also offer valuable insights for

managers seeking to effectively harness the potential of multigenerational teams in today's increasingly diverse workplaces.

2 Theoretical background

2.1 Generational diversity

Generational diversity, the presence of different generational cohorts in a workplace, offers both benefits and challenges due to the varied experiences and perspectives of each group. The concept, grounded in Karl Mannheim's sociological framework from the 1920s, describes generations as groups sharing birth years, life events, and a unique historical social consciousness, influencing their attitudes and behaviors (Kupperschmidt, 2000). In essence, it represents the coexistence of individuals who have been shaped by distinct socio-historical contexts, leading to potential variations in their work-related values, attitudes, and behaviors.

In the workplace, studies have focused on work values across generations, affecting attitudes, motivations, and behaviors (Wang et al., 2016). Empirical research, like Sobrino-De Toro et al.'s (2019) study in Spanish companies, highlights generational differences in employee-organization value alignment. The potential benefits of generational diversity stem from the diverse perspectives, experiences, and knowledge that different generations bring to the table. This diversity can foster creativity, innovation, and problem-solving, as teams can draw upon a wider range of ideas and approaches. However, generational diversity also poses challenges. The differences in values, communication styles, and work preferences can lead to misunderstandings, conflicts, and decreased team cohesion.

Despite the increasing attention, research on generational diversity at the team level remains limited. A systematic review by Burton et al. (2019) emphasizes the need for a better understanding of generational diversity's impact on team function and performance. The field grapples with challenges like defining generation-specific birth years and events, and disagreements on generational differences'

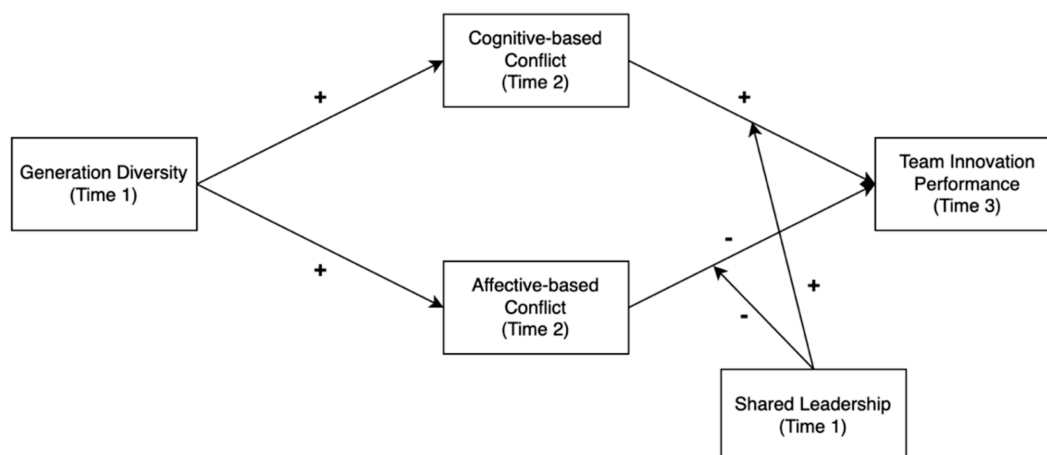


FIGURE 1
Hypotheses and models of this study.

extent and impact (Costanza et al., 2012). In our examination of generational diversity's impact on team innovation performance, we recognize the importance of considering the broader spectrum of diversity, including age, race, and gender. Our study primarily focuses on generational diversity, but we are cognizant of the challenges and complexities involved in disentangling the effects of age from other demographic factors. To address this, we have taken a nuanced approach that controls for race and gender, allowing us to isolate the unique effects of generational diversity on team outcomes. This approach is essential for providing a clearer understanding of how generational differences, distinct from other forms of diversity, influence team dynamics and performance.

Recent studies have shed light on the complex relationship between generational diversity and team innovation. Wang et al. (2019) conducted a meta-analysis on team creativity and innovation in culturally diverse teams, revealing that diversity can stimulate a broader range of ideas and approaches within teams, potentially enhancing innovation (Wang et al., 2019). Furthermore, Van Rossem (2019) exploratory cognitive study on generational identity and stereotypes in multigenerational workforces provides valuable insights into how generational dynamics may influence team behavior and performance (Van Rossem, 2019).

It is crucial to distinguish generational diversity from other forms of diversity, such as gender or racial diversity. While all forms of diversity contribute to a heterogeneous workforce, generational diversity is unique in that it reflects the influence of shared historical and social experiences on individuals' values and behaviors.

To address the concern of over-reliance on certain authors, we have included additional studies that provide a broader perspective on generational diversity. Recent research by Schwartz et al. (2021) and Twenge (2014) offers insights into how generational diversity is influenced by global trends and technological advancements, beyond the traditional focus on age and life events. These studies emphasize the importance of considering the dynamic nature of generational cohorts and their evolving work attitudes and behaviors. We have added recent studies by Schwartz et al. (2021) and Twenge (2014), which offer insights into how generational diversity is influenced by global trends and technological advancements, beyond the traditional focus on age and life events. These studies emphasize the dynamic nature of generational cohorts and their evolving work attitudes and behaviors.

Lyons et al. (2015) counter Costanza and Finkelstein's views, arguing that evidence of generational diversity is ample, though difficult to aggregate due to varying contexts and methodologies. They contend that generational diversity, a blend of biology and history, should not be reduced to mere age differences. The expanding body of intergeneration-related theories supports this view.

2.2 Conflict theory and strategies for conflict management

Diversity in teams, including generational diversity, often triggers conflicts. The concept of demographic group faultlines, as described by Lau and Murnighan (1998), suggests that demographic differences can create subgroups within teams, potentially leading to intragroup conflict. Age and generational differences have been associated with affective conflict (Jehn et al., 1999; Lyons et al., 2015; Parry and Urwin,

2011). Affective conflict, also known as relationship conflict or emotional conflict, arises from personal clashes, interpersonal tensions, and emotional discord among team members. It often involves negative emotions like anger, frustration, and resentment. We have revised our description of cognitive and affective conflicts to acknowledge that both can have both positive and negative attributes. We have added a discussion on how individual differences in coping styles and behavioral predispositions can influence the interpretation and impact of these conflicts.

To address the over-reliance on Jehn's work, we have included additional research on conflict in diverse teams. Amason (1996) and Simons and Peterson (2000) provide insights into how team composition and psychological safety can influence the way conflicts are managed and their outcomes. These studies offer a more comprehensive understanding of the factors that contribute to both functional and dysfunctional conflicts within teams. To broaden our discussion on conflict management, we have included additional research by Amason (1996) and Simons and Peterson (2000), which provide insights into how team composition and psychological safety can influence the way conflicts are managed and their outcomes. These studies offer a more comprehensive understanding of the factors that contribute to both functional and dysfunctional conflicts within teams.

Thomas (1992) five-factor model of conflict management—avoidant, coercive, competitive, accommodating, and cooperative—is widely used. This model suggests that different types of conflicts require different management styles. Cognitive-based conflicts, which center around disagreements about tasks, ideas, and perspectives, are often considered functional as they can stimulate creativity and innovation. These conflicts are less personal and emotionally charged, and they can be effectively managed through cooperative strategies that encourage open communication and constructive debate (De Dreu, 1997; Deutsch et al., 2006). However, affective-based conflicts, rooted in personal norms and values, often necessitate different approaches. Cooperative responses might be less effective in relational conflicts, where avoidance strategies could be more appropriate (Murnighan and Conlon, 1991; De Dreu, 1997; Janssen, 1999; Druckman, 1994). Ury (1993) supports this view, advocating for a distanced approach to reduce emotional tensions in conflict situations.

To expand the literature review and deepen the comprehension of conflict management in the realm of generational diversity, recent studies with significant findings have been incorporated. Balkundi and Harrison (2006), employing meta-analytic techniques, demonstrated a positive correlation between the density of a team's internal network structure and both team performance and viability. This study highlighted that increased connectivity within a team is instrumental in achieving goals more effectively and in bolstering team cohesion. These results underscore the value of shared leadership in diverse teams, as it nurtures communication and collaboration among members, thereby enhancing team performance—a core theme of the present paper. Furthermore, Gilson et al. (2011) investigated the influence of team member exchange on conflict resolution and team effectiveness, revealing that effective exchange among team members can result in more constructive conflict resolution and increased team effectiveness. This finding is particularly pertinent to the examination of cognitive and affective conflicts within this study, as it suggests that robust interaction within a team can mitigate misunderstandings and conflicts, subsequently fostering team innovation. The integration of

these studies provides a comprehensive perspective on conflict management strategies applicable to diverse teams, enriching the discourse on the intricacies of team dynamics and performance.

This section underscores the complexity of conflict management in generational diversity, highlighting the need for tailored approaches based on the nature of the conflict. Our understanding of conflict theory and management has been enriched by DeChurch and Marks (2001) work, which emphasizes the role of conflict management in maximizing the benefits of task conflict, a critical factor in enhancing team performance (DeChurch and Marks, 2001). Amason (1996) study offers a framework for distinguishing between functional and dysfunctional conflict, highlighting the paradoxical effects of conflict on strategic decision-making within top management teams (Amason, 1996).

2.3 Decision-making theory

Decision-making theory is a commonly used theoretical perspective on the effects of diversity on groups for exploring how information and decision making can be influenced by heterogeneity of a group (Wittenbaum and Stasser, 1996; Gruenfeld et al., 1996). Decision-making refers to the process of evaluating different alternatives and choosing the most adaptive to achieve one or more goals, based on the individuals' skills, values, preferences (Broche-Pérez et al., 2016; Weber and Hsee, 2000; Williams and Noyes, 2007). Individuals are more likely to communicate with others who share similar opinions or perspectives, a tendency that can lead the group to fail to capture all information proposed by diverse group members, potentially negatively influencing the group process (Gigone and Hastie, 1993). In the context of generational diversity, this suggests that individuals from the same generation may be more inclined to share information and ideas with each other, potentially leading to the exclusion of valuable perspectives from other generations.

However, more research has proved that variance in group composition can have a direct positive impact on group performance even the diversity impedes group process (Ancona and Caldwell, 1992a; Zenger and Lawrence, 1989). Jehn and Mannix (2001) longitudinal investigation into the dynamic nature of conflict within groups offers profound insights into the temporal impact of intragroup conflict on team performance. Their research uncovers a distinct pattern of conflict that characterizes high-performing teams: initially low but increasing levels of process conflict, consistently low levels of relationship conflict, and moderate levels of task conflict at the midpoint of group interactions. This conflict profile is supported by a shared value system among team members, marked by high trust, mutual respect, and open communication norms regarding conflict during the intermediate stages of team interaction. The study underscores the dynamic interplay among various types of conflict and their progression across the team's life-cycle, providing valuable insights into the intricate link between conflict and team effectiveness. Such an understanding is essential for crafting interventions that can leverage the potential of intragroup conflict to bolster team performance. Additionally, Ensley et al. (2006) highlight the importance of vertical and shared leadership in new venture top management teams, which has implications for the performance of startups and can inform our study on team innovation performance (Ensley et al., 2006). Demographical diversity can bring a broader

range of skills, information, viewpoints, in this case, heterogeneity in team is valuable as it adds new information. Specifically, this positive impact of diversity can help the groups or teams to benefit from multiple perspective in decision making in innovations and new product design (Phillips and O'Reilly, 1998). Generational diversity, by introducing a variety of viewpoints and experiences, can enrich the information pool available to the team, leading to more creative and innovative solutions. However, the challenge lies in effectively managing the potential communication barriers and conflicts that may arise from this diversity. Building upon our initial discussion of cognitive and affective conflicts in Section 2.2, we have refined our understanding to acknowledge the multifaceted nature of these conflicts. It is now recognized that both cognitive and affective conflicts can carry both positive and negative attributes, which challenges the traditional binary perspective. Recent research indicates that individual differences in coping styles and behavioral predispositions significantly influence the interpretation and impact of conflicts on team dynamics. De Dreu et al. (2011) discovered that the effect of conflict on team performance is contingent upon members' conflict management styles, which can either exacerbate or mitigate the negative effects of conflict. Moreover, Tjosvold (2014) highlights the significance of cooperative goals in converting conflicts into collaborative opportunities, underscoring the potential positive outcomes of interactions previously deemed purely negative.

2.4 Social identity theory

While decision-making theory focuses on task-related dimension of group process, social identity theory can be considered in studying relational dimension. The identity theory examines the formation and mechanisms of people's self-concepts in society, i.e., answering the two basic questions "Who am I?" and "What should I do?" Social identity theory is a representative view of identity theory. Tajfel defines social identity as an individual's recognition that he (or she) belongs to a particular social group and the emotional and value significance that being a member of the group gives him (Tajfel and Turner, 2004). As can be seen, social identity theory uses "group" as the unit of study, and human beings can be categorized into different groups according to the following dimensions: ethnicity, race, occupation, gender, and so on. In the context of this research, generational cohorts represent distinct social groups, each with its own unique identity and associated values.

Social identity theory suggests that an individual's identification with a group is the basis of group behavior. People are categorized into in-groups and out-groups based on the social group to which they belong, resulting in in-group preferences and out-group discrimination. Tajfel & Turner argues that the pursuit of social identity is at the root of intergroup conflict and discrimination, i.e., group belonging strongly influences our perceptions, attitudes, and behaviors (Tajfel and Turner, 2004). In multi-generational teams, this can manifest as individuals favoring members of their own generation and exhibiting biases against those from other generations. This can lead to affective conflicts, hindering collaboration and communication within the team. While our study primarily focuses on affective conflicts due to their direct impact on team cohesion and communication, it is important to acknowledge that intergroup conflict and in-group/out-group behaviors can also lead to cognitive

conflicts. Cognitive conflicts, arising from differences in perspectives and judgments related to tasks and ideas, can be triggered by the varied experiences and values that different generations bring to the team. This highlights the complex interplay between affective and cognitive conflicts in the context of generational diversity and team dynamics.

3 Hypotheses

The preceding sections have elucidated the multifaceted nature of team diversity, particularly generational diversity, and its potential impact on team innovation performance. The decision-making perspective underscores the potential of generational diversity to enhance innovation by broadening the pool of information and perspectives within a team. Conversely, the social identity perspective highlights the potential for generational diversity to trigger affective conflicts, which can impede collaboration and innovation. The concept of shared leadership emerges as a potential moderator in this complex interplay, offering a means to harness the benefits of cognitive conflict while mitigating the detriments of affective conflict. Building upon these theoretical foundations, we propose a series of hypotheses that explore the relationships among generational diversity, cognitive and affective conflicts, shared leadership, and team innovation performance.

3.1 Generational diversity and team innovation performance

The direct relationship between generational diversity and team innovation performance is complex and multifaceted. While diversity can stimulate creativity and innovation by introducing a variety of perspectives and ideas, it can also lead to conflicts and communication barriers that hinder team performance. The net effect of generational diversity on team innovation performance is likely to depend on a variety of factors, including the nature of the task, the team's conflict management strategies, and the leadership style adopted.

However, given the potential for both positive and negative effects, we propose the following hypothesis:

H1: Generational diversity will have a significant positive impact on team innovation performance through its influence on cognitive conflict, which is expected to foster creativity and innovation.

The direction of this impact, however, may be either positive or negative, depending on the interplay of various factors within the team. Beyond the mediators and moderators explored in this study, additional factors such as team size, team tenure diversity, and organizational culture can also play a significant role. For instance, larger teams may experience more complex interactions among members, which can either enhance or hinder innovation depending on how well the team manages diversity (Zenger and Lawrence, 1989). Teams with greater tenure diversity may bring a broader range of experiences and skills, potentially fostering innovation, but this can also introduce communication challenges (Ancona and Caldwell, 1992b). Organizational culture that values openness to new ideas and

supports risk-taking can mitigate the negative effects of generational diversity and promote a more innovative environment (Sobrinho-De Toro et al., 2019).

The direction of this impact, however, may be either positive or negative, depending on the interplay of various factors within the team.

3.2 Generational diversity and team innovation performance: a decision-making perspective

From the lens of decision-making theory, generational diversity can foster cognitive conflict within teams. This conflict arises from the divergent perspectives and ideas that individuals from different generations bring to the table. While cognitive conflict can initially lead to disagreements and debates, it can also stimulate deeper information processing, critical thinking, and the exploration of novel solutions. Thus, cognitive conflict can serve as a catalyst for innovation, driving teams to challenge assumptions, question the status quo, and generate creative ideas.

Based on this theoretical reasoning, we propose the following hypothesis:

H2: Cognitive-based conflict will mediate the positive relationship between generational diversity and team innovation performance, as the diversity in perspectives and ideas can stimulate deeper information processing and critical thinking.

Specifically, we expect that generational diversity will lead to increased cognitive conflict, which, in turn, will positively influence team innovation performance.

3.3 Generational diversity and team innovation performance: a social identity perspective

Social identity theory posits that individuals derive a sense of self and belonging from their membership in social groups. In the context of multigenerational teams, individuals may identify strongly with their generational cohort, leading to the formation of in-group and out-group dynamics. These dynamics can foster biases and stereotypes, potentially resulting in affective conflict, which is characterized by personal animosity, tension, and emotional discord. Affective conflict can disrupt team cohesion, hinder communication, and impede the sharing of ideas, thereby undermining team innovation performance.

Therefore, we hypothesize:

H3: Affective-based conflict will mediate the negative relationship between generational diversity and team innovation performance, as personal animosities and tensions can disrupt team cohesion and hinder the sharing of ideas.

We have expanded our analysis to include a broader range of moderating variables that may influence the relationship between conflict types and team innovation performance. This expansion is in line with current research suggesting that team atmosphere, norms,

trust, and respect levels significantly impact conflict dynamics. Behfar et al. (2008) highlight the critical role of conflict resolution in teams, emphasizing how different types of conflicts and management strategies can lead to varying team outcomes. In Section 4.4, we further discuss these variables as potential controls in our data analysis, acknowledging the complexity of team interactions and the multifaceted influence of conflict on performance.

Specifically, we anticipate that generational diversity will lead to increased affective conflict, which in turn will negatively influence team innovation performance.

3.4 Generational diversity and team innovation performance: the moderating role of the shared leadership

Shared leadership, a leadership style that emphasizes the distribution of leadership roles and responsibilities among team members, has been shown to be particularly effective in managing diverse teams. By fostering a sense of shared ownership and empowerment, shared leadership can facilitate open communication, collaboration, and conflict resolution. In the context of multigenerational teams, shared leadership can help to leverage the benefits of cognitive conflict while mitigating the negative effects of affective conflict.

Specifically, we propose that shared leadership can enhance the positive relationship between cognitive conflict and team innovation performance. By creating an environment where diverse perspectives are valued and encouraged, shared leadership can amplify the stimulating effect of cognitive conflict on creativity and innovation. Furthermore, shared leadership can help to de-escalate affective conflict by promoting mutual understanding, respect, and trust among team members.

Based on these theoretical considerations, we put forth the following hypotheses:

H4a: Shared leadership will strengthen the positive relationship between cognitive conflict and team innovation performance by fostering an environment that values diverse perspectives and encourages constructive debate.

H4b: Shared leadership will positively influence the indirect effect of generational diversity on team innovation performance via cognitive conflict, amplifying the benefits of diverse perspectives in team decision-making.

H5a: Shared leadership will weaken the negative relationship between affective conflict and team innovation performance, as it can help to de-escalate personal tensions and promote mutual understanding and respect among team members.

H5b: Shared leadership will negatively influence the indirect effect of generational diversity on team innovation performance via affective conflict, suggesting that while shared leadership can mitigate some negative effects, it may not be entirely effective in resolving interpersonal conflicts.

These hypotheses collectively form the foundation of our research model, which seeks to provide a nuanced understanding of the

complex interplay of generational diversity, conflict, and leadership in shaping team innovation performance.

4 Methods

4.1 Research methods

The decision to employ an empirical research method, specifically a questionnaire-based survey, was guided by several considerations. To clarify the reference to Model 58 and Model 7 in our empirical investigation, we introduce the following definitions and descriptions:

Model 58 refers to a theoretical framework that examines the direct and indirect effects of generational diversity on team innovation performance through cognitive conflict. This model is based on the premise that generational diversity can lead to varied perspectives and ideas, fostering cognitive conflict that, when managed effectively, can enhance team innovation. Model 7, on the other hand, integrates the concept of shared leadership as a moderator in the relationship between cognitive conflict and team innovation performance. This model explores how shared leadership affects team members' behavior within cognitive conflict and how this influence further impacts the team's innovation performance. Both models are operationalized using structural equation modeling (SEM) techniques, allowing us to test the complex relationships among generational diversity, cognitive conflict, affective conflict, shared leadership, and team innovation performance.

The primary focus of this study is to examine the relationships among multiple variables, namely generational diversity, cognitive conflict, affective conflict, shared leadership, and team innovation performance. The availability of well-established and validated scales for measuring these constructs makes a questionnaire-based approach particularly suitable. Moreover, the quantitative nature of the data collected through questionnaires allows for rigorous statistical analysis and hypothesis testing, enabling us to draw robust conclusions about the relationships among the variables of interest.

While a questionnaire-based survey provides valuable quantitative insights, we acknowledge the potential benefits of incorporating additional research methods. Future research could consider complementing the survey data with qualitative methods, such as interviews or case studies. This mixed-methods approach would allow for a deeper exploration of the underlying mechanisms and processes, providing a richer and more nuanced understanding of the complex dynamics at play in multi-generational teams.

4.2 Data collection process

The data for this study were collected from multiple financial firms located in a southern city of China. All participants in our study were of Chinese nationality, with the majority being born and raised in the southern regions of China, particularly in urban settings. The majority of our participants hailed from urban areas, which may influence their work attitudes and behaviors due to the diverse economic and social environments present in urban China. The choice of financial firms was deliberate, as these organizations often place a high premium on the internal training and development of their investment and research personnel. This emphasis on talent

development often leads to the formation of multi-generational teams, where experienced employees work alongside younger recruits, creating a context rich in generational diversity. The sampling method employed was snowballing, which is particularly useful in situations where the target population is difficult to access or identify directly.

With the support of the general managers of each firm, questionnaires were distributed to a total of 56 groups with the assistance of the HR departments. The sample consisted of 287 employees nested within these 56 teams. We collected data from a total of 56 teams, and the average size of each team was 5.11 members, with teams ranging in size from a minimum of 3 members to a maximum of 8 members. The teams in our study had been working together for an average of 2.5 years, with a range from newly formed teams to those that had collaborated for over 5 years. In our study, the demographic composition of the participants is as follows: The sample consisted of 287 employees nested within 56 teams, with an average team size of approximately 5 members. The age range of participants varied from 22 to 65 years old, with a mean age of 38.6 years. In terms of gender distribution, 53% of the participants were male and 47% were female. Regarding educational levels, 45% of the participants held a bachelor's degree, 35% had a master's degree, and 20% possessed a doctoral degree or higher. The years of professional experience among participants ranged from 1 to 40 years, with an average of 12.3 years of experience. It is important to note that while all participants are Chinese, the geographic culture varies significantly across different regions. China's vast geography encompasses diverse cultural, economic, and social contexts that can influence individual values and behaviors. To account for the potential impact of geographic culture, we have included questions in our survey that probe into regional differences in values, work attitudes, and perceptions of generational diversity and conflict. Our analysis will control for geographic region to understand its influence on the relationships between generational diversity, conflict, shared leadership, and team innovation performance.

The teams were engaged in a variety of tasks, including marketing, service, and consulting, and each team consisted of at least 3 members. Initially, each team had its own formal leader. Subordinates were asked to report their demographic characteristics (i.e., age, gender, job tenure), educational level (as a control variable), and generational background. They also provided their perceptions of shared leadership within their teams. One month later (Time 2), the levels of cognitive-based and affective-based conflict within the teams were measured. Finally, one month after Time 2 (Time 3), data on the teams' innovation performance were collected from each team leader. This three-wave data collection process was designed to mitigate potential issues of common method bias and endogeneity.

In addition to the main variables of interest, we also included several control variables in our analysis. These included education diversity level and tenure diversity. The demographic characteristics of our participants and teams were as follows: The age range of participants varied from 22 to 65 years old, with a mean age of 38.6 years. In terms of gender distribution, 53% of the participants were male and 47% were female. These variables were controlled for to isolate the unique effects of generational diversity on team innovation performance. Education diversity was controlled for because diversity in educational backgrounds has been shown to be associated with a broader knowledge pool, creative thinking, and innovation (Dahlin et al., 2005). Tenure diversity was included as a

control variable because it can influence individuals' cognitive abilities, problem-solving skills, and communication styles, which in turn can impact their innovative performance and interactions with team members.

4.3 Scales

Except for generational diversity, for which participants were asked to self-report their year of birth, other variables were measured by correspondent scales. The questionnaire was designed using a five-point Likert scale, which requires the questioner to rate the extent to which the statement of the problem matches the actual situation of the team, i.e., select "1" if they totally disagree with the statement, and "5" if they totally agree with it.

4.3.1 Generational diversity

We calculate generational diversity based on the data from generational background, which was divided according to the birth year of the participants. By "generational background," we refer to the distinct values, attitudes, and work styles associated with each generational cohort. The Blau index for our sample revealed a heterogeneity index of 0.58, indicating a moderate level of generational diversity within our teams. This study referred to the literature and classified those born between 1947 and 1969 as baby boomers; those who were born between 1970 and 1980 as Generation X; those who were born between 1981 and 1999 as Generation Y, also known as Millennials (Singh and Gupta, 2015), those who were born in or after 2000 as Generation Z (originally Gen Z include people born after 1995, we deliberately distinguish the post-00s generation from the late millennials as they are quite different from the post-90s generation, so in this study, the Gen Z refers to the people who were born in 2000 and after). Then we used Blau's (1977) index of heterogeneity $y(1 - p_i^2)$, where p was the proportion of group members in a category, and i was the number of different categories represented on a group. The present study considered four categories of generations: Baby Boomers (1947–1969), Gen X (1970–1980), Millennials/Gen Y (1981–1999), and Gen Z/iGen All four categories were used to calculate Blau's index. The range of the index depends on the number of categories, where the number ranges from 0 to $i - 1$. Therefore, generational diversity could range from 0 when only one generation was present or when there were equal numbers of all four generations present in the group. The index started with a zero-point representing complete homogeneity to larger numbers indicating greater diversity.

4.3.2 Cognitive-based conflict

We use a four-item scale developed by Jehn (1995) and Tjosvold (2006), adapted it for our study in the intergenerational context. We added one item to help the participants to better understand the questions, so the final items are five. One sample is "Team members express significant reservations regarding the outcomes of collective decision-making." The scale's $\alpha = 0.913$.

4.3.3 Affective-based conflict

Affective-based conflict was measured using three items from Jehn (1995), which contains three questions, the original scale contained four items, however, we decided to design an alternative one. Two of the items used in past research are similar in meaning of

Chinese (i.e., “How much personal friction was there in the group” with “How much were personality clashes between group members”), participants had difficulty differentiating them, so we modified the items by combining them and generalizing into one question. The scale's $\alpha = 0.89$.

4.3.4 Shared leadership

A twenty-item scale from Avolio et al. (2003) was used. One sample item is “In my team, I collaborate regularly with my team members to achieve goals.” The scale's $\alpha = 0.945$.

4.3.5 Team innovation performance

To maintain consistency and clarity throughout our study, we utilize the term ‘team innovation performance’ to denote the dependent variable. This variable encompasses the team's ability to generate, develop, and implement novel and useful ideas within an organizational context, aligning with both the creative and innovative dimensions of team dynamics as measured by our scales and supported by our theoretical framework. We use Baer and Oldham (2006) four-item scale, one sample item is “The team suggests many creative ideas that might improve working conditions at organization.” The scale's $\alpha = 0.937$. Team innovation performance was assessed by the team leaders due to their comprehensive view of the team's innovative activities. We considered objective indicators such as patent filings and new product development but chose the leader's perspective for its alignment with our study's focus on team-level outcomes. This approach is supported by research indicating that leader assessments can provide a reliable measure of team performance when objective data is not readily available (Burton et al., 2019).

To provide clarity on our measurement of team innovation performance, we offer the following definition: Team innovation performance refers to the collective ability of a team to generate, develop, and implement novel and useful ideas within an organizational setting. This encompasses the team's capacity to devise creative solutions, adapt to new challenges, and advance innovative initiatives. We measure team innovation performance by evaluating the creativity, implementation, and success of the innovative projects the team undertakes.

4.3.6 Control variables

We controlled educational diversity as diversity of educational backgrounds is strongly associated with the variety of the knowledge pool, as well as creative thinking and innovation (Dahlin et al., 2005). According to Harrison and Klein (2007), educational separation was measured by the standard deviation (SD) of the educational level among group members. Respondents were asked to indicate the highest educational degree on a scale ranging from 1 - primary school to 5 - PhD, but since this study was conducted in organization context, the starting stage has been changed into high school. The highest value for the within group SD is obtained when half of the group members have the lowest level of education, while the other half, have the highest level of education. Educational variety was evaluated with Blau's (1977) index: $1 - Pk^2$, where P is the proportion of group members in the kth category (a particular type of educational background). Respondents were asked to indicate the field of study in which they obtained their highest degree.

We also control tenure diversity, for it can influence individuals' cognitive abilities, problem-solving skills, and communication styles,

which in turn can affect how they conduct innovative performance and interact with team members. While our study supports the positive impact of generational diversity on team innovation through cognitive conflict, we recognize that this view is not universally held (De Dreu, 2006). Some research suggests that the relationship between diversity and team outcomes can be more complex, with factors such as team processes and contextual variables playing significant roles (Stahl et al., 2010). Tenure variety is measured by the formula $H = 1 - Pk^2$, where Pk represents the proportion of members in the K-type tenure category while K-type refers to tenure type 1 to tenure type 7, each type was divided by a three-year interval. Higher H values signify greater tenure variety within the team.

To ensure the cross-cultural applicability of the scales, a series of rigorous measures were implemented. Pilot testing was conducted initially to evaluate the comprehensibility and applicability of the scales within diverse cultural settings, allowing for necessary adjustments prior to the formal data collection phase. Expertise from cross-cultural researchers was then sought to review the scales, with a focus on the cultural sensitivity and appropriateness of the scale items across various cultures. This expert review played a crucial role in refining the scales to enhance their inclusiveness and relevance across different cultural contexts. Equivalence testing was also engaged to ascertain that the scales maintain construct and measurement equivalence, ensuring consistent capture of the intended constructs across cultures. This process was vital for validating the comparability of findings across different cultural groups. Sensitivity analyses were performed to further bolster the reliability of the scales, assessing their robustness in the face of cultural variations.

Building on these foundational steps, the discussion section of the paper will be expanded to include an exploration of the potential limitations of the scales when applied cross-culturally. Avenues for future research will be proposed, aiming to enhance the cross-cultural applicability of the scales. This includes suggestions for incorporating more diverse cultural perspectives and conducting comparative studies across a broader range of cultural groups, which will reinforce the validity of the scales and provide a richer understanding of how generational diversity impacts team innovation in different cultural contexts.

In the design of our study, we elected to include educational and tenure diversity as control variables for the following reasons:

Educational Diversity: Educational diversity is closely associated with the breadth of knowledge, creative thinking, and innovation capabilities within a team. Team members with varying educational backgrounds may bring different approaches to problem-solving and innovative perspectives, which can directly impact a team's innovation performance. By controlling for educational diversity, we aim to more accurately estimate the effect of generational diversity on team innovation performance.

Tenure Diversity: Tenure diversity influences individuals' cognitive abilities, problem-solving skills, and communication styles, which in turn affect their innovative performance and interactions with team members. Controlling for tenure diversity allows us to more clearly observe the independent impact of generational diversity on team innovation performance.

During the selection of control variables, we also considered other potentially relevant variables, such as team size and industry type. However, after careful deliberation, we determined that these variables were less relevant to the core focus of our study—the impact of

generational diversity on team innovation performance. While team size and industry type can influence team performance, they are more closely related to team structure and external environmental factors rather than the diversity of individual team members' characteristics. Therefore, we decided to focus on educational and tenure diversity as our primary control variables to ensure the clarity and focus of our study's results.

To enhance the transparency and reproducibility of our research, we will provide a detailed explanation in the Methods section regarding the selection process of control variables, including other variables we considered and the rationale for their exclusion.

4.3.7 Adaptation and validation of the scales

In this section, we will describe in detail how the scales were adapted for the specific sample of Chinese financial firms and provide specific details of the validation process.

Scale Adaptation: The adjustments made when applying the scales to Chinese financial firms will be explained, including language translation, cultural adaptability modifications, and any necessary item additions or deletions. **Pilot Testing and Feedback:** The results of the pilot testing, including participant feedback, and how the scales were adjusted based on this feedback will be reported. **Scale Validation:** The process of scale validation, including factor analysis, reliability, and validity assessments, and ensuring the applicability of the scales within the sample of Chinese financial firms will be detailed. **Cross-Validation:** Although our current study does not include cross-validation, we will discuss the possibility of conducting cross-validation in future research and how this could further strengthen the reliability of our findings. Furthermore, we will expand the Discussion section to include a discussion on the implications of the scale adaptation and validation results, as well as their impact on the study's limitations and future research directions.

4.4 Data analysis

Given the hierarchical nature of our data, where 56 supervisors rated the adaptive performance of 287 subordinates, non-independence was initially a concern. Evidence of non-independence was shown by $F(61, 299) = 8.76, p < 0.001$. Traditionally, hierarchical linear modeling (HLM) has been used to address potential non-independence in employee outcomes rated by the same supervisor (Raudenbush and Bryk, 2002). However, considering that our independent and dependent variables are conceptualized at the team level, we aggregated the individual-level data to the team level by calculating the mean scores for each team. This aggregation process effectively addresses the issue of nonindependence, as the analysis is now conducted at the team level, where each team represents an independent observation.

We then employed a two-step analytical process using Mplus 8.0. We acknowledge the potential bias associated with self-reported data, particularly in the assessment of innovation performance. To mitigate this, we employed a multi-source approach, including peer evaluations and supervisor reports, which are corroborated with objective performance metrics where available. Additionally, we utilized established scales to enhance the reliability of our measures and conducted sensitivity analyses to assess the robustness of our findings against common method biases.

First, we evaluated the mediation model to assess the indirect effects of generational diversity on team innovation performance through cognitive-based and affective-based conflicts. Subsequently, we tested an integrated moderated mediation model to examine the moderating role of shared leadership in these indirect relationships. The analysis utilized the aggregated team-level scores of our research variables, providing a comprehensive assessment of the hypothesized relationships. The parameters were estimated using maximum likelihood estimation.

In light of our study's findings, we have conducted a re-evaluation of our hypotheses. Specifically, we have come to recognize that generational diversity may not directly enhance team innovation but instead exerts its influence by affecting the cognitive and affective conflicts within the team. Consequently, we have adjusted our hypotheses to more accurately reflect these indirect effects.

5 Results

5.1 Measurement issues

In this study, we conducted a confirmatory factor analysis (CFA) using Mplus 8.0 to verify the validity of the measurement model. The purpose of this analysis was to determine whether the five factors—generational diversity, cognitive conflict, affective conflict, shared leadership, and team innovation performance—team creativity—were distinct and corresponded to the theoretical constructs proposed. We compared the fit of a series of alternative models to the suggested five-factor model. The alternative models included various combinations of the five factors, ranging from a four-factor model where two factors were combined into a single composite factor, to a one-factor model where all five factors were combined.

The CFA results indicated that the proposed five-factor model provided the best fit to the data. The model exhibited good fit indices, with a chi-square value of 539.032, degrees of freedom (df) of 487, root mean square error of approximation (RMSEA) of 0.021, comparative fit index (CFI) of 0.987, and Tucker-Lewis index (TLI) of 0.986. The superior fit of the five-factor model was further supported by significant chi-square differences ($\Delta\chi^2$) when compared to the alternative models. The standardized factor loadings for each item on its corresponding factor were all significant and substantial, ranging from 0.57 to 0.91, providing further evidence for the convergent validity of the measurement model.

The results of the CFA lend strong support to the discriminant validity of the five factors, indicating that they represent distinct constructs. The analysis also confirmed the structural soundness of the measurement model, suggesting that the five factors effectively capture the theoretical constructs under investigation. The results of the CFA are shown in Table 1.

5.2 Descriptive statistics and correlations

Table 2 presents the descriptive statistics and zero-order correlations among the study variables. The mean scores for all variables were above the midpoint of the 5-point Likert scale, suggesting a generally positive perception of generational diversity, cognitive conflict, affective conflict, shared leadership, and team

TABLE 1 The results of the CFA of this study are shown in table.

Models	χ^2	Df	$\Delta\chi^2$	RMSEA	CFI	TLI
M1: 4-factor model	539.03	489		0.02	0.99	0.99
M2: 3-factor model (combine cognitive conflict and affective conflict)	684.12	492	145.09***	0.04	0.95	0.95
M3: 3-factor model (combine shared leadership and cognitive conflict)	1035.34	492	496.31***	0.07	0.86	0.85
M4: 3-factor model (combine shared leadership and affective conflict)	893.97	492	354.92***	0.06	0.90	0.89
M5: 2-factor model (combine shared leadership, cognitive conflict and affective conflict)	1270.18	494	731.15***	0.08	0.80	0.79
M6: 1-factor model (combine shared leadership, cognitive conflict, affective conflict and team creativity)	1473.31	495	934.28***	0.09	0.75	0.74

Significance: * $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

TABLE 2 Descriptive statistics and zero-order correlations.

Variable	Mean	SD	1	2	3	4	5
1. Generational diversity	2.79	0.65	1				
2. Cognitive-based conflict	2.27	0.58	0.57***	1			
3. Affective-based conflict	2.30	0.56	0.50***	0.55***	1		
4. Shared leadership	3.47	0.69	0.01	0.23***	0.03	1	
5. Team creativity	3.43	0.71	0.15*	0.31***	−0.17*	0.25***	1

Significance: * $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

innovation performance in the sample. The standard deviations were relatively small, indicating limited variability in the responses.

The correlation analysis revealed several noteworthy associations. Generational diversity was significantly and positively correlated with both cognitive-based conflict ($r = 0.57, p < 0.001$) and affective-based conflict ($r = 0.50, p < 0.001$), supporting the notion that generational differences can trigger both task-related and relationship-related conflicts. Cognitive-based conflict was positively correlated with team innovation performance ($r = 0.31, p < 0.001$), suggesting that constructive disagreements can stimulate creativity and innovation. In contrast, affective-based conflict was negatively correlated with team innovation performance ($r = -0.17, p < 0.05$), highlighting the detrimental impact of interpersonal tensions on team outcomes. Shared leadership was positively correlated with cognitive-based conflict ($r = 0.23, p < 0.001$) and team innovation performance ($r = 0.25, p < 0.001$), but not significantly correlated with affective-based conflict ($r = 0.03, p > 0.05$).

These correlational findings provide preliminary support for our hypotheses and set the stage for further analysis using mediation and moderated mediation models.

5.3 Hypotheses test of mediation model

Before examining the mediation model, we first tested the direct effect of generational diversity on team creativity. The Mplus results did not indicate a significant effect of generational diversity on team creativity ($B = 0.169, SE = 0.101, p = 0.093 > 0.05$), hence hypothesis H1 was not supported.

To test the mediation model related to hypotheses H2 and H3, we examined the indirect effects of generational diversity on team innovation performance through cognitive-based conflict and affective-based conflict, respectively. The results revealed that

generational diversity was significantly and positively related to both cognitive-based conflict ($B = 0.530, SE = 0.059, p < 0.001$) and affective-based conflict ($B = 0.485, SE = 0.063, p < 0.001$). Furthermore, cognitive-based conflict had a positive effect on team innovation performance ($B = 0.647, SE = 0.086, p < 0.001$), whereas affective-based conflict had a negative effect ($B = -0.659, SE = 0.090, p < 0.001$).

The indirect effects analysis showed that both cognitive-based conflict and affective-based conflict significantly mediated the relationship between generational diversity and team innovation performance. The indirect effect through cognitive-based conflict was positive and significant [indirect effect = 0.343, $SE = 0.060, p < 0.001$, 95% CI (0.239, 0.468)], supporting H2. The indirect effect through affective-based conflict was negative and significant [indirect effect = −0.320, $SE = 0.064, p < 0.001$, 95% CI (−0.463, −0.212)], supporting H3. These findings suggest that generational diversity can both enhance and hinder team innovation performance, depending on the type of conflict it triggers.

5.4 Hypotheses test of moderated mediation model

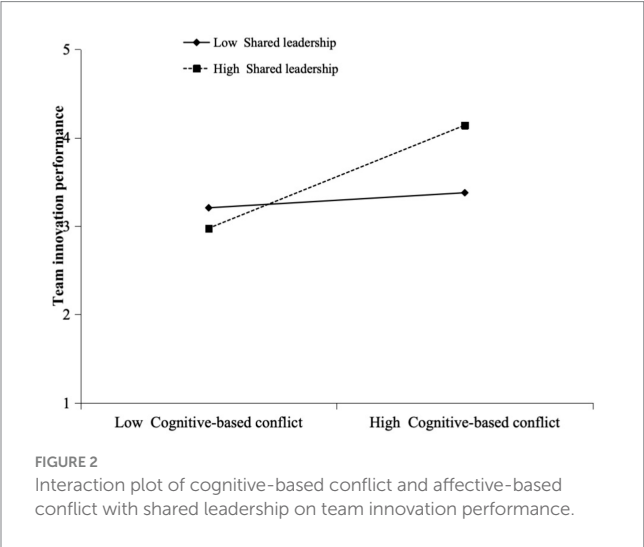
In the second model, we incorporated shared leadership as a moderator and examined its interaction effects with cognitive-based and affective-based conflicts on team innovation performance. The moderated mediation model demonstrated a good fit to the data [MLR $\chi^2 (2) = 2.450, RMSEA = 0.080, SRMR = 0.018, CFI = 0.995, TLI = 0.901$].

The analysis revealed a significant positive interaction effect between cognitive-based conflict and shared leadership in predicting team innovation performance ($B = 0.617, SE = 0.113, p < 0.001$). This finding suggests that the positive relationship between cognitive

TABLE 3 Unstandardized estimates (standard error) of the moderated mediation path.

	Cognitive-based conflict	Affective-based conflict	Team innovation performance		
Control variable 1 Educational diversity	−0.03	−0.01	−0.06	−0.05	−0.03
Control variable 2 Tenure diversity	0.02	0.04	0.03	0.04	0.02
Independent variable generational diversity	0.53***	0.49***	0.17	0.17	0.09
Mediator 1 Cognitive-based conflict				0.65***	0.58***
Mediator 2 Affective-based conflict				−0.66***	−0.56***
Moderator Shared leadership					0.19**
Shared leadership*cognitive-based conflict					0.62***
Shared leadership*affective-based conflict					−0.09
R ²	0.33	0.26	0.03	0.28	0.30

Significance: * $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.



conflict and team innovation is amplified when shared leadership is high. In contrast, the interaction effect between affective-based conflict and shared leadership on team innovation performance was not significant ($B = -0.087$, $SE = 0.134$, $p = 0.514$), indicating that shared leadership does not moderate the negative relationship between affective conflict and team innovation. The unstandardized estimates of the model are presented in Table 3.

Figure 2 illustrates the interaction plot using values plus and minus one standard deviation from the mean of shared leadership (Cohen et al., 2003).

The plot in Figure 2 shows that cognitive-based conflict positively influenced team innovation performance when shared leadership was high [$B = 0.986$, $SE = 0.112$, $p < 0.001$, 95% CI (0.774, 1.209)], but this relationship was not significant when shared leadership was low [$B = 0.147$, $SE = 0.103$, $p = 0.153$, 95% CI (−0.048, 0.357)], supporting H4. Conversely, affective-based conflict negatively influenced team creativity regardless of the level of shared leadership, whether high

[$B = -0.617$, $SE = 0.147$, $p < 0.001$, 95% CI (−0.925, −0.346)] or low [$B = -0.496$, $SE = 0.108$, $p < 0.001$, 95% CI (−0.730, −0.306)], thus H5 was not supported.

We further analyzed the conditional indirect effect of generational diversity, as shown in Table 4.

The indirect effect of generational diversity on team innovation performance via cognitive-based conflict was significantly stronger when shared leadership was high [indirect effect = 0.532, $SE = 0.083$, $p < 0.001$, 95% CI (0.378, 0.702)] compared to when shared leadership was low [indirect effect = 0.078, $SE = 0.056$, $p = 0.167$, 95% CI (−0.025, 0)].

The indirect effect through affective-based conflict was not significant, regardless of the level of shared leadership [indirect effect = −0.299, $SE = 0.085$, $p = 0.000$, 95% CI (−0.490, −0.160) for high shared leadership; indirect effect = −0.240, $SE = 0.062$, $p = 0.000$, 95% CI (−0.388, −0.140) for low shared leadership]. The difference in indirect effects was not significant [difference of indirect effect = −0.059, $SE = 0.103$, 95% CI (−0.285, 0.143)]. The results of the moderated mediation analysis supported H4a and H4b, but not H5a and H5b. The comparison of the moderated indirect effects is summarized in Table 4.

6 Discussion

Research on the correlation between work group diversity and group performance has produced inconclusive findings. Among the many aspects of diversity, generational diversity has emerged as a particularly contentious and debated subject. The existing literature on generational diversity and its impact on work outcomes presents a mixed picture. While some studies have reported limited effects of generational differences, particularly in specific fields like the medical sector (Parry and Urwin, 2011), others have highlighted the potential for both positive and negative outcomes depending on various contextual factors. The inconclusive nature of these findings underscores the need for more comprehensive investigations that delve

TABLE 4 Comparison of moderated indirect effect.

Mediator	Pattern	Indirect effect	SE	t	p	95%CI
Cognitive-based conflict	Low shared leadership	0.08	0.06	1.38	0.17	−0.03, 0.20
	High shared leadership	0.53	0.08	6.37	0.00	0.38, 0.70
	Difference	0.45	0.10	4.73	0.00	0.27, 0.65
Affective-based conflict	Low shared leadership	−0.24	0.06	−3.85	0.00	−0.39, −0.14
	High shared leadership	−0.30	0.09	−3.54	0.00	−0.49, −0.16
	Difference	−0.06	0.09	−0.64	0.52	−0.26, 0.11

deeper into the underlying mechanisms and processes through which generational diversity influences team dynamics and performance.

Recent research has also raised concerns about the methodological and theoretical limitations of existing studies on generational differences (Van Rossem, 2019). Many studies have relied on simplistic categorizations of generations and have failed to adequately account for the complex interplay of individual, team, and organizational factors that shape the impact of generational diversity. To address these limitations, our study adopts a more nuanced approach by integrating decision-making and social identity perspectives and incorporating key mediators and moderators.

By adopting this integrated theoretical framework, our research contributes to the existing literature in several ways. First, we provide compelling evidence that generational diversity has an indirect, rather than direct, impact on team innovation performance. This challenges the notion that generational differences alone are sufficient to explain variations in work-based outcomes (Costanza and Finkelstein, 2015). Second, we demonstrate that the indirect effect of generational diversity on team innovation is mediated by both cognitive and affective conflicts. This highlights the dual nature of generational diversity, which can simultaneously trigger both functional and dysfunctional conflicts within teams. Third, we examine the moderating role of shared leadership in this complex process, revealing its potential to amplify the positive effects of cognitive conflict and mitigate the negative effects of affective conflict.

Furthermore, our findings challenge the traditional view that shared leadership is universally effective in managing all types of conflict. While shared leadership appears to be effective in fostering an environment conducive to constructive debate and the leveraging of diverse perspectives, it may not be as effective in resolving interpersonal tensions and emotional conflicts. This suggests that different leadership styles or interventions may be required to address different types of conflict in multigenerational teams.

6.1 Theoretical implications

This study makes several significant theoretical contributions to the literature on generational diversity and team innovation. First, by integrating decision-making and social identity perspectives, we offer a more comprehensive and nuanced understanding of the mechanisms through which generational diversity influences team innovation performance. This integrated framework highlights the importance of considering both task-related and relationship-related factors in understanding the dynamics of multi-generational teams.

Second, our study challenges the prevailing notion that generational differences have a direct and deterministic impact on work-based outcomes. By demonstrating the mediating role of cognitive and affective conflicts, we provide evidence that the impact of generational diversity is contingent upon the types of conflict it triggers within teams.

Third, our findings underscore the importance of shared leadership in harnessing the potential benefits of generational diversity. By fostering an environment of open communication, collaboration, and constructive conflict resolution, shared leadership can amplify the positive effects of cognitive conflict on team innovation. However, our study also reveals the limitations of shared leadership in mitigating the negative effects of affective conflict, suggesting the need for further research on alternative leadership styles or interventions that may be more effective in addressing interpersonal tensions and emotional conflicts.

6.2 Practical implications

Our research offers valuable insights for managers seeking to effectively manage multigenerational teams and foster innovation in today's diverse workplaces. First, our findings highlight the importance of recognizing the dual nature of generational diversity. While generational differences can lead to conflicts and challenges, they can also be a source of creativity and innovation. Managers need to be aware of both the potential benefits and drawbacks of generational diversity and adopt strategies to leverage the former while mitigating the latter.

Second, our study underscores the critical role of shared leadership in fostering team innovation in multi-generational contexts. By promoting a collaborative and inclusive leadership style, organizations can create an environment where diverse perspectives are valued and encouraged, and where cognitive conflict is channeled toward productive outcomes. However, managers also need to be mindful of the limitations of shared leadership in addressing affective conflict and consider implementing additional interventions, such as conflict resolution training or team-building activities, to address interpersonal tensions and emotional conflicts.

Third, our research suggests that effective management of multigenerational teams requires a nuanced and adaptive approach. Managers need to be attuned to the specific needs and challenges of different generations and tailor their leadership styles and interventions accordingly. By fostering an environment of mutual respect, understanding, and collaboration, organizations can harness the full potential of generational diversity and drive innovation in the workplace.

6.3 Limitation and future directions

Our study, while offering significant theoretical and practical insights, encounters certain limitations that warrant acknowledgment. Primarily, the reliance on self-reported data for most variables might introduce common method bias, a concern noted by Podsakoff et al. (2003). We attempted to mitigate this through a multi-wave design, gathering data at varied intervals. While self-reporting is appropriate for subjectively evaluated constructs like generational diversity and the mediating variables, future research should seek alternative data collection methods for validation.

The impact of team dynamics on innovation, influenced by internal factors like gender, discipline, and external elements such as incentive systems, is well-documented (Im et al., 2013). Our study controlled for demographic variables and work-related factors to isolate generational diversity's unique effect. However, future studies should employ more robust methodologies, like longitudinal designs, to capture the evolving nature of generational diversity (Costanza et al., 2012).

Moreover, conflict management in teams might be affected by team atmosphere, norms, trust, and respect levels (Behfar et al., 2008; DeChurch et al., 2013; Jehn and Mannix, 2001). Future research should explore these factors as potential moderators in resolving conflicts in multigenerational teams. While our focus was on leadership style, subsequent research could broaden the scope to include these aspects, thus enhancing the comprehensiveness of the framework.

The implications of the scale adaptation and validation for the study's findings, particularly in the context of Chinese financial firms, will be further explored in the Discussion section. We will also consider how these results might influence the generalizability of our findings and suggest directions for future research that could build upon our validation work. This includes the potential for cross-validation studies to enhance the robustness of the scales and their applicability in different cultural and organizational contexts.

6.4 Generational diversity and team innovation: a discussion on indirect effects

The findings of this study indicate that the direct effect of generational diversity on team innovation is not significant ($p = 0.093$), which may seem counterintuitive at first, given our emphasis on this relationship in the hypotheses. However, our analysis reveals that generational diversity significantly impacts team innovation indirectly through cognitive and affective conflicts. This discrepancy may arise from the complexity of generational diversity, which does not merely influence team innovation directly but shapes the cognitive and affective conflicts within the team, thereby indirectly affecting the innovation process.

Firstly, the multidimensional nature of generational diversity implies that employees from different generations may differ in values, work attitudes, and communication styles. These differences may not directly translate into innovative activities, but they do influence how team members communicate, collaborate, and resolve conflicts, all of which are critical factors in the innovation process. For instance, younger generations may be more inclined to adopt new technologies and innovative methods, while older generations may place more emphasis on tradition and experience. Such differences can lead to cognitive conflicts, which, if managed effectively, can foster innovative thinking and problem-solving.

Secondly, affective conflicts may stem from personal incompatibilities and emotional tensions, which are typically considered detrimental to team performance. However, our study demonstrates that with effective leadership and management, these conflicts can be transformed into a catalyst for team innovation. Thus, we emphasize the importance of understanding and managing these indirect effects, rather than focusing solely on the direct link between generational diversity and team innovation.

Lastly, these findings have significant implications for practitioners. They highlight the importance of nurturing open communication, collaboration, and conflict resolution skills within multi-generational teams, and how these can be leveraged to foster team innovation.

The limitations of our scales in cross-cultural research are an important consideration. While our methods have strived to ensure the scales' applicability, there may still be nuances that are culturally specific and could affect the interpretation of the results. We suggest that future research continues to refine these scales by incorporating more diverse cultural perspectives and conducting comparative studies across a wider range of cultural groups. This will not only strengthen the validity of the scales but also enrich our understanding of how generational diversity influences team innovation in different cultural contexts.

To enhance the connection between our empirical findings and the theoretical frameworks of decision-making and social identity theories, we provide the following insights:

Application of Decision-Making Theory: Our empirical results offer valuable insights into how diversity within teams, particularly cognitive conflict, fosters deeper information processing and innovative thinking. This aligns with the decision-making theory's proposition that diversity can enhance team performance by bringing a wider range of perspectives to the decision-making process.

Application of Social Identity Theory: We will analyze how our findings either support or challenge the social identity theory. Specifically, we will discuss how shared leadership mitigates the dynamics of in-group and out-group within multigenerational teams, thereby reducing affective conflict and enhancing team cohesion. This is directly related to the social identity theory's assertion that group identity influences individual behaviors and intergroup relations.

Alignment of Shared Leadership with Theories: We will explore how our findings on shared leadership align with social identity theory. Our results indicate that shared leadership, by promoting mutual respect and trust among team members, helps to alleviate conflicts arising from generational differences. This is consistent with the view from social identity theory that harmony within a group can reduce intergroup conflicts.

Explanation of Theories for Results: We will further explain how these theories help us understand the differential moderating effects of shared leadership on cognitive and affective conflicts and how these conflicts impact team innovation performance.

By integrating these discussions, we aim to provide a more comprehensive understanding of how our empirical results are supported by and contribute to the existing theoretical frameworks. Given the insightful feedback on the cultural variability in generational classifications, we extend our discussion to address the cultural specificity of generational cohorts in China and its alignment with global patterns.

Cultural Dependence of Generational Definitions: Our categorization, while grounded in established literature, acknowledges the potential for variation in how generational cohorts are delineated

across different cultures and societies. We will explore the nuances that may arise from differing cultural and societal contexts, affecting the universality and applicability of generational definitions.

Comparison of Chinese Generational Experiences with Global Patterns: We will contrast the generational experiences in China with global generational patterns to assess the degree of alignment. This involves examining how China's unique socio-historical context shapes the values, work attitudes, and behavioral patterns of its generational cohorts, potentially deviating from global trends.

Cultural Specificity Discussion: We will delve into the cultural specificity of generational groups in China, analyzing how these specificities influence our research findings. This includes an in-depth look at the developmental backgrounds of Chinese generational cohorts and how these backgrounds inform their behaviors and interactions in the workplace.

Implications for Research Findings: Finally, we will discuss the potential impacts of these cultural specificities on our research outcomes and consider the applicability of our findings in other cultural contexts worldwide. This reflection aims to enhance the global relevance of our study and provide a more nuanced understanding of generational diversity's role in team innovation performance across different cultures.

7 Conclusion

Our analysis demonstrates that generational diversity in teams leads to cognitive-based and affective-based conflicts, significantly influencing team innovation performance. We found that shared leadership plays a crucial role in moderating the cognitive process.

Our study, incorporating decision-making and social identity perspectives, reveals a dual process in managing team innovation performance in the context of generational diversity. While generational diversity can hinder team innovation performance through affective-based conflict, it can also enhance it via cognitive-based conflict. Importantly, shared leadership moderates cognitive process, intensifying the positive impact to yield beneficial work outcomes. Our analysis demonstrates that generational diversity in teams leads to cognitive-based and affective-based conflicts, significantly influencing team innovation performance. We found that shared leadership plays a crucial role in moderating the cognitive process. This aligns with the findings of Carson et al. (2007) and Wang et al. (2014), who also observed the mediating effects of leadership in managing generational diversity and enhancing team outcomes. This research contributes significantly to the understanding of generational diversity's effects on team performance and offers valuable insights for managing multi-generational teams, especially from a leadership style standpoint.

Our research emphasizes the importance of understanding how generational diversity indirectly impacts team innovation through cognitive and affective conflicts. For managers, this means focusing not just on generational diversity itself but on the internal team

dynamics as well. By fostering a work environment that promotes open communication, collaboration, and effective conflict resolution, organizations can better harness the potential of multi-generational teams to drive innovation.

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.

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 OR patients/participants legal guardian/next of kin] was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

LW: Conceptualization, Formal analysis, Methodology, Writing – original draft. XD: Data curation, Software, Validation, Writing – review & editing.

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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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Development of organizational healing scale: validity and reliability study

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Introduction: Adverse and destructive situations can have a significant and long-lasting impact on organizational members, resulting in considerable disruption to organizational functioning. The occurrence of negative or traumatic events in organizations can be attributed to a range of factors, including natural adversities, as well as intentional or human-induced crises. The concept of organizational healing encompasses both the processes that enable an organization to regain functionality following adversity and the strategies that facilitate enhanced performance in the period following trauma or harm. Recent advances have highlighted the topic of organizational healing, particularly in relation to how organizations can recover from significant traumatic events and return to their pre-disaster state. This study aimed to develop the Organizational Healing Scale by verifying its reliability and validity.

Methods: The item pool for the organizational healing scale was developed with the objective of ensuring its applicability for researchers and participants by adhering to the principles of scientific rigor and practicality. In this context, an item pool of 32 items was created. To ensure construct validity, EFA and CFA were conducted, and for content and face validity, expert opinion was consulted. Validity was also ensured through convergent and discriminant validity. Reliability was tested using Cronbach's alpha coefficient value.

Results: The two components (individual priority, organizational priority) identified through EFA as contributing to the construct validity of the scale were subsequently confirmed by CFA. The fit indices for the scale were at satisfactory level. The Cronbach Alpha coefficient value demonstrated that both components were reliable.

Discussion: A review of the results indicated that the organizational healing scale is a valid and reliable instrument for measuring the healing levels of organizations with respect to the component under consideration.

KEYWORDS

healing, trauma, recovery, organizational healing, scale development

1 Introduction

Organizations established to achieve a specific purpose (Aytaç, 2004) may occasionally be confronted with unforeseen and adverse circumstances while engaged in their regular operations. Such destructive and adverse situations can have a profound traumatic impact on organizational members and significantly disrupt organizational functioning. In order to proactively mitigate the risk of such adverse situations, organizations implement a range of measures. However, in the contemporary era, developments can occur rapidly and in a complex manner. Consequently, organizations may find themselves in a state of crisis and chaos (Powley, 2012). The aforementioned adverse situations, which have the potential to inflict significant trauma on organizations, may be precipitated by natural disasters such as earthquakes, fires, and floods, or they may result from human-induced crises, including robberies, armed attacks, terrorist acts, and severe financial crises (Demirtaş, 2000; Powley, 2013). Organizational healing denotes the capacity of organizations to resume their core activities following such significant crisis (Pettersson, 1999). Similarly, as a healthy body becomes unwell and then recovers and regains its health, it is possible for organizations to recover from adverse situations and regain their normal order (Mitchell, 1996; Powley and Piderit, 2008). However, the internal structure and functioning of each organization is different, and thus, it is inevitable that there will be differences in the healing processes of organizations after crisis situations. For instance, as institutions dedicated to the dissemination of knowledge, schools are among the organizations that are most reliant on the contributions of human capital. The healing process in such organizations will differ from the healing of a bank or a company. Indeed, the media frequently depicts the traumatic effects of terrorist or violent acts that occur in schools in various global locations. However, it is challenging to eradicate the consequences of such incidents on students and educators, thereby facilitating organizational healing.

The concept of organizational healing is employed to describe the process by which organizations regain a state of wellbeing following a significant degree of damage. The term “healing” is commonly used in the field of health to describe the process of returning to a state of soundness, health, and wholeness after illness or harm (Powley and Cameron, 2006). However, healing is a process that extends beyond the mere healing of physical ailments (Criddle, 1993). In this sense, organizational healing refers to the work of repairing practices, routines, and structures in the face of disruption and strengthening organizational functioning through social relationships (Powley, 2013).

Organizational healing can be defined as a type of restoration that occurs during and after any event that disrupts organizational routines, structures, relationships between individuals, and an individual's life experience (Fazio and Fazio, 2005). In their examination of the healing of organizations that experienced traumatic events, Powley and Cameron (2006) identified four main enablers of the healing process through extensive research and long-term observations. These themes are as follows: “Reinforcing the priority of the individual,” which refers to the extent to which the organization demonstrates a commitment to the wellbeing, future, and career development of its members; “Fostering High

Quality Connections,” which describes the degree to which organizational members intentionally cultivate robust personal relationships with one another; and “Strengthening a Family Culture,” which emphasizes the importance of a close-knit, supportive organizational culture. The term “Initiating Ceremonies and Rituals” refers to the degree to which rituals, ceremonies, and symbolism facilitate the restoration of stability, self-concept, and organizational identification among members. The term “close-knit, family-type organization” is defined as an organizational culture that fosters a sense of belonging and cohesion among individuals across boundaries.

The concept of organizational healing encompasses not only the processes through which organizations regain their functionality following adversity but also the ways in which they enhance their performance in the period following trauma or harm (Tedeschi and Calhoun, 1995). Shepherd's (2003) work on coping with business failure and losses contributes to an in-depth understanding of the learning processes of organizations. Shepherd (2003) posits that failures should not only be perceived as losses, but also as experiences that provide learning opportunities. This perspective is crucial for comprehending how organizations learn from past adverse experiences and how they undergo restructuring. In the aftermath of crises, organizations implement measures to foster the psychological and emotional wellbeing of their employees through a range of strategies. For example, post-crisis support programs may be designed to reduce employees' anxiety and increase their engagement (Cope, 2011). Furthermore, social support and network relationships play a critical role in organizations' healing processes. The sharing of experiences within social networks, where entrepreneurs and organizations can interact, can facilitate the healing process (Izquierdo and Buelens, 2008). In this sense, organizational healing is distinct from other related concepts in organizational sciences, including hardiness, resilience, and recovery. This is because resilience is an individual characteristic, attributed to managers or other organizational members, who are able to cope with setbacks and withstand difficult circumstances. It is not a process of repair and restoration. Furthermore, healing is distinguished from resilience. Resilience is a latent capacity inherent to both individuals and organizations prior to the occurrence of any traumatic event. Resilience can be defined as the capacity to recover from adverse events and to withstand disruptions (Sutcliffe and Vogus, 2003). In contrast, healing is an active process involving social interaction that occurs after a crisis in order to ensure the restoration of the organization. The concept of healing is closely related to, but conceptually distinct from, the concept of recovery. The term “recovery” is used to describe a long-term process that enables systems affected by trauma or injury to resume their normal routines and functions. It is important to note that recovery is fundamentally different from the process of healing in terms of its temporal dimension. Unlike healing, which is a relatively short-term process that begins immediately after the crisis or trauma occurs and is measured in hours, days, or weeks (Powley and Piderit, 2008), recovery is a long-term process that can span months, years, or even decades. In the context of organizational studies, the term “organizational healing” is used to describe the process by which an organization rebounds and reorganizes following a traumatic event. This concept is distinct from that of organizational resilience, which pertains

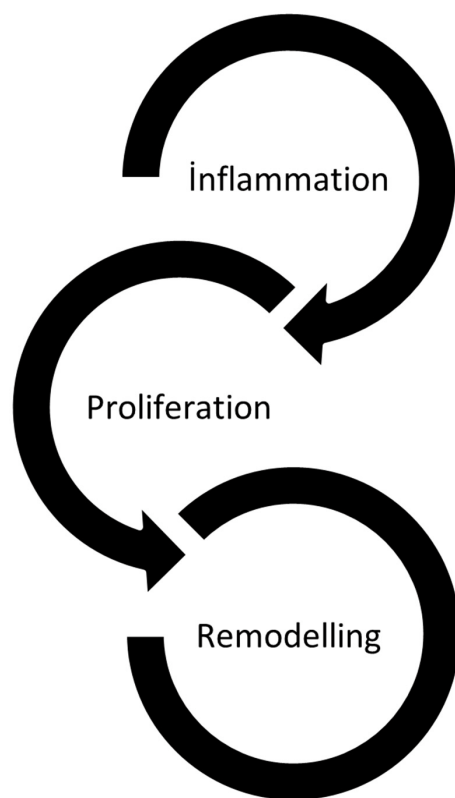


FIGURE 1
Model of organizational healing (Powley and Piderit, 2008).

to an organization's capacity to withstand and recover from such events (Luthans et al., 2006; Tugade and Fredrickson, 2004). The primary distinction between these two concepts lies in their respective focal points and operational mechanisms. The objective of organizational healing is to surmount the consequences of trauma and reinstate the psychological and emotional wellbeing of employees. These processes encompass the implementation of strategies designed to foster trust among employees, enhance motivation, and reinforce the organizational culture. For example, post-crisis support programs may seek to mitigate employee anxiety and enhance engagement (Brewin et al., 2009). In contrast, organizational resilience can be defined as an organization's capacity to withstand challenges and demonstrate adaptability in the face of adversity. The concept of resilience is concerned with the capacity of an organization to respond effectively to unforeseen circumstances and to maintain its functionality throughout this process. A resilient organization demonstrates the capacity to rapidly adapt and alter its strategic orientation in response to changing circumstances and uncertainty. This contributes to the organization's ability to not only survive but also thrive in the post-crisis period (Berkman and Glass, 2000; Masten, 2001). Consequently, while recovery focuses on the aftermath of a specific crisis, resilience emphasizes the overall flexibility and adaptability of organizations. Both concepts are critical in enhancing the sustainability of organizations and ensuring effective crisis management.

Powley and Piderit (2008) argue that the wound healing process in medicine can be conceptualized as a rich metaphor for exploring organizational healing. Schilling (1968) research on wound healing identifies three fundamental stages in the healing process: inflammation, proliferation, and maturation. Based on these stages, Powley and Piderit (2008) propose a theoretical model of organizational healing that includes three healing stages and six key facilitators. These are: inflammation, which involves prioritizing the individual in need of immediate care and addressing the potential for blame; proliferation, which entails fostering high-quality connections and improvising on routines; and remodeling, which involves strengthening a family culture and initiating ceremonies and rituals (Figure 1).

Powley (2012) delineates the inflammation stage as the pivotal actions undertaken by both leaders and members to safeguard themselves from further trauma. The objective of this stage, as outlined by Powley, is to "secure and ensure the collective wellbeing of the organization's members." For organizations, the inflammation stage necessitates an internal triage process. Those individuals who are most in need of care are accorded the highest priority and are attended to in the shortest possible time. In this phase, members of the organization endeavor to ascertain the root causes of the original trauma. However, in the inflammation phase, members of the organization are particularly advised to eschew mutual recrimination. In the proliferation phase, members of the organization endeavor to identify and foster connections between each other. The shared experience of organizational members provides an opportunity for them to gain insight into each other's perspectives and establish connections that may not be possible with individuals outside the organization. This can only occur when members of the organization facilitate a sense of comfort and belonging for others within the organizational structure. In the remodeling phase, the organizational culture is reinforced through the sharing of a collective history and the healing process. The group has emerged from the healing process in a robust state, and the organization has become more resilient as a result of shared experiences. Consequently, shared experiences engender a more profound sense of community, and the rituals of the group evolve to reflect this new phase (Powley and Piderit, 2008). Indeed, Powley (2012) asserts that the objective of the reshaping phase is not to revert to a previous state, but to transition to a productive organizational structure that is better equipped to withstand future harms.

In light of the aforementioned information, organizational healing can be defined as the process of addressing and resolving issues that have the potential to cause harm or dysfunction within an organization (Johnson, 2023). In this context, organizational healing involves the addressing of conflicts, problems, and other issues between employees or departments, as well as the examination of the effects of organizational change. The promotion of organizational healing can be achieved through the implementation of effective communication strategies, the establishment of a supportive work environment, and a focus on the wellbeing of employees (Powley, 2012). Consequently, as in all managerial processes, organizational leaders assume significant responsibilities in the healing process (Wallace and Witherspoon, 1998). Leaders who support the healing process at

TABLE 1 Demographic characteristics of the participants.

Variable	EFA	<i>n</i>	%	CFA	<i>n</i>	%
Gender	Female	318	72.1	Female	269	73.5
	Male	123	27.9	Male	97	26.5
Age	22–29 years old	61	13.8	22–29 years old	45	12.3
	30–39 years old	158	35.8	30–39 years old	124	33.9
	40–49 years old	180	40.8	40–49 years old	158	43.2
	50 years old and over	42	9.5	50 years old and over	39	10.7
Professional experience	0–5 years	88	20.2	0–5 years	67	18.3
	6–10 years	99	22.4	6–10 years	87	23.8
	11–15 years	105	23.8	11–15 years	82	22.4
	16–20 years	59	13.4	16–20 years	51	13.9
	21–25 years	48	10.9	21–25 years	41	11.2
	25 years and over	41	9.3	25 years and over	38	10.4
The number of educational organizations (classified according to level)	Pre-school	4	20.0	Pre-school	5	25.0
	First level (1st, 2nd, 3rd, and 4th grade)	5	25.0	First level (1st, 2nd, 3rd, and 4th grade)	4	20.0
	Second stage (5th, 6th, 7th, and 8th grade)	5	25.0	Second stage (5th, 6th, 7th, and 8th grade)	6	30.0
	Third level (9th, 10th, 11th, and 12th grade)	6	30.0	Third level (9th, 10th, 11th, and 12th grade)	5	25.0
The number of educational organizations, classified by the number of students enrolled	0–300	3	15.0	0–300	5	25.0
	301–600	7	35.0	301–600	5	25.0
	601–900	7	35.0	601–900	8	40.0
	901+	3	15.0	901+	2	10.0
The current number of teaching staff employed at educational organization	0–20	5	25.0	0–20	6	30.0
	21–40	9	45.0	21–40	8	40.0
	41–60	6	30.0	41–60	6	30.0

all stages of healing consciously prioritize the establishment of connections between members of the organization and internal and external stakeholders. It is therefore anticipated that their remedial leadership behaviors will effectively diagnose, treat, healing and eliminate organizational problems (Wallace, 2001). In this respect, leaders are expected to implement certain key behaviors to restore a healthy work environment (Byrd-Poller et al., 2017).

1.1 Purpose of the research

The topic of organizational healing has recently been a prominent area of study in the field of management literature, as it pertains to the ability of organizations to return to their pre-disaster state following a significant traumatic event. However, an examination of the studies on this subject reveals that the majority of them are literature reviews or case studies (Powley and Cameron, 2006; Powley and Piderit, 2008; Powley and Taylor, 2010; Powley, 2012, 2013; Wallace, 2001). It is therefore necessary to conduct further research on organizational healing using quantitative research methods. However, prior to this, a scale for determining the healing levels of organizations must first be developed. Utilizing quantitative research techniques, the present study was undertaken

with the objective of developing a valid and reliable scale for the assessment of organizational healing following traumatic events or major crisis situations.

2 Materials and methods

2.1 Sample of the study

A simple random sampling method was employed to identify the participants. This sampling method is distinguished by the fact that the units in the population are equal and independent in the selection of the sample (Büyüköztürk et al., 2020; Karasar, 2012, p. 113). The research sample comprises educators employed by educational institutions affiliated with the Ministry of National Education in Turkey.

As seen in the Table 1, 318 (72.1%) of the individuals who participated in the EFA study were female and 123 (27.9%) were male. A total of 61 (13.8%) individuals aged 22–29, 158 (35.8%) individuals aged 30–39, 180 (40.8%) individuals aged 40–49, and 42 (9.5%) individuals aged 50 and over participated in the study. When the professional experience variable is analyzed, it is seen that the number of participants with 6–10 years of experience is 99 (22.4%), 11–15 years of experience is 105 (23.8%), 16–20 years

TABLE 2 Descriptive statistics of the data set before EFA.

Item no 1	<i>n</i>	$\bar{X}$	<i>sd</i>	Skewness	Kurtosis
Item no 2	441	3.40	1.185	−0.392	−0.802
Item no 3	441	3.55	1.054	−0.702	−0.141
Item no 4	441	3.75	1.110	−0.736	−0.260
Item no 5	441	3.71	1.016	−0.659	0.024
Item no 6	441	3.63	1.095	−0.543	−0.411
Item no 7	441	3.76	1.025	−0.840	0.343
Item no 8	441	3.85	0.990	−0.865	0.387
Item no 9	441	3.81	1.017	−0.859	0.338
Item no 10	441	3.59	1.125	−0.609	−0.346
Item no 11	441	3.73	1.110	−0.674	−0.290
Item no 12	441	3.74	1.052	−0.752	0.068
Item no 13	441	3.19	1.093	−0.159	−0.724
Item no 14	441	3.82	0.906	−0.709	0.336
Item no 15	441	3.70	0.976	−0.619	0.047
Item no 16	441	3.73	1.011	−0.801	0.310
Item no 17	441	3.84	0.960	−0.880	0.662
Item no 18	441	3.86	0.944	−0.899	0.699
Item no 19	441	3.20	1.079	−0.192	−0.610
Item no 20	441	3.76	0.941	−0.892	0.834
Item no 21	441	3.93	0.824	−1.110	1.932
Item no 22	441	3.71	1.018	−0.658	0.002
Item no 23	441	3.62	1.081	−0.560	−0.294
Item no 24	441	3.56	1.077	−0.612	−0.140
Item no 25	441	3.47	1.081	−0.361	−0.500
Item no 26	441	3.56	1.030	−0.633	−0.058
Item no 27	441	3.72	0.988	−0.828	0.525
Item no 28	441	3.39	1.098	−0.441	−0.434
Item no 29	441	3.49	1.053	−0.547	−0.319
Item no 30	441	3.72	0.983	−0.747	0.251
Item no 31	441	3.67	0.988	−0.675	0.034
Item no 32	441	3.57	1.036	−0.655	−0.072

of experience is 59 (13.4%), 21–25 years of experience is 48 (10.9%), and 25 years and above is 41 (9.3%). The distribution of educational organizations according to level of education indicates that 4 (20%) and 5 (25%) are pre-school and first level (grades 1–4) respectively, 5 (25%) are second level (grades 5–8) and 6 (30%) are third level (grades 9–12). The organizations were subsequently categorized according to the number of students enrolled. In the context of EFA, the number of students in the 0–300 and 901+ ranges each constituted 3 (15%) of the total, while the number of students in the 301–600 and 601–900 ranges each made up 7 (35%). The teaching staff numbers were also evaluated, with organizations having 0–20,

TABLE 3 Bootstrapping for the model.

	Coefficients	Lower bound	Upper bound
Item no 1	0.626**	0.564	
Item no 2	0.746**	0.694	
Item no 3	0.865**	0.833	
Item no 4	0.872**	0.84	
Item no 5	0.829**	0.785	
Item no 6	0.858**	0.827	
Item no 7	0.81**	0.768	
Item no 10	0.769**	0.718	
Item no 16	0.663**		0.599
Item no 17	0.696**		0.63
Item no 18	0.546**		0.48
Item no 23	0.756**		0.709
Item no 24	0.808**		0.766
Item no 25	0.811**		0.769
Item no 26	0.809**		0.768
Item no 27	0.727**		0.675
Item no 28	0.858**		0.823
Item no 29	0.88**		0.854
Item no 30	0.841**		0.808
Item no 31	0.813**		0.766
Item no 32	0.842**		0.8

***p* < 0.01.

21–40, and 41–60 staff members accounting for 5 (25%), 9 (45%), and 6 (30%), respectively.

Of the individuals who participated in the CFA study, 269 (73.5%) were female and 97 (26.5%) were male. A total of 45 (12.3%) individuals aged 22–29, 124 (33.9%) individuals aged 30–39, 158 (43.2%) individuals aged 40–49, and 39 (10.7%) individuals aged 50 and over participated in the study. When the professional experience variable is analyzed, it is seen that the number of participants with 6–10 years of experience is 87 (23.8%), 11–15 years of experience is 82 (22.4%), 16–20 years of experience is 51 (13.9%), 21–25 years of experience is 41 (11.2%), and 25 years and over is 38 (10.4%). The distribution of educational organizations according to level of education indicates that 5 (25%) and 4 (20%) are pre-school and first level (grades 1–4), respectively, 6 (30%) are second level (grades 5–8) and 5 (25%) are third level (grades 9–12). The organizations were also subsequently categorized according to the number of students enrolled. In the sample of CFA, the number of students in the 0–300 students were 5 (25%), 301–600 students were 5 (25%), 601–900 students were 8 (40%), and 901+ students were 2 (10%). The teaching staff numbers were also evaluated, with organizations having 0–20, 21–40, and 41–60 staff members accounting for 6 (30%), 8 (40%), and 6 (30%), respectively. Furthermore, all of the municipal entities in which the educational institutions and the teaching personnel involved in the

TABLE 4 Eigenvalues of the organizational healing scale and variance ratio explained by factors.

Components	Initial eigenvalues			Rotation sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	11.283	53.727	53.727	7.125	33.929	33.929
2	1.518	7.226	60.953	5.675	27.024	60.953
3	0.961	4.577	65.530			
4	0.818	3.893	69.423			
5	0.727	3.460	72.883			
6	0.694	3.303	76.186			
7	0.568	2.703	78.889			
8	0.511	2.435	81.324			
9	0.485	2.311	83.635			
10	0.441	2.101	85.736			
11	0.389	1.852	87.588			
12	0.367	1.750	89.338			
13	0.335	1.593	90.931			
14	0.309	1.471	92.402			
15	0.290	1.380	93.782			
16	0.261	1.245	95.027			
17	0.244	1.163	96.190			
18	0.230	1.094	97.284			
19	0.200	0.955	98.238			
20	0.196	0.933	99.172			
21	0.174	0.828	100.000			
Extraction Method: Principal Component Analysis						

research are situated are within the middle-income category (SEDI, 2022).

To prepare the dataset for analysis, the assumptions of exploratory factor analysis (sample size, homogeneity, linearity, multicollinearity) were first conducted. In the context of handling missing data, one effective approach is to utilize a method of imputation that replaces the missing values with plausible estimates that have been derived from the observed data. This approach is based on the premise that missing data can be filled in with statistically reasonable values, thus ensuring the overall integrity of the dataset is maintained. The most commonly utilized techniques for this type of imputation are mean, median, and mode imputation, through which missing values are replaced with the average, median, or most frequent value observed in the dataset, respectively (Gautam and Latifi, 2023). In this study, the mean values were assigned in the data set where the missing data was present. Data from 441 participants were used for the exploratory factor analysis (EFA) stage, and data from 366 participants were used for the confirmatory factor analysis (CFA) stage in the development of the organizational healing scale. The two factors (Individual Priority and Institutional Priority) identified after the EFA were confirmed through CFA.

2.2 Scale development process

Scale development studies should answer questions such as what is the construct to be measured, to whom will the scale be applied, for what purpose will the scores obtained from the scale be used, and what is the format of the scale items (Lane et al., 2016). Balci (2018) generally states that the steps in the scale development process include creating an item pool, obtaining expert opinion, conducting a pilot study, and calculating validity and reliability.

As posited by Johnson and Morgan (2016), the development of scales is a common methodology employed by researchers to quantify the knowledge levels, behaviors, or perceptions of participants. The feature measured by the organizational healing scale was identified as the perceptions of the participants. The item pool for the organizational healing scale was developed in accordance with the principle of applicability for researchers and participants (DeVellis, 2017). In the preparation of the item pool, studies in the related field were taken into consideration (Powley, 2012, 2013; Powley and Piderit, 2008; Powley and Cameron, 2006). In this context, an item pool of 32 items was created. It is anticipated that the comprehensibility of the items in the item pool will be examined through the conduct of a technical audit regarding the adequacy of the items in measuring the targeted feature (Lane

TABLE 5 Rotated component matrix after factor analysis of organizational healing scale.

Items	Components	
	Individual priority	Organizational priority
Item no 1		0.682
Item no 2		0.703
Item no 3		0.821
Item no 4		0.822
Item no 5		0.768
Item no 6		0.745
Item no 7		0.632
Item no 10		0.665
Item no 16	0.631	
Item no 17	0.660	
Item no 18	0.530	
Item no 23	0.707	
Item no 24	0.714	
Item no 25	0.660	
Item no 26	0.634	
Item no 27	0.649	
Item no 28	0.777	
Item no 29	0.739	
Item no 30	0.742	
Item no 31	0.728	
Item no 32	0.741	

et al., 2016). In accordance with the aforementioned criteria, 32 items were presented to two experts in the field of educational administration and one expert in the field of Turkish language teaching. Additionally, the experts were requested to evaluate the scale items in terms of comprehensibility and scope. The 32-item scale was administered to a total of 465 individuals. The data set was subsequently filtered to exclude 24 responses that were identified as having been completed in an uncaredful manner. In the absence of data, a value was assigned through the process of average assignment. The data obtained from 441 individuals were thus included in the subsequent validity and reliability analysis. Factor analysis can be divided into two categories: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) (Wang and Wang, 2020). To guarantee the accuracy and reliability of the findings, both EFA and CFA were employed to assess the construct validity, and the opinions of experts were sought to ensure content and face validity. The Cronbach alpha coefficient was calculated to ascertain the reliability of the data.

As stated by Tabachnick and Fidell (2014), kurtosis and skewness values serve as indicators of univariate normal distribution. The objective was to ascertain whether the data exhibited univariate normal distribution, a conclusion

reached through an analysis of the skewness and kurtosis values. Upon examination of Table 2, it was determined that the skewness and kurtosis values of the study fall within the range of ± 2 , which is indicative of a normal distribution (George and Mallery, 2010).

As Carpenter (2018) asserts, it is imperative to ascertain the suitability of the sample for factorization through the utilization of Bartlett's Test of Sphericity and Kaiser-Meyer-Olkin (KMO) Test prior to the execution of Exploratory Factor Analysis. Field (2018) posits that the outcome of Bartlett's Test of Sphericity should be statistically significant and that the KMO value should exceed 0.50. In the present study, the results of Bartlett's test of sphericity were found to be statistically significant ($\chi^2 = 11,093$, $p = 0.000$) and the KMO value was 0.97.

Reckelkamm et al. (2023) demonstrate the efficacy of bootstrapping in mimicking new patient data to assess model quality, thereby circumventing the stringent requirement of multivariate normality. The coefficients for the direct effects, as determined using a 95% confidence interval, can be seen in Table 3.

3 Findings

The scale was developed in line with the study's purpose, with particular emphasis placed on construct, content, and face validity.

3.1 Construct validity

In order to ensure construct validity of the scale developed within the scope of the study, an exploratory factor analysis (EFA) was conducted initially, followed by a confirmatory factor analysis (CFA).

3.1.1 EFA findings

After testing the suitability of the data for EFA, principal component analysis was applied to the data, and the Varimax vertical rotation method was used. As a result of principal component analysis, two factors with eigenvalues above 1 emerged.

An examination of the rotated components matrix revealed that the highest factor loadings were concentrated in the initial two factors. In accordance with the stipulations set forth by Johnson and Morgan (2016), the factor loadings of the items pertaining to a given factor were deemed to be acceptable if they reached a minimum value of 0.40. Consequently, this criterion was applied in the present study, with factor loading values determined to be at least 0.40. Furthermore, if items with factor loadings above 0.40 are classified in multiple factors and the differences between these values are below 0.20, the items should be excluded from the scale, as they exhibit overlap (Child, 2006). In this study, after the removal of 11 items due to low factor loadings and overlap, the analysis was conducted using the varimax vertical rotation method. The results are presented in Table 4.

The Table 4 presents the eigenvalues associated with the factor structure of the Organizational healing Scale and the variance ratios explained by the factors. The total variance ratio of the scale,

TABLE 6 Items and components of organizational healing scale.

Component	Item no	Item
Individual priority	Item no 1	After crises or traumatic events, members of the organization avoid blaming each other.
	Item no 2	Members of the organization are enabled to quickly confront crises or traumatic events.
	Item no 3	After crises and traumatic events, management strives to restore members of the organization to their previous wellbeing.
	Item no 4	After crises or traumatic events, management acts with the future of the members of the organization in mind.
	Item no 5	After crises or traumatic events, the management pays attention to the careers of the members of the organization.
	Item no 6	In the aftermath of crises or traumatic events, management prioritizes the care of members in urgent need.
	Item no 7	After crises or traumatic events, the management meets with the members who have been adversely affected.
	Item no 10	Communication between members of the organization is based on trust.
Organizational priority	Item no 16	To prevent crises or traumatic events from happening again, negative experiences are commemorated with regular events.
	Item no 17	After crises or traumatic events, activities are organized to refocus the organization on its goals.
	Item no 18	Necessary measures are taken against possible new crisis situations after crises or traumatic events.
	Item no 23	All members of the organization learn from crises or traumatic events.
	Item no 24	My organization emerges stronger from crises or traumatic events.
	Item no 25	After crises or traumatic events, the management develops scenarios for possible crisis situations.
	Item no 26	Shared experiences from crises or traumatic events strengthen the organization.
	Item no 27	In order to prevent crises or traumatic events from happening again, negative experiences are honored with regular events.
	Item no 28	After crises or traumatic events, activities are organized to refocus the organization on its goals.
	Item no 29	Necessary measures are taken against possible new crisis situations after crises or traumatic events.
	Item no 30	After crises or traumatic events, my organization makes changes in routine actions or arrangements.
	Item no 31	Anxiety-reducing changes for crises and traumatic events are determined by the manager of the organization.
	Item no 32	Changes to prevent crises and traumatic events are initiated by the manager of the organization.

TABLE 7 Confirmatory factor analysis fit indices of organizational healing scale.

Fit indices	Indices relevant to the model	Excellent fit values	Acceptable fit values
χ^2	567.8		
df	185		
χ^2/df	3	$0 \leq \chi^2/df \leq 2$	$2 \leq \chi^2/df \leq 3$
RMSEA	0.075	$0 \leq RMSEA \leq 0.05$	$0.05 \leq RMSEA \leq 0.08$
SRMR	0.03	$0 \leq SRMR \leq 0.05$	$0.05 \leq SRMR \leq 0.10$
NFI	0.92	$0.95 \leq NFI \leq 1.00$	$0.90 \leq NFI \leq 0.95$
NNFI	0.93	$0.97 \leq NNFI \leq 1.00$	$0.90 \leq NNFI < 0.97$
CFI	0.94	$0.97 \leq CFI \leq 1.00$	$0.95 \leq CFI \leq 0.97$
GFI	0.88	$0.95 \leq GFI \leq 1.00$	$0.80 \leq GFI < 0.95$
AGFI	0.84	$0.90 \leq AGFI \leq 1.00$	$0.80 \leq AGFI \leq 0.90$

which was determined to be two factors, was determined to be 60.9%. Accordingly, the contribution of the first factor to the total variance was 33.9%, and the contribution of the second factor to the total variance was 27%. It is recommended that the variance ratio obtained through factor analysis should ideally fall between 40% and 60% (Scherer et al., 1988). In this instance, the variance

ratio obtained is deemed to be at an adequate level. Subsequently, Table 5 illustrates the categorization of the items in accordance with the identified factors.

The Table 5 illustrates the factors that inform the grouping of the items. In accordance with this categorization, the “Individual Priority” factor includes items M1, M2, M3, M4, M5, M6, M7, M10, whereas the “Organizational Priority” factor includes items M16, M17, M18, M23, M24, M25, M26, M27, M28, M29, M30, M31, M32.

Table 6 presents the findings pertaining to the components in which the scale items are grouped.

Upon examination of the items comprising the factors, the first component, consisting of eight items, was designated as “Individual Priority,” while the second component, comprising 13 items, was designated as “Organizational Priority.” Upon examination of the entire Organizational healing Scale, it becomes evident that it comprises 21 items and two components.

3.1.2 CFA findings

In order to confirm the 2-factor and 21-item scale structure that emerged as a result of EFA, the CFA application was conducted as the other stage of the validity of the Organizational Healing scale. To prevent erroneous results in testing the scale structure, it is recommended that CFA be conducted with data obtained from a new sample, as opposed to EFA (Henson and Roberts,

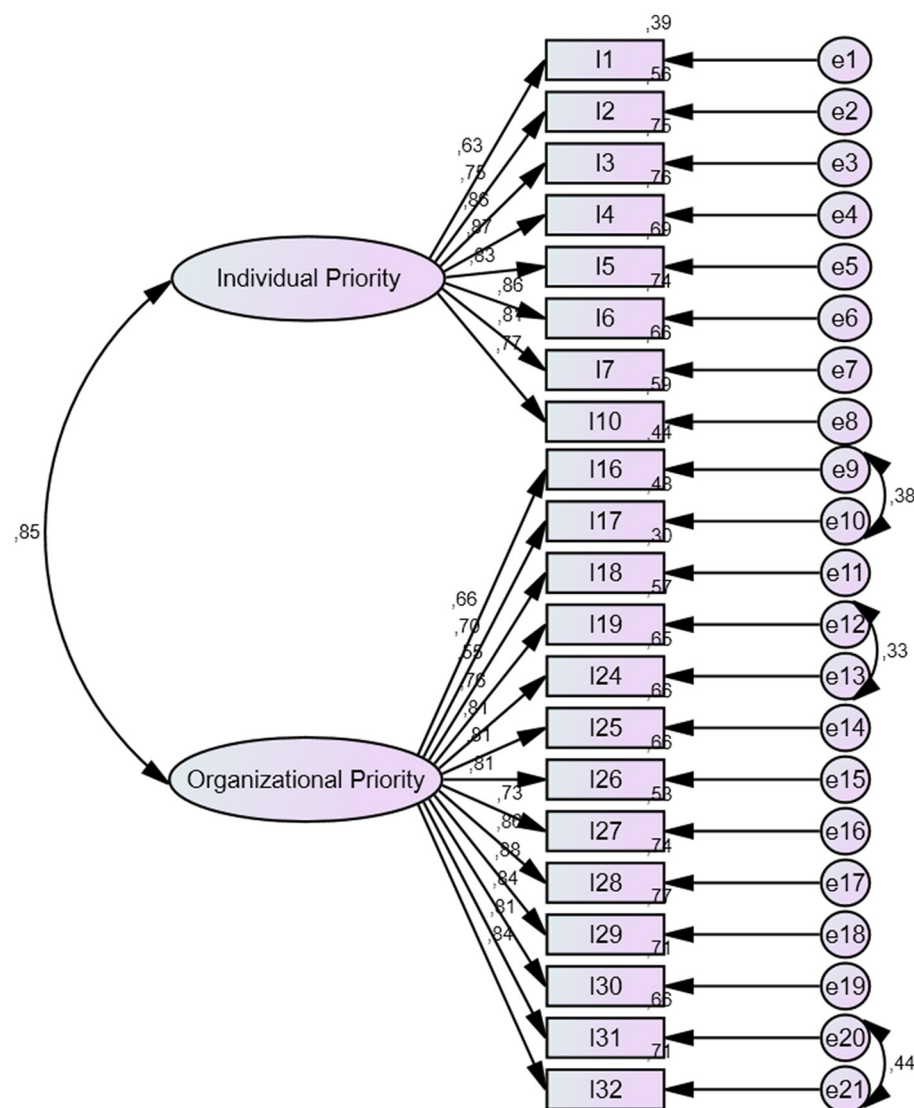


FIGURE 2
Confirmatory factor analysis diagram of the organizational healing scale.

2006). In this context, the scale completed by 384 participants was reduced to 366 participants after outliers were removed from the data set. It has been suggested that a sample size of more than 300 participants would be sufficient for a CFA application (Worthington and Whittaker, 2006). The findings obtained as a result of the CFA conducted to confirm the two-factor structure of the organizational healing scale are presented in Table 7.

Kline (2015, p. 269) posits that a variety of fit indices should be evaluated through the application of CFA, with the objective of verifying the model that emerges from EFA. The model fit indices and the reference intervals for the perfect and acceptable fit indices for the organizational healing scale are provided in Table 7 (Büyüköztürk et al., 2020; Schermelleh-Engel et al., 2003; Hu and Bentler, 1999; Schumacker and Lomax, 2016).

As a consequence of the CFA, the value of χ^2 was found to be 567.8, with a degrees of freedom value of 185. The p -value

was determined to be 0.000, which is below the threshold of 0.05 (Hooper et al., 2008). Additionally, the RMSEA value was found to be below 0.08 (Schermelleh-Engel et al., 2003), The SRMR value was found to be below 0.08 (Hu and Bentler, 1999), the GFI value should be above 0.80 (Hu and Bentler, 1999), the AGFI value should be above 0.80 (Segars and Grover, 1993), and the NFI value should be above 0.80 (Segars and Grover, 1993). In the present study, the NFI value is above 0.80 (Hu and Bentler, 1999), the NNFI (TLI) value is over 0.90 (Hu and Bentler, 1999), and the CFI value is 0.94 (Kline, 2015), indicating that the scale model proposed is validated. The model obtained through the CFA conducted for the Organizational Healing scale is presented in Figure 2.

Upon examination of the Figure 2, it becomes evident that the organizational healing scale is comprised of two components: "Individual Priority" and "Organizational Priority." It is observed

TABLE 8 The scores of the participants in the lower and upper 27% for the organizational healing scale.

Groups	27% score intervals for the lower groups		27% score intervals for the upper groups		<i>t</i> (<i>df</i>)	<i>p</i>
	$\bar{X}$	sd	$\bar{X}$	sd		
Item 1	2.76	0.975	4.46	0.735	13.82 (194)	0.000
Item 2	2.85	0.901	4.46	0.595	14.78 (194)	0.000
Item 3	2.85	0.934	4.79	0.460	18.42 (194)	0.000
Item 4	2.88	0.828	4.62	0.566	17.22 (194)	0.000
Item 5	2.72	0.894	4.63	0.616	17.39 (194)	0.000
Item 6	2.96	0.884	4.71	0.497	17.12 (194)	0.000
Item 7	3.05	1.009	4.79	0.412	15.75 (194)	0.000
Item 8	2.80	0.896	4.71	0.556	18.00 (194)	0.000
Item 9	3.24	0.862	4.66	0.591	13.43 (194)	0.000
Item 10	3.24	0.909	4.61	0.549	12.74 (194)	0.000
Item 11	2.66	0.963	4.10	0.891	10.85 (194)	0.000
Item 12	2.76	0.897	4.50	0.630	15.75 (194)	0.000
Item 13	2.72	0.757	4.55	0.644	18.19 (194)	0.000
Item 14	2.82	0.817	4.50	0.579	16.65 (194)	0.000
Item 15	2.99	0.855	4.58	0.555	15.45 (194)	0.000
Item 16	2.62	0.856	4.28	0.743	14.43 (194)	0.000
Item 17	2.63	0.842	4.53	0.596	18.21 (194)	0.000
Item 18	2.83	0.874	4.69	0.485	18.49 (194)	0.000
Item 19	2.87	0.820	4.60	0.492	17.95 (194)	0.000
Item 20	2.82	0.854	4.51	0.613	15.95 (194)	0.000
Item 21	2.95	0.866	4.72	0.471	17.82 (194)	0.000

TABLE 9 Cronbach alpha (α) reliability coefficients of the organizational healing scale.

Components	Cronbach alpha (α)
Individual priority	0.93
Organizational priority	0.95

that the factor loadings of the model for the organizational healing scale exhibit a range of values between 0.55 and 0.88.

An additional method for determining item discrimination is to examine whether there is a significant relationship between the high and low scores obtained from the relevant item. The use of 27% score intervals for the lower and upper groups is a preferred approach in terms of ease of comprehension and interpretability (DeMar, 2018). The statistical values for the item discrimination of the organizational healing scale are presented in Table 8.

Kelley (1939) emphasizes the importance of focusing on the upper and lower 27% groups when analyzing test items. This method allows researchers to concentrate on the extremes of the data distribution. As seen in Table 8, the items on the scale have the capacity to distinguish between high- and low-performing individuals in a meaningful way, which is essential to validate the scale.

TABLE 10 AVE values for factor loadings.

Components	AVE values
Individual priority	0.58
Organizational priority	0.61

TABLE 11 Discriminant validity of the scale.

Components	Individual priority	Organizational priority
Individual priority	1	
Organizational priority	0.57	1

TABLE 12 Criterion-related validity of the scale.

Components	Individual priority	Organizational priority	Professional resilience
Individual priority	1	0.765**	0.721**
Organizational priority		1	0.516**
Professional resilience			1

***p* < 0.01.

In order to ascertain the reliability of the structure that emerged as a result of the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) conducted for the Organizational healing Scale, a Cronbach's Alpha (α) coefficient was calculated. The resulting Cronbach Alpha (α) coefficients are presented in Table 9.

A Cronbach alpha (α) internal consistency coefficient value of 0.90 or above is indicative of a very high level of reliability (Kline, 2015, p. 92). In this context, analysis of the internal consistency coefficients indicate that individual priority and organizational priority components are reliable.

3.2 Convergent and discriminant validity

In addition to EFA and CFA, convergent and discriminant validity studies were also conducted to examine the construct validity of the Organizational Healing Scale. The high factor loadings obtained from the CFA indicate that the scale achieved convergent validity. In addition to factor loadings, Average Variance Extracted (AVE) values can be examined to determine whether convergent validity is achieved. An AVE above 0.50 is considered evidence of convergent validity (Fornell and Larcker, 1981). Table 10 shows the AVE values for the factor loadings obtained from CFA.

Upon examination of the findings presented in Table 10, it becomes evident that the AVE values calculated for the factor loadings obtained from CFA exceed the 0.50 criterion (Shrestha, 2021). Consequently, it can be asserted that the Organizational Healing Scale has met the requisite criteria for convergent validity.

In examining the discriminant validity, it is necessary to ensure that the value obtained by taking the square root of the AVE for each dimension is greater than the correlation between the dimensions and above 0.50 (Fornell and Larcker, 1981). Table 11 presents discriminant validity of the scale of the organizational healing scale.

Upon examination of the findings presented in Table 11, it becomes evident that the square root AVE value calculated for each dimension is higher than the correlation between the subscales, exceeding the criterion of 0.50. These findings substantiate the assertion that the Organizational Healing Scale has achieved discriminant validity.

The teachers' professional resilience scale was used to calculate organizational healing construct for the criterion-related validity. Given the significant differences in the individual and organizational priority means for overall resilience, as evidenced by the correlation analyses in Table 12, it can be concluded that both the model (individual priority: $F = 266.81$, $p < 0.001$, $R^2: 0.52$; organizational priority: $F = 89.61$, $p < 0.001$, $R^2: 0.26$) and the construct demonstrates criterion validity (Bollen, 1989).

4 Discussion

The objective of this study is to develop an organizational healing scale. In the course of this study, two components were identified: "individual priority" and "organizational priority."

The individual priority factor consists of eight items, while the organizational priority factor consists of 13 items. In the preparation of these items, the organizational healing literature was consulted, as well as related literature. The concept of healing is inherently linked to the occurrence of harm or damage. It is inaccurate to assume that healing occurs when circumstances are favorable. Consequently, it is challenging to ascertain the extent to which an organization is capable of recovering from a traumatic event, as this cannot be determined until the incident has occurred. However, through the use of simulated or actual traumas, organizational members can gain insight into their organization's capacity to restore itself to a state of health and integrity, which can be defined as its level of healing (Powley and Cameron, 2006). The process and mechanisms of organizational healing represent an important aspect for improving organizations in the face of challenges and harm. When healing mechanisms are in place, organizational healing represents a process for strengthening relationships, activating positive outcomes and restoring organizations to positive health. Organizational healing relies on known concepts to suggest not only a return to normal routines and previous states, but also a process of growth where healing provides organizational strength. Healing provides organizational strength through positive practices, collective action, leadership activities and associated structures and routines (Powley, 2012). In this respect, it is considered very important to know the organizational healing levels of organizations and in this study, an "Organizational Healing Scale" was developed to fill this gap in the field.

A total of 441 individuals participated in the exploratory factor analysis (EFA) phase, while 366 individuals participated in the confirmatory factor analysis (CFA) phase. The KMO test was conducted to ascertain the suitability of the scale for factorization. The two-factor variances of the organizational healing scale indicated that the scale has sufficient values (Hair et al., 2018). Upon examination of the fit indices associated with the organizational healing scale, it becomes evident that the obtained values indicate a good to excellent fit level. In order to validate the scale model, it is necessary to ensure χ^2/sd value (Hu and Bentler, 1999), RMSEA value (Schermelele-Engel et al., 2003), SRMR value (Hu and Bentler, 1999), GFI value (Hu and Bentler, 1999), AGFI value (Segars and Grover, 1993), NFI value (Hu and Bentler, 1999), NNFI value (Hu and Bentler, 1999) and CFI value (Kline, 2015). In light of the evidence presented, it can be concluded that the scale model depicted in Figure 2 is an empirically valid representation of the underlying construct.

According to Kline (2015, p. 92), values of 0.90 and above indicate very high reliability for the Cronbach Alpha internal consistency coefficient. Upon examination of the Cronbach Alpha coefficient of the factors and the total scale, it was determined that the organizational healing scale exhibited high reliability. As evidenced by the rotated components matrix obtained following the exploratory factor analysis (EFA) conducted to determine the factor loadings of the organizational healing scale, the lower limit of factor loading estimation was set at 0.40. Upon analysis of the rotated components matrix of the scale, it was observed that the factor loadings obtained were of a notably high level (Costello and Osborne, 2005; Tabachnick and Fidell, 2014).

The Organizational Healing Scale can assist in determining the status of an organization's return to normal functioning and enhancing its operational efficacy following adverse circumstances that impair the organizational structure and interpersonal relationships. Furthermore, the Organizational Healing Scale can be utilized to ascertain the influence of various interventions on the organizational context and to identify potential avenues for improvement. An examination of analogous studies on this subject reveals that the majority of them (Doganay and Dagli, 2020; Singh and Jha, 2018) address organizational trauma, organizational health, and related matters. Accordingly, the scale developed in this research will contribute to the existing literature on this topic by providing a tool for assessing the potential for organizational healing following a adverse event.

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 humans were approved by the studies was conducted under the Declaration of Helsinki and approved by the Recep Tayyip Erdoğan University Social and Human Sciences Ethics Committee with the decision number 2024/280. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

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İK: Conceptualization, Data curation, Formal analysis, Methodology, Resources, Software, Validation, Writing – original draft, Writing – review & editing. SÇ: Conceptualization, Investigation, Supervision, Writing – original draft, Writing – review & editing.

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How digital leadership adds affective commitment of new generation employees: an affective events perspective

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How do leaders' responses to the digital era affect new generation employees' affective commitment? As digital leaders have led to new ways of distributing digital resources and building virtual relationships, employees are facing a shift in the way of interaction, which influences their affective response to organizations. This study aims to understand how digital leaders interact with new generation employees to influence changes in employees' affective commitment to organizations. We have developed a chain mediating model and tested it on data collected from 408 new generation employees working in China. Ultimately, we found that digital leadership is associated with more positive changes in new generation employees' affective commitment. Furthermore, both employee empowerment and employee voice behavior mediate the relationship between digital leadership and affective commitment, forming a chain mediation mechanism in this relationship. We conclude with a discussion of theoretical implications and practical applications.

KEYWORDS

digital leadership, new generation employees, affective commitment, employee voice behavior, employee empowerment

1 Introduction

With the steady increase in the proportion of new generation employees in the Chinese workforce, organizational leaders are increasingly encountering challenges related to demographics, including strained workplace relationships and frequent turnover (Lu et al., 2023). These issues not only disrupt short-term operational efficiency but also erode the long-term competitiveness of enterprises. Affective commitment, defined as the emotional attachment and identification of employees with their organization (Allen et al., 2017), plays a pivotal role in determining their decision to remain with or leave an organization (Chordiya et al., 2017). Lower levels of affective commitment among new generation employees have been strongly associated with higher turnover rates (Fazio et al., 2017). Leadership has always been a key factor in influencing employees' affective commitment (Grego-Planer, 2022). As such, understanding leadership style is vital for building a talent pool and ensuring the sustained prosperity and innovation of enterprises.

Scholars have extensively examined generational differences in workplace attitudes and behaviors, identifying distinct variations across generations (Jones et al., 2018; Stewart et al., 2017). According to generational cohort theory, individuals belonging to different generational cohorts exhibit unique personality traits, motivational drivers, and behavioral patterns in the workplace, shaped by shared formative experiences during their preadult years, such as significant socio-economic events, natural disasters, or technological advancements (Okros,

2020; Cvetković et al., 2024). Since the 1990s, China has undergone systemic transformations in its economic, social, and cultural domains. The combined effects of the one-child policy, economic prosperity, internet proliferation, the expansion of higher education, and globalization have created a distinct growth environment and behavioral patterns for the new generation employees, markedly different from those of the preceding generation (Zeng and Greenfield, 2015; Garikapati et al., 2016). First, as digital natives, the new generation employees are immersed in vast amounts of information and have developed a strong preference for online communication, instant feedback, and looking for solutions on the Internet (Myers and Sadaghiani, 2010). Besides, influenced by globalization, they often embrace diverse values, maintain an open mindset, and advocate for freedom and autonomy (Angeline, 2011). Second, many new generation employees who are only children with superior material living condition exhibit traits such as individualism, confidence, and adaptability to change (Twenge and Campbell, 2012). Meanwhile, they also express a pronounced need for support, respect, and recognition from their leaders (Mendl and Lester, 2014). The meaning of work and self-transcendence is also what they are committed to pursuing (Kismono, 2023). Third, new generation employees possess higher education backgrounds but experience significant peer pressure, which fosters a strong sense of competitiveness and a drive for continuous self-improvement (Zhang et al., 2024). Thus, they seek to challenging tasks and opportunities to realize their self-worth at work. Consequently, the affective commitment of new generation employees is typically derived from the fulfillment of their needs for meaning, respect and self-development, rather than purely compensation or rank (Atrizka et al., 2020). This generational shift has led to higher expectations for leadership capabilities compared to older employees. Great leaders can recognize and adapt to these differences, and inspire the affective commitment of new generation employees.

Leadership is regarded as a key factor in fostering the affective commitment of new generation employees (Semedo et al., 2016). Among them, responsible leadership, transformational leadership and ethical leadership have garnered significant attention (Haque et al., 2019; Ribeiro et al., 2018; Asif et al., 2019). Unlike these leadership styles that focus on result-oriented tasks, driving change and maintaining ethical standards, digital leadership is uniquely equipped to address the specific needs of new generation employees (Hazni and Nurhaida, 2024). By digital tools, digital leaders can facilitate online collaboration, provide immediate feedback, offer personalized career advancement and empower employees (Hazni and Nurhaida, 2024). For new generation employees, who value openness, autonomy and self-realization, digital leadership may be arguably a more suitable fit, as it effectively promotes their affective commitment to organization (Zeike et al., 2019). However, the impact of digital leadership in virtual contexts, as well as the psychological traits of new generation employees, have received little attention from scholars, which weakens the integrity and persuasiveness of the research. Besides, while prior research has noted the role of digital leadership in promoting the organizational citizenship behavior, the core mediating role of affective commitment has been neglected (Benitez et al., 2022). Therefore, current research has difficulty in explaining the interaction between digital leaders and new generation employees, as well as the antecedents of affective commitment of new generation employees. According to affective events theory, employees' emotions fluctuate in response to interactions with their leaders (Weiss and Cropanzano,

1996). Digital leaders who are adept at using technology to identify and respond to the individual needs of new generation employees, can influence these affective events. This, in turn, has a direct impact on their affective commitment.

Affective events theory posits that employees' affections are shaped by various events they experience in the workplace (Cropanzano et al., 2017). In the digital era, where organizational structure is flattened, leaders' authority is decentralized and collaboration online prevails, digital leaders are more inclined to delegate the authority and foster employees' competencies (Ansong and Boateng, 2019; Yang et al., 2024). Given that the needs of new generation employees for autonomy and self-realization are built on a certain amount of power, empowerment of digital leaders can generate positive emotional responses as a positive event (Ho et al., 2017). It follows from this that employee empowerment plays a critical role as a bridge between digital leadership and affective commitment of new generation employees. It emphasizes the importance of fostering emotional connections between leaders and new generation employees.

Moreover, the emotional relationships between new generation employees and organizations needs to be built through active participation and expression of employees (MacGeorge et al., 2017). According to affective events theory, the intensity of affective responses is directly related to the level of involvement in workplace events (Zhang, 2013). Voice behavior, initiated by employees, represents a deeply engaged event that can provoke strong emotional reactions. Specifically, with access to autonomy and digital resources—such as information, knowledge, and media platforms—new generation employees are more inclined to initiate interactive events with digital leaders, including voice behavior (Wan and Duffy, 2022). Regardless of whether the received feedback is positive or negative, voice behavior is perceived as a challenging task and a major event (Kim et al., 2016). Especially for new generation employees, who prioritize showcasing and enhancing their capabilities, these interactions are often viewed as positive events, further reinforcing their affective commitment (Zhu et al., 2015). Thus, employee voice behavior should be integrated into the framework linking digital leadership and affective commitment. Given that new generation employees with a high perception of empowerment are prone to voice their opinions boldly, employee empowerment and voice behavior serve as chain mediating roles in the relationship between digital leadership and affective commitment.

Simultaneously, from the social learning literature, existing studies emphasize the critical role of leadership styles such as responsible leadership and ethical leadership, arguing that the exemplary role of leaders significantly affects employees' cognition and emotions (Haque et al., 2019; Asif et al., 2019). However, individual emotions are deeply rooted in the interactive events with leaders. Employees are more likely to generate affective commitment when they perceive interactive events as positive events (Panaccio and Vandenberghe, 2012). Despite this, discussions on how the employees, especially new generation employees, evaluate interactive events and specific measures leaders can take affectively interact with employees remain inadequate. Additionally, while existing researches highlight the impacts of affective commitment on voice behavior, it often overlooks the unique psychological needs of new generation employees (Wang et al., 2014). This cohort typically has heightened expectations for leadership and is less likely to establish affective commitment at the outset (Vandenberghe et al., 2004). As such, they are more inclined to

follow a path characterized by “interactive events leading to affections” rather than the traditional sequence of “affections leading to events.”

In summary, consistent with affective events theory, this study considers (1) How digital leadership, as the initiating event, influences the affective commitment of new generation employees, (2) What roles employee empowerment and voice behavior play. Through the empirically analyzed 408 questionnaire data, we reveal that (1) Digital leadership has a significant positive impact on the affective commitment of new generation employees. (2) Employee empowerment and voice behavior partially mediate the relationship between digital leadership and affective commitment. (3) Employee empowerment and voice behavior further act as chain mediators in linking digital leadership and affective commitment. The research not only widens the understanding of affective connections between digital leaders and new generation employees, but also provides insights into the mechanism underlying the formation of affective commitment.

This article is organized as follows. Section 2 provides the literature review and hypotheses. Section 3 covers the method of investigation and analysis. Section 4 shows the results. Section 5 covers theoretical and practical implications, limitations and directions for future research.

2 Literature review and hypotheses

2.1 Digital leadership

Digital leadership refers to the process by which leaders use digital technology to promote changes in attitudes, emotions, and behaviors of employees, teams and organizations, thereby facilitating the transformation of enterprises (Kapucu, 2020). Such leaders are often distinguished by online communication, digital literacy, talent cultivation and a calling for digital transformation (Sainger, 2018). In practice, digital leaders can deliver personalized feedback and learning resources through a variety of digital platforms, such as internal social media, online training systems, data-driven performance management and more (Petrucci and Rivera, 2018). Besides, big data analytics enables digital leaders to analyze employees' skills, interests, and potential, thereby providing training resources and promotion pathways for employees (Zia et al., 2024). Additionally, online communication tools such as virtual meetings and instant messaging are also central to digital leadership. They also tend to create flexible digital platforms where employees are encouraged to share ideas and solutions and take ownership of specific tasks (Antonopoulou et al., 2021). While most scholars stress the role of digital leadership in advancing digital transformation, the development of digital leader-member relationships within digital contexts remains underexplored. These interactive relationships, driven by digital leaders, significantly affect employees' emotional responses. From the perspective of affective events theory, digital leadership acts as a driving force behind work events and serves as a key determinant of employee emotions, which is explored in this study.

2.2 Digital leadership and affective commitment of new generation employees

Affective commitment, as a positive affective response, represents the degree of employees' affective connections to and identification

with the organization (Allen et al., 2017). The form of affective commitment is linked to several desirable work outcomes, including career continuity, a sense of identification and honor for organizational membership (Swalhi et al., 2017). According to the affective events theory, personality traits affect how individuals cognitively assess events, which in turn shapes their emotional responses (Allen et al., 2017). Characterized by traits such as work autonomy, individualism and an open mindset, new generation employees prefer the leaders who provide personalized support, empowerment, flexible work arrangements and instant feedback. Differentiated with traditional leaders who often rely on absolute authority, imperative communications, and results-oriented tasks, digital leadership is better equipped to meet the needs of new generation employees for growth, openness and fairness, autonomy, self-actualization and emotional support at work, which helps to improve their affective commitment (Antonopoulou et al., 2021).

Specially, digital leaders are adept at creating efficient and transparent work environments by digital tools and resources (e.g., performance assessment tools, and personalized training systems). Their support for employees' professional growth is perceived by new generation employees, which increases their sense of competence and control over their work. Second, digital leaders are open to innovative ideas of new generation employees and foster a climate of psychological safety by anonymous feedback channels and online collaboration tools (Erhan et al., 2022). It enables employees to express their ideas freely without fear of negative consequences, thereby cultivating a sense of participation and belonging. Third, digital leaders use digital tools to analyze the data on the specific needs of new generation employees and develop personalized ways of communications and incentives. It makes employees feel valued and supported, enhancing the emotional connection between employees and leaders. Finally, digital leaders empower new generation employees by granting decision-making authority and providing transparent information channels through the digital management platform, so as to enhance their sense of autonomy and trust in the organization. Besides, in the process of digital transformation, digital leaders also demonstrate the ability to cope with the challenges of internal or external environments and seize digital opportunities for organizational development. Their digital proficiency and visionary leadership attract new generation employees to follow, enhance a sense of optimism about the organizational future, and strengthen their loyalty. To sum up, we hypothesize the following:

H1: Digital leadership is positively associated with the affective commitment of new generation employees.

2.3 The mediation role of employee empowerment

Given that employee empowerment is a positive psychological perception of employees, it is likely to create the discernment that they can autonomously plan work processes and influence work outcomes based on confidence in their abilities and knowledge (Hirzel et al., 2017). Thus, when employees possess the necessary skills and resources to cope with their jobs, they are more likely to take ownership of work. Leaders can achieve employee empowerment in a variety of formal and informal ways, including, but not limited to, providing resources and information, encouraging participation in management, granting

autonomy, providing feedback, and other methods (Yang et al., 2024). New generation employees with perceptions of empowerment are more motivated to engage in work and extra-role behaviors, which positively predict their career stability (Islam and Tariq, 2018).

In a dynamic adaptive atmosphere, digital leaders value employees' continuous learning and professional development and promote the trend of decentralization of digital work. They are able to empower employees to take ownership of work tasks and emphasize the development of digital skills through digital technology (Eberl and Drews, 2021). It promotes employees' understanding of their work goals and enhances their sense of job control and influence. Secondly, by optimizing workflow, resource allocation, and communication methods, digital leadership breaks down resource barriers, builds sharing channels, and enables the flow of all kinds of resources, materials and information in the social network. In this way, it helps the new generation employees to access, transfer and integrate high-quality resources and improves the perception of employee empowerment (Zeike et al., 2019). Finally, leaders are able to use digital technology to realize digital talent management. Digital tools are used to transmit organizational development strategies to employees and to give meaning to their jobs. Employees can then construct meaning for their work and develop the motivation and behavior to improve the organization's status quo (Türk, 2023).

Further, employees with a high level of empowerment perception have their social and belonging needs met after feeling valued and recognized by the organization (Suarez-Balcazar, 2020). They thus develop emotional attachment and identification with the organization. Therefore, employee empowerment can positively predict an individual's level of affective commitment. Based on this, we hypothesize the following:

H2: Employee Empowerment plays a mediation role in the relationship between digital leadership and the affective commitment of new generation employees.

2.4 The mediation role of employee voice behavior

Employee voice behavior refers to a spontaneous behavior in which employees put forward constructive opinions for the purpose of improving performance or solving problems (Liang et al., 2012). It is usually manifested in providing ideas for improvement in the decision-making, process, system or other optimizations, either within or outside the scope of their duties. Employee voice behavior has certain characteristics such as initiative, risk and constructive. From the affective events theory, the interaction between leaders and new generation employees can be regarded as a process of emotional exchange (Nazir et al., 2018). Compared with leader-initiated events, employee-initiated events have a stronger impact on the emotional responses of employees.

Digital leadership specializes in building knowledge resource systems and online learning platforms through digital technology (Benitez et al., 2022). This significantly helps employees gain more knowledge and insight, enhancing their self-efficacy to express their opinions. As for new generation employees, they are more likely to perceive a high level of control over the voice risk and motivated to perform it (Liang et al., 2012). Second, digital leaders are open to employees' suggestions and promote a digitally-enabled voice climate

where employees freely express their opinions. Consequently, a strong psychological safety can ease the felt risk of presenting new ideas and lead to a more positive evaluation of voice. Finally, digital leaders are able to provide personalized feedback and incentive on advice by digital tools (de Araujo et al., 2021). High-quality interactions strengthen employees' positive attitudinal evaluation of voice and thus are more likely to engage in voice.

Affective commitment is an enduring psychological state that stems from feeling comfortable and competent in one's job and workplace (Allen and Meyer, 1990). By expressing opinions, employees may feel fulfillment of their psychological needs and thereby increase the emotional investment to organizations (Kim and Leach, 2020). First, affective events theory proposes that individuals' emotions fluctuate in response to interactive events with others (Weiss and Cropanzano, 1996). By exercising voice, employees may perceive the potential to influence decisions, and have the positive feelings of personal validation and self-worth (Frese et al., 1999; Jena et al., 2017). Especially, for new generation employees, they are committed to pursuing the meaning of work and realizing self-worth (Zhou and Qian, 2021; Westerman and Yamamura, 2007). When opinions are heard and acted upon, new generation employees may feel more comfortable knowing that their competence is acknowledged and contributes to the functioning of organization (Truss et al., 2012; Yoon, 2012). Besides, Voice behavior strengthens psychological empowerment of new generation employees, when they can influence the positive change processes of organization that are deemed necessary (Morin et al., 2016; Kim and Leach, 2020). They are more likely to perceive the respective demands for self-worth and self-realization met and thereby experience higher level of affective commitment (Zhang et al., 2024; Greguras and Diefendorff, 2009). Second, according to affective events theory, the intensity of affective responses is directly related to the level of engagement in workplace events (Zhang, 2013). Voice behavior puts new generation employees into organizational decisions making and emphasis on employee autonomy, particularly in times of major change (Heffernan and Dundon, 2015; Wu and Zhou, 2020). It helps to foster a sense of ownership and deeply involve in management, which assist employees in accepting, believing in, and identifying with organizational goals, thereby resulting in increased levels of affective commitment (Farndale et al., 2011). Third, the two-way and fair communications with digital leaders engender the belief of new generation employees that their contributions are valued and recognized (Whiting et al., 2012). If new generation employees have more needs for respect met, they will be more emotionally motivated (Korzynski, 2013). These positive interactions may direct to establish their psychological contracts with organization and take a sense of ownership, enhancing the affective commitment of employees (Ohana, 2015; Parzefall and Hakanen, 2010). Taken together, we hypothesize the following:

H3: Voice behavior mediates the relationship between digital leadership and the affective commitment of new generation employees.

2.5 The chain mediating role of employee empowerment and voice behavior

To complete our hypothesized model, we further predict that employee empowerment can positively influence the voice behavior

of new generation employees. New generation employees with high perceptions of empowerment tend to feel supported and trusted by the organization. As a result, a high sense of security and efficacy motivates them to be more vocal. Moreover, employee empowerment creates a perception of owning power in the new generation of employees, further engaging employees in their work. Continuous work engagement also makes employees more aware of the deficiencies in their work processes and environment, which in turn leads them to think about how to improve the status quo of the organization (Figure 1).

Consistent with affective events theory, digital leaders trigger employee empowerment and employee voice behavior (affective events), which subsequently influences the affective commitment of new generation employees (affective responses). Specifically, digital leaders excel at empowerment in digital contexts, enhancing new generation employees' sense of control and effectiveness at work. With access to more digital resources and information, employees dare to voice for the development of the organization, which in turn generates an insider identity and affective commitment. Based on this, we hypothesize the following:

H4: Employee empowerment and voice behavior serve as chain mediators between leaders' digital leadership and the affective commitment of new generation employees.

3 Methods

3.1 Participants and procedure

Compared to the central and eastern regions, enterprises in Southwest China began their digitalization relatively late. However, in recent years, the potential for digital transformation in specialized industries has grown significantly with strong policy support and regional collaboration, involving traditional manufacturing, green agriculture, cultural tourism, energy, and other advantageous industries. A large number of digital talents are gathered here and the management of digital talents has made a difference. Thus, we select 12 leading enterprises from these characteristic industries of the southwest region. They prioritize the cost-effectiveness of technology in practical operations and the cultivation of digital talent. Then, this study mainly adopts a questionnaire survey to the employees in the 12 selected enterprises, who are intellectual workers with professional and technical skills or management skills. They work mainly in the form of online collaboration and interact with leaders more frequently.

At the beginning of the research, we communicate with the human resources department of the surveyed company, and after receiving permission for the research, number the employees of the company. Paper questionnaires are then distributed to the respondents according to the number, and the respondents are informed that the data are confidential and used only for academic research. To minimize the impact of common methodological bias issues, a two-time points data collection method with an interval of 10 days is used in this study. At time point 1, the survey is for employees, including basic socio-demographic information, digital leadership and voice behavior. At time point 2, the survey is administered to the employees, which included affective commitment and employee empowerment.

In the first survey, 840 employee questionnaires are distributed on-site, and 697 valid questionnaires are returned. In the second survey, targeted distribution is made to employees who provided valid questionnaires in the first survey, and a total of 593 valid questionnaires are returned. Excluding employees born before 1990, as well as invalid questionnaires that are abandoned or take less than 2 minutes to complete. Finally, 408 valid questionnaires are obtained, with a return rate of 48.571%. In terms of sample structure, female employees predominate, accounting for 54.902% of the total sample. In terms of education background, bachelor's degree predominates, with 71.324% of the total sample size. In terms of working years, 3 ~ 5 years predominates, with 43.627% of the total sample. Besides, the majority of respondents work in privately owned enterprises, with 53.676% of the total sample. The size of companies in the sample is mainly between 300 ~ 1,000, with a rate of 39.706%.

3.2 Measurements

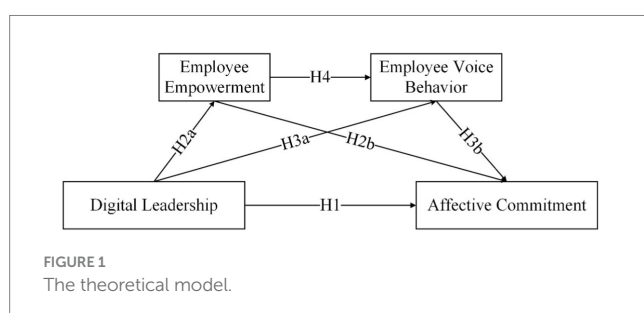
The measurement scales used in this study are mature or widely used by scholars both at home and abroad. Each item is scored on a Likert 5-point scale (1 = strongly disagree and 5 = strongly agree), measuring the main four variables: digital leadership, affective commitment, employee empowerment, and voice behavior.

3.2.1 Digital leadership

The 6-dimension measurement scale with 18 items developed by Roman et al. (2019) is used, including the ability to digital communication, digital social, digital team, digital change, digital technology and digital trust. Combined with affective events theory and the online work contexts in Chinese enterprises, we have revised this scale. Representative items are "In online communication, my leader can orderly organize activities and timely receive feedback from employees", "In online communication, my leader is able to motivate team members online to make it work effectively." The Cronbach's α is 0.912.

3.2.2 Affective commitment

The measurement of digital leadership is based on the scale compiled by Tsui et al. (1997) which contains nine items. According to the characteristics of new generation employees, we have revised some items. The representative item is "I am willing to go above and beyond for the success of the organization." The Cronbach's α is 0.919.



3.2.3 Employee empowerment

Four-dimension measurement scale with 16 items developed by Rogers and Singhal (2003) is used, including self-efficacy, influence, meaning of work, and autonomy. According to affective events theory and the relationships of concepts, we further revise this scale. The representative item is “I possess the authority to make decisions, even if they are not entirely correct.” The Cronbach’s α is 0.899.

3.2.4 Employees voice behavior

The measurement of employee voice behavior is based on the scale developed by Liang et al. (2012) which contains ten items. Combined with affective events theory and characteristics of new generation employees, we have revised some items. Representative items are “I often timely discourage behaviors of other employees that negatively affect work efficiency within the organization,” “I often propose constructive suggestions to help the company achieve its goals.” The Cronbach’s α is 0.890.

3.2.5 Control variables

This study selects gender, tenure, and education at the employee level, and size and ownership type at the enterprise level as control variables. It ensures that the relationship between the core variables is not obscured by other factors.

3.3 Reliability and validity test

In this research, SPSS 26.0 and AMOS 24.0 are used to conduct reliability and validity tests. The results are shown in Table 1. Cronbach’s α of four main variables are all above the recommended value of 0.7, which means that the scales have good reliability. In addition, the factor loading coefficients, composite reliability and average variance extracted are also higher than their standard values, indicating that the scales have good reliability and convergent validity. Besides, according to the result of Table 2, the square roots of the average variance extracted are all above their correlation coefficients, thus indicating a good discriminant validity in each scale.

3.4 Common method bias test and confirmatory factor analysis

Considering the potential impact of common method bias on the measurement model, this study conducts Harman’s single-factor test. An unrotated exploratory factor analysis is performed on all questionnaire items, extracting eight factors with eigenvalues greater than 1. The total variance explained is 65.452%, with the largest single factor accounting for 31.939% of the variance. This is below the

threshold of 40% and less than 50% of the total variance explained, indicating that there is no significant common method bias.

Meanwhile, to assess the discriminant validity of the scales, this study employs confirmatory factor analysis (CFA) to test the model. As shown in Table 3, the four-factor model ($X^2/DF = 1.461$, $TLI = 0.939$, $CFI = 0.945$, $RMSEA = 0.034$) achieves ideal fit indices and is significantly better than the other four alternative factor models, indicating that the four variables have good discriminant validity.

3.5 Descriptive analysis and correlation analysis

The means, standard deviations and correlation coefficients of the variables in this study are shown in Table 2. Digital leadership is positively correlated with employee empowerment ($\gamma = 0.589$, $p < 0.01$), voice behavior ($\gamma = 0.616$, $p < 0.01$) and affective commitment ($\gamma = 0.524$, $p < 0.01$). Employee empowerment is positively correlated with voice behavior ($\gamma = 0.671$, $p < 0.01$) and affective commitment ($\gamma = 0.533$, $p < 0.01$). Voice behavior is also positively correlated with affective commitment ($\gamma = 0.640$, $p < 0.01$). The results of the above analysis lay a robust foundation for the subsequent hypothesis testing.

4 Results

In this research, the full hypothesized model is tested using SPSS 26.0 and AMOS 24.0. This study employs regression analysis and Bootstrapping (repeated sampling 10,000 times) to test the model. In traditional regression analysis, hypothesis testing often relies on the hypothetical distribution of parameters, so a large sample size is required to ensure accurate results. If the sample size is small or there is a nonlinear relationship, bootstrapping can verify the complex model by multiple resampling, which improves the reliability of regression analysis results. In Tables 4, 5, after controlling for variables such as gender and education, digital leadership has a significant positive impact on the affective commitment of the new generation employees ($\beta = 0.517$, $p < 0.001$), confirming Hypothesis 1 (Model 4).

Drawing on Baron’s approach to the mediating effect test, this paper evaluates the mediating role of employee empowerment through the hierarchical regression method (Baron and Kenny, 1986). First, in Model 1 of Table 4, digital leadership had a significant positive effect on employee empowerment ($\beta = 0.582$, $p < 0.001$); Second, according to Model 5 of Table 4, employee empowerment had a significant positive effect on affective commitment ($\beta = 0.474$, $p < 0.001$). Finally, compared to Model 4, the impact of digital leadership on affective commitment decreases with the addition of mediating variables ($\beta = 0.517 \rightarrow \beta = 0.434$), which verifies the

TABLE 1 Measurement, factor analysis and reliability test ($N = 408$).

Variables	Cronbach’s α	Factor loading	Composite reliability	Average variance extracted
Digital leadership	0.912	0.604 ~ 0.775	0.949	0.554
Affective commitment	0.919	0.649 ~ 0.816	0.922	0.570
Employee empowerment	0.899	0.583 ~ 0.826	0.939	0.508
Employee voice behavior	0.890	0.562 ~ 0.822	0.922	0.545

TABLE 2 The descriptive statistics and correlation analysis.

Variable	1 Gender	2 Education	3 Time	4 Ownership	5 Size	6 DL	7 EE	8 EVB	9 AC
Mean	0.450	2.890	3.280	2.030	2.820	4.039	4.003	3.879	3.870
SD	0.498	0.584	0.911	0.908	0.835	0.531	0.499	0.623	0.712
Kurtosis	−1.971	1.644	−0.054	0.650	−0.811	−0.309	−0.439	0.088	0.892
Skewness	0.198	−0.650	−0.228	0.981	−0.086	−0.670	−0.538	−0.682	−1.047
1		−0.07	0.005	−0.067	0.029	−0.024	0.063	0.020	−0.143**
2			−0.061	0.077	0.029	0.019	0.051	0.042	0.009
3				−0.062	0.188**	0.054	0.115*	0.100*	0.103*
4					−0.219**	0.01	0.051	0.053	0.001
5						0.016	0.036	0.011	0.023
6						(0.744)	0.589**	0.616**	0.524**
7							(0.713)	0.671**	0.533**
8								(0.738)	0.640**
9									(0.755)

N = 408; DL, Digital Leadership; EE, Employee Empowerment; EVB, Employee Voice Behavior; AC, Affective Commitment; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Bold values means square roots of the average variance extracted are all above their correlation coefficients, it indicates a good discriminant validity in each scale.

TABLE 3 Confirmatory factor analysis (CFA) results of measurement models.

Model	χ^2/DF	TLI	CFI	RMSEA
Model 1: DL + EE + EVB + AC	3.901	0.619	0.633	0.084
Model 2: DL, EE + EVB + AC	2.943	0.745	0.758	0.069
Model 3: DL, EE, EVB + AC	2.138	0.850	0.862	0.053
Model 4: DL, EE, EVB, AC	1.461	0.939	0.945	0.034

N = 408; DL, Digital Leadership; EE, Employee Empowerment; EVB, Employee Voice Behavior; AC, Affective Commitment; +: Two factors combined as one.

mediating role of employee empowerment. To further test the model, we select Model 4 of the Macro Process 3.3 developed by Hayes for 10,000 replicate sampling with 95% confidence intervals. If the confidence interval does not contain 0, we consider the model is effective. According to Table 5, the mediating effect value of employee empowerment between digital leadership and affective commitment is 0.090, with a 95% confidence interval of [0.001, 0.180], not containing 0. It indicates that the mediation effect is significant, thus confirming Hypothesis 2.

The mediating effect of voice behavior is also examined. As indicated by Models 2 and 6 in Table 4, digital leadership has a significant positive impact on employee voice ($\beta = 0.612, p < 0.001$); voice behavior has a significant positive effect on affective commitment ($\beta = 0.519, p < 0.001$). Similarly, in Model 6, we can see the coefficient of digital leadership influencing affective commitment is 0.200, less than 0.517 in Model 4, which validates the mediating effect of voice behavior. Again, we use the Bootstrapping method developed by Hayes. As shown in Table 5, the mediating effect value of employee voice between digital leadership and affective commitment is 0.210, with a 95% confidence interval of [0.126, 0.308], not containing 0, thus confirming the mediating effect of voice behavior. Hypothesis 3 is verified.

Consequently, the chain mediating effect of employee empowerment and employee voice behavior is tested. As shown in Model 3 of Table 4, employee empowerment has a significant positive effect on voice behavior ($\beta = 0.470, p < 0.001$); as shown in Model 7,

when digital leadership, employee empowerment, and voice behavior are taken as independent variables, their effects on affective commitment remains significant ($\beta_1 = 0.167, p < 0.001$; $\beta_2 = 0.115, p < 0.005$; $\beta_3 = 0.463, p < 0.001$). For more complex chain mediating models, it is more necessary to verify the regression model through bootstrapping. We select Model 6 of the Macro Process 3.3 for 10,000 replicate sampling with 95% confidence intervals. As is shown in Table 5, the chain mediating effect value of employee empowerment and voice behavior between digital leadership and affective commitment is 0.170, with a 95% confidence interval of [0.106, 0.244], not containing 0, thus confirming Hypothesis 4.

5 Discussion

In this study, digital leadership, employee empowerment, employee voice behavior, and affective commitment of new generation employees are included in the same research framework, and the hypotheses are verified by empirical analysis with the 408 valid data. First, digital leadership has a significant positive impact on the affective commitment of new generation employees. That is, as a key element of major events in the workplace, digital leadership can trigger events that align with the preferences of new generation employees and inspire their positive emotions. Reviewed with the traits of new generation employees, digital leadership is able to demonstrate a higher level of affective commitment by meeting their needs of self-actualization, respect, and autonomy. Second, employee empowerment and voice behavior partially mediate the relationship between digital leadership and affective commitment. It seems to follow that if digital leaders provide online learning platforms, are open to innovative ideas and emphasize personalized feedback and incentives, new generation employees will feel a sense of self-efficacy and psychological safety, which promote the sense of empowerment and voice efficacy. These perceptions will drive employees to act as voice behaviors, which further generates interactions with digital leaders and meets their needs for self-realization, and self-improvement and being respected. Eventually, their affective commitment is enhanced. Third, employee empowerment and voice

TABLE 4 Results of variable regression analysis.

Variable	EE	EVB	AC				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
DL	0.582***	0.612***	0.338***	0.517***	0.434***	0.200***	0.167***
EE			0.470***		0.474***		0.115**
EVB						0.519***	0.463***
Gender	−0.044	0.040	0.061	−0.132**	−0.118**	−0.153***	−0.146***
Education	0.038	0.034	0.016	−0.005	−0.018	−0.023	−0.025
Time	0.086**	0.073	0.033	0.075	0.046	0.037	0.031
ownership type	0.049	0.050	0.027	−0.007	−0.023	−0.033	−0.036
Size	0.022	−0.004	−0.014	0.003	−0.004	0.005	0.002
R ²	0.361	0.389	0.530	0.298	0.368	0.462	0.469
F	37.691***	42.517***	64.503***	28.341***	33.326***	49.160***	44.037***

N = 408; DL, Digital Leadership; EE, Employee Empowerment; EVB, Employee Voice Behavior; AC, Affective Commitment; Bootstrap = 10,000 times. ***p < 0.001; **p < 0.01; *p < 0.05.

TABLE 5 The mediating effect of employee empowerment and voice behavior.

Model path	β	Boot SE	95% Confidence interval		Percentage
			Lower	Upper	
DL → AC	0.225	0.065	0.096	0.353	32.37%
DL → EE → AC	0.090	0.046	0.001	0.180	12.95%
DL → EVB → AC	0.210	0.047	0.126	0.308	30.22%
DL → EE → EVB → AC	0.170	0.035	0.106	0.244	24.46%

N = 408; DL, Digital Leadership; EE, Employee Empowerment; EVB, Employee Voice Behavior; AC, Affective Commitment; Bootstrap = 10,000 times.

behavior serve as the chain mediating role in the relationship between digital leadership and the affective commitment of new generation employees. It further reveals the deeper interactive relationships and provides theoretical support for understanding these relationships.

5.1 Theoretical implications

First, the findings demonstrate the impact of digital leadership on the affective commitment of new generation employees. It not only enriches the theoretical explanation of the drivers of affective commitment among new generation employees but also opens up a space for exploring the impact of digital leadership. Based on that, we construct the relationship between digital leadership and the new generation employees and extend the online interactions contexts of affective events theory. Besides, our study supplements the impact of digital leaders and affective connections with employees. Meanwhile, we reveal the characteristics of new generation employees and their affective commitment, which adds to the research on the emotional motivations of behaviors among the new generation employees and builds connections related to affective events with leaders. It further lays a theoretical foundation for future research on their workplace behaviors.

Second, we introduce employee empowerment as an internal mechanism to explain the impact of digital leadership on the affective commitment of new generation employees. According to affective commitment, digital leadership will drive something to happen that inspires emotional responses from employees. That is, employee empowerment is an interactive event initiated by the leader, which is aligned with the goals and values of new generation employees and further triggers a positive emotional experience for

them. These results expand the study of emotional responses of empowerment among new generation employees, which paves the way for future research on the motivation of them. Additionally, this paper examines the mediating pathways of employee voice behavior. Traditional employees are likely to advise with a high perception of affective commitment (Machokoto, 2019; Zhou et al., 2021). While for new generation employees, only based on sufficient interactions, especially highly involved voice behavior, can the new generation employees form affective commitment. Combined with the traits of new generation employees, we focus on the antecedent of affective commitment among new generation employees, which is largely overlooked in comparison to that of traditional employees. We supplement the characteristics and antecedent of affective commitment of new generation employees, which provides a theoretical foundation for the study of motivation and retention among new generation employees. Moreover, it widens the scope of affective events theory toward the group of new generation employees and certifies that interactive affective events can engender their affections in similar pathway.

Further, we confirm the chain mediating roles of employee empowerment and voice behavior. It reflects that the interactive relationship between leaders and employees can be deepened by behavior. On the one hand, employee voice behavior can strengthen the emotional connections between digital leaders and new generation employees. Especially for new generation employees with unique traits, they will accept more leaders' behavioral events and respond to them. A logical chain of "leaders' behavioral events—employees' behavioral responses to suggestions—employees' emotional responses" is built by the affective events theory in digital contexts. This reinforces the theory in the event-emotion interactions between

leaders and employees. On the other hand, employee empowerment reflects the perceptions from the interactive events with leaders, which echoes a logical chain of “leaders’ behavioral events— employees’ recognition— employees’ affections.” It strengthens the roles of personal traits and recognitions between events and emotions.

5.2 Practical implications

To sum up, this study provides some practical implications.

First, we discover that digital leaders can increase the affective commitment of new generation employees. Therefore, leaders must actively promote their digital leadership as well as take notice of the different traits and emotional responses of new generation employees. Employees’ autonomy and self-realization should be respected and valued. At the same time, digital and personalized measures should be taken by leaders to motivate and communicate with new generation employees.

Second, the mediation roles of employee empowerment and voice behavior are revealed and provide some constructive implications. For leaders, it is vital to empower employees and focus on their growth and development. If leaders support a fair and transparent empowerment process, employees should be more likely to interact with leaders in ways that are perceived as respected and motivated. Besides, Leaders should also create multiple channels for employees to two-way communications, establish personalized incentives and policies, and allow employees to participate in organizational management. It is essential for organizations and leaders to understand what triggers new generation employees to behave in a way that commits to their organizations. For new generation employees, they should observe their unique needs such as being respected and self-realization, and then try their best to participate in the management, especially advice. Meanwhile, they should have a bit more patience for the adaption of organizations and leaders. It goes through a period that employees experience interactive events with leaders and have certain cognitions and emotions.

Third, we further reveal the chain mediating role of employee empowerment and voice behavior in the relationship between digital leadership and the affective commitment of new generation employees. Namely, new generation employees with a higher perception of empowerment are likely to take the voice behaviors for leaders. New generation employees should be open to the leaders’ power and embrace the knowledge and skills through digital resources to increase the perceptions of empowerment and potency.

5.3 Limitations and directions for future research

This study inevitably has certain limitations that warrant further exploration and improvement. First, the study uses cross-sectional survey data, but the impact of digital leadership on affective commitment may have a temporal lag, which is likely to affect the statistically

significant results. Thus, future research can adopt longitudinal studies to examine the relationships between variables over time. Second, given that external variables, such as emotional intelligence and power distance, may influence the relationships of main variables. Future studies will be intriguing if related boundary factors are involved.

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 from the [patients/ participants OR patients/participants legal guardian/next of kin] was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

HL: Writing – original draft. FL: Writing – review & editing. JM: Writing – review & editing. BL: Writing – review & editing.

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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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Impact of empowering leadership on adaptive performance in hybrid work: a serial mediation effect of knowledge sharing and employee agility

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With the advent of the pandemic era, many organizations have implemented a hybrid work model to manage office- and remote-based work. The proliferation of hybrid work demands leaders to demonstrate a different style of leadership than that in the past and to delegate authority, providing autonomy and responsibility to employees. Furthermore, both within and outside the organization, members must adapt and respond to rapidly changing environments and demonstrate adaptive performance to generate better outcomes. This study identifies the relationship between empowering leadership and adaptive performance in hybrid work, based on the social exchange and self-determination theories. Furthermore, it validates the mediation effect of knowledge sharing and employee agility and serial mediation effect. We analyzed data from 290 IT manufacturing employees working in hybrid work in South Korea. The findings reveal that empowering leadership positively influences adaptive performance and that knowledge sharing and employee agility partially mediate this relationship. Moreover, knowledge sharing and employee agility serially mediate the impact of empowering leadership on the adaptive performance of employees. These research findings provide theoretical and practical implications for organizations in hybrid work.

KEYWORDS

empowering leadership, adaptive performance, knowledge sharing, employability, serial mediation effect

1 Introduction

Following the COVID-19 pandemic, the economic downturn prompted companies to move beyond traditional work methods and adopt more productive and efficient approaches. Various work methods are encouraged to facilitate the transition from remote work, which has been extensively employed during the pandemic. In this context, hybrid work is expected to emerge as a significant mode of operation in future workplace (Moglia et al., 2021). Specifically, Amazon has informed its employees of plans to reintroduce office-based work to complement the remote work practices established during the pandemic (Amazon, 2023). The company has announced the adoption of a hybrid work model that blends office and remote work arrangements (GeekWire, 2023). This approach aims to leverage the benefits of both work environments, fostering flexibility and maintaining productivity. Thus, hybrid work model is being used to manage remote- and office-based work.

However, compared with traditional work arrangements, the physical distance between leaders and employees increases in hybrid model that reduces communication

and feedback, thereby creating a gap in feedback (Zhang et al., 2020). Such physical distance highlights the importance of a different type of leadership compared to traditional settings. In hybrid work arrangements, overcoming the challenges posed by physical separation and achieving strong performance requires employees to take ownership of their tasks and actively engage in their work. Rather than focusing on managing task progress, leaders must guide employees to work autonomously. Therefore, the significance of empowering leadership, which delegates authority to actively engage in their tasks, is growing (Gray et al., 2023; Jolly et al., 2021).

Empowering leadership involves delegating authority to employees, enhancing their intrinsic motivation, and stimulating their sense of responsibility and desire for growth, leading to performance achievements (Zhang and Bartol, 2010). In the current endemic era, it is imperative for organizations and individuals to anticipate, adapt, and respond swiftly to rapid environmental changes. This agility is essential for maintaining resilience and competitiveness in a landscape characterized by ongoing uncertainties and shifting dynamics. By cultivating an adaptive mindset and implementing flexible strategies, organizations can better navigate the complexities of this new era and seize emerging opportunities. Empowering leadership uses distributed authority as a resource to respond agilely to internal and external environmental changes (Arnold et al., 2000).

This study extends the exploration of the mechanisms connecting empowering leadership to adaptive performance by investigating the sequential mediating roles of knowledge sharing and employee agility. Within a knowledge-based society, knowledge is emphasized as a critical resource for enhancing organizational performance and competitiveness (Tung, 2014). Employees actively engage in the exchange and acquisition of knowledge to enhance their capabilities, a process that not only maximizes organizational value but also significantly boosts performance improvement (Srivastava et al., 2006). Under empowering leadership, employees strategically leverage knowledge sharing to enhance performance and respond adeptly to dynamic environments.

Employees must cultivate their skills to effectively adapt to evolving internal and external environmental changes (Kinicki and Latack, 1990). In this context, employee agility has emerged as a crucial competency for navigating dynamic environments. By proactively responding to changes, employees enhance their decision-making capabilities, ultimately leading to improved work quality and performance.

Numerous prior studies have explored the impact of empowering leadership on adaptive performance. However, to achieve a more nuanced understanding of the relationship between these variables, there is a pressing need for integrative research that considers multiple influencing factors (Bonini et al., 2024; Xu and Zhang, 2022). This study aims to investigate the mechanisms through which empowering leadership influences adaptive performance specifically in hybrid work settings, employing self-determination theory and social exchange theory as foundational theoretical frameworks. By examining the mediating roles of knowledge sharing and employee agility within these environments, this study endeavors to deepen the understanding of the connection between empowering leadership and adaptive performance, particularly in the context of increasingly prevalent hybrid work arrangements.

2 Literature review

2.1 Empowering leadership

Empowering leadership refers to a leadership style in which a leader shares authority with employees, induces intrinsic motivation, and instills them with a sense of the importance of their work and confidence in their performance (Srivastava et al., 2006; Zhang and Bartol, 2010). Traditional leadership faces limitations in responding flexibly to significant changes or resource-scarce environments such as those presented by the COVID-19 pandemic (Javed et al., 2019). In contrast, empowering leadership, by delegating authority and fostering intrinsic motivation, encourages innovative behavior and responds flexibly to changes (Javed et al., 2019).

A leader's role is vital in fostering employee empowerment (Srivastava et al., 2006; Zhang and Bartol, 2010). Empowerment plays a crucial role in improving individual and organizational performance through self-development and the pursuit of innovative actions. Empowering leadership can be realized from the perspectives of empowerment and leader behavior. The leader behavior perspective focuses on the style of leadership, feedback provision, and behaviors that delegate autonomy and responsibility (Kirkman and Rosen, 1997), focusing on how a leader's actions impact employees. However, empowerment perspective emphasizes on employees' responses to delegated authority and motivation, including acquiring and using power and autonomy within the organization (Conger and Kanungo, 1988; Kirkman and Rosen, 1997; Spreitzer, 1995), highlighting how employees perceive and respond to empowering leadership.

Research on empowering leadership examines how leaders' behavior impacts employees and enhances performance (Druskat and Wheeler, 2003; Judge et al., 2004). According to Zhang and Bartol (2010), empowering leadership positively influences employee performance indicators such as organizational citizenship behavior, innovation, and work performance improvement. Additionally, studies indicate that empowering leadership positively affects employees' work performance (Kundu et al., 2019).

2.2 Adaptive performance

As the Fourth Industrial Revolution is grounded in digitalization, traditional job performance measures have limitations in reflecting the complexity of work (Kim and Yoon, 2021). Moreover, changes in the external environment require employees to enhance their knowledge and skills in response (Kinicki and Latack, 1990). Both the external environment and job roles are becoming more diversified, and the demand for jobs is continuously evolving (Goldstein and Gilliam, 1990). Consequently, the concept of adaptive performance has emerged, which involves actively responding to changing environments that lead to performance outcomes. Adaptive performance refers to appropriately altering one's responses and actions in new job situations or environments (Pulakos et al., 2000).

Adaptive performance was proposed as a development of the traditional job performance model that distinguishes between task and contextual performance (Allworth and Hesketh, 1999; Ployhart and Bliese, 2006; Pulakos et al., 2000). The increasing complexity and unstructured nature of jobs due to changes in the job environment have prompted the expansion of the concept of job

performance. Therefore, individual job performance, previously divided into task and contextual performance, has been expanded to include adaptive performance, reflecting success in adapting to increasing dynamism and changes (Schmitt et al., 2003).

Initially, adaptive performance was defined from a learning perspective (Ployhart and Bliese, 2006). London and Mone (1999) define adaptive performance as a response to new learning, whereas Mumford et al. (1993) define it as the activity of creating new frameworks to adapt to new environments, moving beyond existing learning. However, these definitions are limited, as they focus only on learning behavior and do not fully encompass broader meanings. The scope of adaptive performance is extended to include behaviors required in new environments (Pulakos et al., 2000). This expansion encompasses individual actions based on abilities, dispositions, skills, and proactivity in both the internal and external environments. Furthermore, it has been defined from situational and reactive perspectives, focusing on utilizing various capabilities to improve performance in changing environments (Lepine et al., 2000; Ployhart and Bliese, 2006; Pulakos et al., 2000). Specifically, research has progressed from the perspective that the ability to respond to and proactively utilize capabilities in changing environments leads to performance improvement.

Several studies have explored the multidimensional nature of adaptive performance. Pulakos et al. (2000) distinguish adaptive performance from a situational perspective into eight dimensions: handling emergencies or crisis situations; handling work stress; solving problems creatively; learning work tasks, technologies, and procedures; dealing with uncertain and unpredictable work situations; demonstrating interpersonal adaptability; demonstrating cultural adaptability; and demonstrating physically oriented adaptability. However, Charbonnier-Voirin and Roussel (2012) define it using five dimensions, reactivity in the face of emergencies, creativity, handling work stress, training effort, and interpersonal adaptability, to facilitate generalization.

2.3 Knowledge sharing

In a knowledge-based society, knowledge is a crucial resource for sustaining and securing the competitiveness of organizations, with employees voluntarily sharing and learning knowledge playing a key role (Tung, 2014). However, knowledge sharing among individuals and teams must be implemented effectively for knowledge to effectively contribute to gaining a competitive edge (Han et al., 2016). Knowledge sharing includes not only sharing explicit knowledge through documents, manuals, and data but also sharing tacit knowledge such as thoughts, behaviors, and know-how, which can also be communicated through sharing (Nonaka and Takeuchi, 1996). Srivastava et al. (2006) argue that if knowledge is not shared, its value can be underestimated. Therefore, knowledge sharing plays a vital role in realizing the true value of knowledge, beyond merely possessing it.

Van Den Hooff and De Ridder (2004) introduce the concept of knowledge sharing using the concepts of donating and collecting knowledge. Knowledge donation means voluntarily providing the knowledge one possesses to other members, whereas knowledge collection means acquiring knowledge from others through processes such as persuasion (Van Den Hooff and De Ridder, 2004).

A major topic discussed in research related to knowledge sharing is whether a difference exists between the intention to share knowledge and actual knowledge-sharing behavior. According to previous

research, intention is a precursor to behavior that transforms into behavior over time (Bandura, 2001). Although the temporal difference between intention and behavior leads them to be perceived as different concepts, the intention to share knowledge influences the behavior leading to actual sharing; hence, it is used as an equivalent concept in the context of knowledge sharing (Reychav and Weisberg, 2010). Therefore, in this study, knowledge sharing is conceptualized and measured according to previous research as the intention to share both explicit and tacit knowledge.

2.4 Employee agility

Owing to the unpredictability of recent environments, the importance of employees' agile mindsets has been emphasized (Harsch and Festing, 2019). Additionally, in the era of digital transformation, agility enables employees to quickly adapt and respond to change, allowing the execution of appropriate strategies (Nijssen and Paauwe, 2012; Troise et al., 2022; Baran and Woznyj, 2020). Organizations with agile employees can respond flexibly to environmental changes and secure a competitive advantage.

The concept of agility has been studied from both personal and organizational perspectives (Breu et al., 2002; Salmen and Festing, 2022). Organizational agility is defined as the ability to anticipate and leverage changes in the external environment to respond quickly (Sharifi and Zhang, 1999; Sherehiy and Karwowski, 2014). According to prior research, organizational agility largely depends on individual agility (Harsch and Festing, 2019). Individual agility must be improved to respond to changes at the organizational level. Therefore, this study validates the concept of employee agility at an individual level.

Early research defines agile employees as those who effectively solve given problems and pursue self-development (Plonka, 1997). Later, Breu et al. (2010) define it in terms of technical aspects such as a combination of skills, responsiveness to change, and access to information. From a behavioral perspective, it is defined as the skill to anticipate changes, learning new technologies, and responding flexibly (Sherehiy and Karwowski, 2014). Braun et al. (2017) integrate these concepts to define employee agility as a skill to actively respond to changes. They divide employee agility into three subfactors according to work adjustment theory: proactivity, adaptivity, and resilience. Proactivity refers to the active response to problems effectuated by changes in anticipation of solving them. Adaptivity refers to the voluntary learning and acquisition of skills to adapt to environmental changes. Finally, resilience refers to the efficient management of the unpredictable stress caused by changes. Owing to the ambiguity regarding the concept of resilience, recent research has emphasized the importance of proactivity and adaptivity, which involve predicting new environments and acting proactively (Pitafi et al., 2018).

3 Hypothesis development

3.1 Empowering leadership and adaptive performance

Empowering leaders enhance employees' intrinsic motivation (Chen et al., 2011; Lorinkova and Perry, 2017; Zhang and Bartol, 2010). When delegating authority, employees voluntarily participate

in decision-making processes and actively express their opinions. This process makes them recognize the importance of their work and the organization's goals, leading to intrinsic motivation (Amundsen and Martinsen, 2014). Thus, enhanced intrinsic motivation is utilized as a resource in changing environments, influencing the improvement of adaptive performance.

According to the self-determination theory (Ryan and Deci, 2000), to enhance intrinsic motivation for performance, psychological needs such as competence, autonomy, and relatedness must be satisfied. Empowering leadership can fulfill these psychological needs by delegating authority. Delegated authority increases autonomy in job roles and strengthens relationships with employees through trust (Morrison and Phelps, 1999; Zhang et al., 2020). Thus, enhanced intrinsic motivation is utilized as a resource to respond to changes and challenging tasks (Bajaba et al., 2021; Griffin et al., 2010; Niessen and Jimmieson, 2016). Specifically, enhanced intrinsic motivation makes individuals feel responsible for autonomous decisions, preparing them to face the risks of change and strive to improve their performance (Demerouti and Bakker, 2011).

This relationship can be explained by the social exchange theory (Blau, 1964; Porter, 2018). According to the social exchange theory, individuals reciprocate favors they receive, adhering to the norm of reciprocity. Employees perceive delegated authority as a sign of trust and favor and seek to reciprocate it. In an effort to reciprocate, they maintain a positive attitude and engage in behaviors beneficial to the organization. Such constructive behavior is utilized as a resource that positively influences adaptive performance.

In hybrid work environments, the physical distance between leaders and employees frequently results in feedback gaps (Zhang et al., 2020). These gaps hinder leaders' ability to promptly intervene in employees' tasks, necessitating that employees independently reflect on, adjust, and execute their work to achieve desired outcomes. In such contexts, it is imperative that employees work autonomously and approach their tasks with intrinsic motivation. Empowering leadership plays a crucial role by fostering autonomy and responsibility, encouraging employees to take ownership of their work. This leadership approach fulfills essential psychological needs, thereby enhancing intrinsic motivation and positively influencing adaptive performance.

H1: Empowering leadership positively affects adaptive performance in hybrid work.

3.2 Mediation effect of knowledge sharing

In the digital era, knowledge becomes increasingly crucial. However, even the most valuable knowledge has limited potential to enhance organizational performance and individual competencies if not shared or used by employees (Nonaka, 1991). Therefore, to fully leverage knowledge as a competitive advantage for an organization, it is essential to consider how employees share the knowledge they possess (Argote, 2012).

As knowledge acts as a key competitive factor in this era, empowering leadership plays a critical role in fostering individual autonomy and affecting knowledge sharing (Singh, 2008). Employees endowed with authority and responsibility over their work require appropriate knowledge and information for rational decision-making. Hence, they strive to secure resources for decision-making by sharing

knowledge, information, and know-how. Consequently, empowering leadership drives employees' knowledge sharing using it as a resource impacting adaptive performance (Oliver and Reddy Kandadi, 2006; Srivastava et al., 2006).

The mediation effect of knowledge sharing can be explained by the self-determination theory (Ryan and Deci, 2000). As voluntary knowledge sharing is nonmandatory, motivation is necessary (Peng, 2013; Wang and Noe, 2010). Enhanced intrinsic motivation through empowering leadership encourages individuals to determine and improve the resources required to better perform their tasks (Ahearne et al., 2005). Through such efforts, shared knowledge becomes a resource that is utilized to adapt to changing and unfamiliar environments, thus contributing to performance.

This relationship can also be explained by the social exchange theory (Blau, 1964; Porter, 2018). Employees empowered through empowering leadership engage in constructive actions for the organization (Arnold et al., 2000; Rao Jada et al., 2019). As part of these efforts, employees willingly share their intellectual assets such as information, knowledge, and know-how with others and actively seek knowledge to achieve better performance. In other words, to reciprocate the favor of the leader, they share their intellectual assets and competitiveness for the growth and development of the organization, despite the potential risk of losing their competitive edge. These intellectual resources are used to proactively respond to changes and achieve performance outcomes.

In hybrid work environments, the physical separation from colleagues often leads to reduced access to resources compared to traditional office settings. To better adapt to changes and achieve higher performance under these conditions, employees must proactively gather resources. Specifically, they are driven to engage in knowledge sharing to acquire and expand their intellectual capital, enabling them to perform their assigned tasks more effectively. This acquired knowledge enhances decision-making quality and acts as a critical resource for responding to and adapting to environmental changes, thereby positively influencing adaptive performance.

H2: Knowledge sharing mediates the relationship between empowering leadership and adaptive performance in hybrid work.

3.3 Mediation effect of employee agility

Rapid environmental changes require employees to develop the appropriate skills (Kinicki and Latack, 1990). In response to such changes, the significance of skills that prepare employees to proactively adapt to changing environments based on resources and knowledge, known as employee agility, has been emphasized.

Employee agility and adaptive performance share conceptual similarities in their responses to changes. However, employee agility is defined as the skill to respond to change, whereas adaptive performance is defined as the behavior of responding and adapting to actual changes or unfamiliar environments.

Furthermore, the mediating effect of employee agility is explained by the self-determination theory (Ryan and Deci, 2000). Authority and autonomy achieved through empowering leadership serve as motivations for better decision-making. According to the self-determination theory, employees whose psychological needs are satisfied voluntarily strive to develop skills (Ahearne et al., 2005). They seek, train, and prepare for the

skills required to respond appropriately to internal and external organizational environments. These efforts positively impact employee agility. The skill of anticipating and responding to change assists in efficiently reacting and adapting to actual changes and unfamiliar environments, thus contributing to performance outcomes.

According to the social exchange theory (Blau, 1964; Porter, 2018), the favor perceived by employees owing to empowering leadership induces them to engage in constructive behaviors to reciprocate with the organization and leader. Employees contribute to an organization by enhancing skills that predict and respond to unpredictable changes, managing future challenges, and handling organizational risks. These skills aid in adapting and responding to actual changes and unfamiliar environments, thereby contributing to performance outcomes.

In a hybrid work setting, employees face unpredictable changes in both office and remote work environments. Moreover, working in new locations and adopting new work styles introduce additional changes. In such environments, employees with intrinsic motivation fostered by empowering leadership endeavor to develop skills to predict and manage change. Enhanced skills can be applied to proactively respond and adapt to unpredictable changes occurring in a hybrid work setting, contributing to performance improvement.

H3: Employee Agility mediates the relationship between empowering leadership and adaptive performance in hybrid work.

exhibited in empowering leadership, act as positive experiences for employees and motivate them to reciprocate. Employees voluntarily share their knowledge and strive to learn from others for personal and organizational growth and performance. They not only apply the acquired intellectual assets to their tasks but also use them to enhance their skills to predict and respond to potential changes. These risk management skills are applied when actual changes occur, managing organizational change and risks as reciprocating behaviors toward the organization.

In a hybrid work environment, where access to resources may be more limited than in traditional work settings, employees with delegated authority actively strive to acquire intellectual assets for better decision-making. Moreover, they utilize these intellectual assets to enhance skills for timely response to changes that may occur in the new work environment, facilitating better task performance. Such actions serve as resources for timely response and adaptation to the unpredictable changes attributed to hybrid work, thereby impacting adaptive performance (Figure 1).

H4: Empowering leadership influences knowledge sharing, affecting employee agility and subsequently adaptive performance in hybrid work. Specifically, the relationship between empowering leadership and adaptive performance is serially mediated by knowledge sharing and employee agility in hybrid work.

3.4 Serial mediation effect of knowledge sharing and employee agility

According to the self-determination theory (Ryan and Deci, 2000), employees who receive delegated authority through empowering leadership experience satisfaction with their psychological needs, enhancing their intrinsic motivation. This enhancement enables employees to select and utilize the resources necessary for better task performance, thereby improving decision-making quality (Ahearne et al., 2005). Employees actively participate in knowledge sharing to acquire such resources. These intellectual assets enhance skills for predicting and responding to internal and external organizational changes. These efforts are utilized as resources to appropriately respond to actual changes, thereby impacting adaptive performance.

This perspective can also be affirmed through the social exchange theory (Blau, 1964; Porter, 2018). Leaders' behaviors, such as those

4 Research methodology

4.1 Sample and data collection

We collected data through both online and offline surveys targeting employees from small- and medium-sized IT manufacturing companies in South Korea who were engaged in hybrid work during the COVID-19 pandemic. This study specifically focused on IT-based firms utilizing hybrid work models, with an emphasis on the IT manufacturing sector, where adaptive performance is considered particularly crucial for effectively responding to changes. The surveys were administered exclusively to employees actively participating in hybrid work arrangements from March to April 2022. After removing insincere responses and incomplete data, a total of 290 valid responses were obtained and analyzed, comprising 258 online and 32 offline submissions (see Table 1 for details).

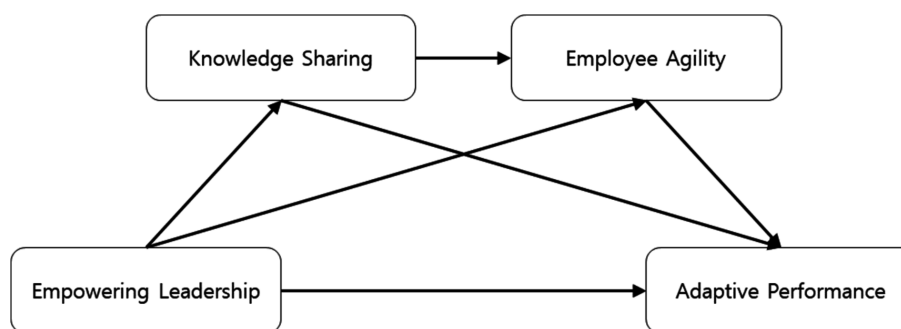


FIGURE 1
Research model.

4.2 Data analysis method

SPSS 26.0 and AMOS 23.0 softwares were used to analyze the data. Confirmatory factor analysis (CFA) was conducted to assess the discriminant, convergent, and conceptual validity of the measurement variables. Subsequently, correlation analysis was performed to examine the relationships between the measurement variables. Finally, we employed the bootstrap method (Hayes, 2013) in the PROCESS macro to test the serial mediation model. We used Model 6 of the PROCESS macro to validate the serial mediation model.

4.3 Variable measurement

4.3.1 Empowering leadership

Empowering leadership refers to the behavior of leaders who share authority with employees, thereby increasing their intrinsic motivation and providing them with confidence in the importance and performance of their work (Srivastava et al., 2006; Zhang and Bartol, 2010). The measurement tool for empowering leadership

utilized a 5-point scale with 12 items from Ahearne et al. (2005). It comprised sub-dimensions such as enhancing the meaningfulness of work (three items), fostering participation in decision-making (three items), expressing confidence in high performance (three items), and providing autonomy from bureaucratic constraints (three items).

4.3.2 Adaptive performance

Adaptive performance is defined as appropriately changing one's behavior and responses to align with the demands of new situations or job environments (Pulakos et al., 2000). It was measured using a 5-point scale with 19 items developed by Charbonnier-Voirin and Roussel (2012). The subdimensions of adaptive performance included reactivity during emergencies (four items), handling work stress (three items), creativity (four items), training effort (four items), and interpersonal adaptability (four items).

4.3.3 Knowledge sharing

Knowledge sharing is the intention to share explicit and implicit knowledge (Bock et al., 2005). Following previous research, knowledge-sharing intentions and knowledge-sharing behaviors were conceptualized and used as the same terms (Reychav and Weisberg, 2010). It was measured using a 5-point scale with five items developed by Bock et al. (2005). The items included intention to share explicit knowledge (two items) and intention to share implicit knowledge (three items).

4.3.4 Employee agility

Employee agility is the skill of employees to proactively utilize their knowledge and skills to adapt to new opportunities and environments (Braun et al., 2017). This was measured using a 5-point scale with five items developed by Braun et al. (2017). In this study, four items were utilized for the analysis, excluding one item that inquired about past experiences of responding to actual changes rather than the proactive behavior of employee agility. Additionally, based on the results of the CFA, this particular item did not adequately explain the concept, with a coefficient of 0.575.

4.3.5 Control variables

Gender, age, education level, job category, position, and tenure were considered control variables. Gender and job category were dummy coded as R&D and Management, respectively. Regarding gender, females were coded as 0 and males as 1. The two most common job categories, R&D and Management, were selected. R&D was coded as 1, and other job categories were coded as 0 for the analysis.

5 Empirical results

5.1 Reliability analysis of variables

A reliability analysis was conducted to verify the validity of the measurement instruments. The reliability verification uses Cronbach's α coefficient ranging from 0 to 1, and a value of 0.6 or higher indicates high reliability (Morgan et al., 2004). In this study, empowering leadership indicates a value of 0.927, adaptive performance 0.930, knowledge sharing 0.918, and employee agility 0.878. As all variables exceed 0.6, they are considered to demonstrate high reliability.

TABLE 1 Frequency analysis results.

Classification		Frequency	Percentage
Gender	Male	197	67.9
	Female	93	32.1
Age	20–29 years old	42	14.5
	30–39 years old	125	43.1
	40–49 years old	65	22.4
	More than 50 years old	58	20.0
Education	High school	11	3.8
	College	29	10.0
	Undergraduate	173	59.6
	Master's degree	62	21.4
	Doctorate degree	15	5.2
Job	R&D	105	36.2
	Management	88	30.3
	Other	97	33.5
Position	Staff	53	18.3
	Associate	15	5.2
	Senior associate	42	14.5
	Manager	54	18.6
	Senior manager	32	11.0
	Executive manager	38	13.1
	Executive	56	19.3
Job tenure	Less than 2 years	56	19.3
	2–5 years	50	17.2
	5–8 years	47	16.2
	8–10 years	33	11.4
	10–13 years	25	8.6
	More than 13 years	79	27.2

5.2 Confirmatory factor analysis

The results of the CFA indicate that the average variance extracted (AVE) values for all variables are above 0.5: empowering leadership (0.744), adaptive performance (0.682), knowledge sharing (0.692), and employee agility (0.582). The values for construct reliability (CR) are empowering leadership (0.972), adaptive performance (0.975), knowledge sharing (0.918), and employee agility (0.872), all of which exceeded 0.7. According to Anderson and Gerbing (1988) and Fornell and Larcker (1981), a model is considered appropriate when AVE is above 0.5 and CR is above 0.7.

The overall model fit is also assessed using CFA, yielding a chi-square of 1412.618, root mean square residual of 0.051, root mean square error of approximation of 0.055, and a comparative fit index of 0.917. Previous research suggests that an RMSEA value below 0.08 and a CFI value above 0.9 indicate a good fit (Bentler, 1990; MacCallum et al., 1996). Therefore, this model is considered appropriate.

5.3 Correlation analysis

We conducted Pearson’s correlation analysis to examine the relationships among variables, and the results are presented in Table 2. The findings reveal that Empowering leadership has a significant positive correlation with knowledge sharing ($r = 0.476, p < 0.001$), employee agility ($r = 0.384, p < 0.001$), and adaptive performance ($r = 0.478, p < 0.001$). Furthermore, knowledge sharing shows a significant positive correlation with employee agility ($r = 0.341, p < 0.001$) and adaptive performance ($r = 0.567, p < 0.001$), whereas employee agility has a significant positive correlation with adaptive performance ($r = 0.687, p < 0.001$).

5.4 Hypothesis testing and results

We hypothesized that knowledge sharing and employee agility indirectly affect the direct relationship between empowering leadership and adaptive performance. To test this hypothesis, we utilized Baron and Kenny (1986)’s three-step mediation analysis and Hayes (2013) serial mediation effect model analysis using the SPSS Process Macro Model 6. All analyses were conducted using 10,000 bootstrap resamples to obtain 95% confidence intervals (CI).

To verify this hypothesis, we conducted a hierarchical regression analysis, and the results are presented in Tables 3, 4. Model 6 in Table 4 shows that empowering leadership has a significant effect on adaptive performance ($\beta = 0.483, p < 0.001$), indicating statistical significance ($\Delta R^2 = 0.216, F \text{ for } \Delta R^2 = 93.211, p < 0.001$). This result supports Hypothesis 1.

Baron and Kenny’s (1986) three-step mediation analysis is used to verify the mediating effects of knowledge sharing and employee agility. Models 2 and 4 in Table 3 show that empowering leadership has a direct positive impact on the mediating variables, knowledge sharing, and employee agility. Furthermore, Model 6 in Table 4 illustrates, as confirmed by Hypothesis 1, that empowering leadership significantly affects adaptive performance. Model 7 in Table 4 demonstrates that both empowering leadership and knowledge sharing significantly impact adaptive performance ($\beta = 0.297,$

TABLE 2 Descriptive statistics and correlation results.

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Gender	0.68	0.46	-										
2. Age	2.48	0.97	-0.256***	-									
3. Education	4.14	0.80	-0.065	0.345***	-								
4. Management	0.30	0.46	0.061	0.239***	0.117*	-							
5. R&D	0.36	0.48	-0.026	-0.254***	-0.096	-0.497***	-						
6. Position	4.16	2.08	-0.221***	0.825***	0.415***	0.250***	-0.259	-					
7. Tenure	3.54	1.89	-0.210***	0.636***	0.262***	0.135*	-0.191**	0.663***	-				
8. Empowering leadership	3.57	0.66	-0.036	-0.021	0.026	0.047	0.140*	0.019	-0.125*	-			
9. Knowledge sharing	3.99	0.69	-0.035	0.082	0.092	-0.025	0.076	0.145*	-0.006	0.476***	-		
10. Employee agility	3.39	0.77	-0.095	0.266***	0.184**	0.235***	-0.172**	0.307***	0.209***	0.384***	0.341***	-	
11. Adaptive performance	3.62	0.54	-0.074	0.312***	0.210***	0.071	-0.043	0.303***	0.120*	0.478***	0.567***	0.687***	-

n = 290, *p < 0.05, **p < 0.01, ***p < 0.001.
1. Age (dummy variable): 0 = Women, 1 = Men, 2. Age: 1 = Twenties, 2 = Thirties, 3 = Forties, 4 = Over fifties, 3. Education: 1 = Less than high school graduate, 2 = High school graduate, 3 = Technical college graduate, 4 = University graduate, 5 = Master, 6 = Doctor, 4. Job Group (dummy variable): 0 = Management support, 1 = Production/purchase, R&D, sales/marketing/service, etc., 5. Job group (dummy variable): 1 = R&D, 0 = Management support, production/purchase, sales/marketing/service, etc., 6. Position: 1 = staff, 2 = Administrative manager, 3 = Assistant manager, 4 = Manager, 5 = Deputy general manager, 6 = Department manager, 7 = Executive officer, 7. Tenure: 1 = Less than 2 years, 2 = 2 ~ 5 years, 3 = 5 ~ 8 years, 4 = 8 ~ 10 years, 5 = 10 ~ 13 years, 6 = 13 years or more.

TABLE 3 Regression results.

Variable	Knowledge sharing		Employee agility	
	Model 1	Model 2	Model 3	Model 4
Gender	−0.008	0.016	−0.051	−0.030
Age	−0.058	−0.034	0.004	0.025
Education	0.035	0.028	0.068	0.062
Management	−0.019	−0.085	0.161*	0.104
R&D	0.106	0.008	−0.029	−0.144
Position	0.322**	0.222*	0.209	0.123
Tenure	−0.170*	−0.064	0.012	0.103
Empowering Leadership	–	0.466***	–	0.403***
R ²	0.055	0.257	0.128	0.279
adj.	0.031	0.235	0.106	0.259
ΔR ²	–	0.202	–	0.151
F for	2.342*	76.220***	5.917***	58.872***
Overall F	2.342*	12.123***	5.917***	13.599***

n = 290, **p* < 0.05, ***p* < 0.01, ****p* < 0.001; standardized beta.

TABLE 4 Regression results.

Variable	Adaptive performance			
	Model 5	Model 6	Model 7	Model 8
Gender	0.001	0.026	0.020	0.043
Age	0.248*	0.274**	0.287	0.259***
Education	0.097	0.090	0.079	0.055
Management	−0.001	−0.070	−0.035	−0.128**
R&D	0.044	−0.057	−0.060	0.007
Position	0.189	0.085	−0.003	0.016
Tenure	−0.180*	−0.070	−0.044	−0.129*
Empowering leadership		0.483***	0.297***	0.254***
Knowledge sharing			0.400***	
Employee agility				0.568***
R ²	0.131	0.348	0.466	0.580
adj.	0.110	0.329	0.449	0.567
ΔR ²	–	0.216	0.119	0.232
F for	6.097***	93.211***	62.297***	154.913***
Overall F	6.097***	18.731***	27.204***	42.982***

n = 290, **p* < 0.05, ***p* < 0.01, ****p* < 0.001; standardized beta.

p < 0.001; $\beta = 0.400$, *p* < 0.001), with statistical significance ($\Delta R^2 = 0.119$, *F* for $\Delta R^2 = 62.297$, *p* < 0.001). Similarly, the analysis regarding employee agility also indicates a significant effect ($\beta = 0.254$, *p* < 0.001; $\beta = 0.568$, *p* < 0.001), with statistical significance ($\Delta R^2 = 0.232$, *F* for $\Delta R^2 = 154.913$, *p* < 0.001).

Following Baron and Kenny (1986)'s criteria for a partial mediation effect, both variables exhibit a partial mediation effect. Additionally, a more precise Sobel test shows significant mediating

effects, with Z-values of 5.8484 for knowledge sharing and 6.5320 for employee agility as mediators. In the Sobel test, a Z-value greater than 1.96 or less than −1.96 indicates a significant mediating effect (Baron and Kenny, 1986). These results support Hypotheses 2 and 3 (Table 5).

To examine the serial mediation effect of knowledge sharing and employee agility, Hayes (2017) Process Macro Model 6 was used. Table 6 illustrates the serial mediation effects of knowledge sharing and employee agility on the relationship between empowering leadership and adaptive performance. The magnitude of the effect is 0.0356, with a 95% confidence interval (LLCI = 0.0099, ULCI = 0.0638), indicating significance. Furthermore, the size of the indirect effect for the entire model presented in Table 6 is 0.2892 (LLCI = 0.2205, ULCI = 0.3596), showing significance at the 95% confidence level. These results support Hypothesis 4.

6 Conclusion and future research

6.1 Summary and theoretical implications

This study provides a comprehensive empirical examination of the mechanisms through which empowering leadership influences adaptive performance in hybrid work environments. Unlike traditional settings, hybrid work introduces physical distances between leaders and employees, as well as among the employees themselves. Understanding how to bridge these distances to enhance adaptive performance necessitates an exploration of the role and mechanisms of empowering leadership. Our findings reveal that the influence of empowering leadership on adaptive performance extends beyond conventional work contexts, being equally significant within hybrid work settings.

Moreover, this research investigates the mediating effects of knowledge sharing and employee agility on the relationship between empowering leadership and adaptive performance. To fully elucidate this relationship, identifying the mediating factors is essential. The study validates that the delegation of authority through empowering leadership enhances intrinsic motivation, which in turn fosters knowledge sharing and employee agility, ultimately boosting adaptive performance.

Lastly, the research highlights the serial mediating effect of knowledge sharing and employee agility. Expanding the understanding of the mechanisms linking empowering leadership to adaptive performance requires an integrative examination of the sequential relationships among various variables (Bonini et al., 2024). By confirming this serial mediating effect, the study contributes to a more profound understanding of the underlying processes, thereby enriching the theoretical and practical insights into adaptive performance in hybrid work environments.

6.2 Practical implications

This study underscores the vital role of empowering leadership in enhancing employee adaptability and responsiveness to unpredictable changes within hybrid work environments. As organizations shift from strictly remote to office-based operations, they are increasingly adopting hybrid work models as a sustainable alternative. However,

these settings pose challenges to traditional management approaches that focus on closely overseeing every aspect of team activities. Empowering leadership, characterized by the delegation of authority, grants employees the autonomy and responsibility needed to perform tasks independently. This autonomy fosters intrinsic motivation, which drives employees to effectively adapt to changing environments and achieve improved performance. Consequently, organizations operating in hybrid settings can enhance adaptive performance by training leaders on the significance and practice of delegation. Additionally, minimizing unnecessary reporting requirements and alleviating decision-making bottlenecks can indirectly promote empowering leadership by enabling employees to take greater ownership of their work. To directly promote empowering leadership in a hybrid work environment, organizations can implement leadership training programs. These programs should educate leaders on the differences between office-based and hybrid work environments and help them understand how employees perform their tasks in such settings. Additionally, coaching or group training sessions can be conducted to guide leaders on effective communication strategies for delegating authority. For empowering leadership to be effectively practiced, communication and relationships between leaders and employees are crucial. To genuinely delegate authority, organizations must refine their work and communication processes, enabling leaders to better manage these aspects. By developing these competencies, leaders can positively influence adaptive performance within the organization.

Furthermore, the study reveals that empowering leadership fosters knowledge sharing and employee agility, both of which are crucial for influencing adaptive performance in hybrid work environments. The physical separation inherent in hybrid work can impede the flow of explicit and tacit knowledge, essential for maintaining organizational

competitiveness. In this context, emphasizing empowering leadership can enhance the exchange and dissemination of knowledge among employees. Moreover, empowering leadership bolsters employee agility, a critical capability for navigating rapidly changing environments, particularly those experiencing advancements in AI and technology. By delegating appropriate authority, empowering leadership enables employees to become more agile and, consequently, achieve superior adaptive performance. Therefore, improving adaptive performance necessitates not only training leaders in empowering leadership but also establishing systems and creating environments that encourage knowledge sharing and enhance employee agility. These integrated strategies collectively contribute to improved organizational adaptability and competitiveness in dynamic and uncertain environments.

6.3 Limitations and future research directions

First, it focuses on the IT manufacturing industry, which faces many changes, where intellectual assets are relatively more important. However, these effects may vary depending on the industry and job roles. Therefore, future research should analyze the operation of mechanisms in general situations, considering industry and job roles.

Second, this study focuses on the positive effects of empowering leadership in a hybrid work environment. However, employees may perceive excessive delegation of authority as an avoidance of responsibility. According to previous research, there is a curvilinear relationship between empowering leadership and workplace performance (Lee et al., 2017). In addition, it may have negative effects depending on the specific job and characteristics of the employee (Wang and Sun, 2019). Therefore, future research should empirically examine the negative aspects of empowering leadership and analyze its impact on adaptive performance under various conditions.

Third, although multicollinearity between employee agility and adaptive performance was not observed in this study, caution should be exercised because of the similarity of the constructs. In this study, employee agility is defined as skills developed before a change occurs, and adaptive performance is defined as behaviors that appropriately respond and adapt when actual changes occur. Future research should conduct a deeper review of the two variables to analyze the differences explicitly.

Fourth, this study used a cross-sectional design that involved surveys at a specific point in time. To analyze the causal relationship

TABLE 5 Effect of empowering leadership on adaptive performance.

Total effect of empowering leadership on adaptive performance					
B	SE	t	p	LLCI	ULCI
0.3998	0.0414	9.6546	0.0000	0.3183	0.4814

Direct effect of empowering leadership on adaptive performance					
B	SE	t	p	LLCI	ULCI
0.1106	0.0362	3.0548	0.0025	0.0393	0.1819

Boot LLCI: Lower limit within the 95% confidence interval of the bootstrap indirect effect.

Boot ULCI: Upper limit within 95% confidence interval of Bootstrap indirect effect.

TABLE 6 Serial mediation effect results.

Indirect effect of empowering leadership on adaptive performance				
	B	SE	LLCI	ULCI
Total	0.2892	0.0353	0.2205	0.3596
EL – KS – AP	0.1187	0.0199	0.0818	0.1596
EL – AG – AP	0.1350	0.0288	0.0800	0.1924
EL – KS – AG – AP	0.0356	0.0137	0.0099	0.0638

Boot LLCI: Lower limit within the 95% confidence interval of the bootstrap indirect effect.

Boot ULCI: Upper limit within 95% confidence interval of Bootstrap indirect effect.

between empowering leadership and adaptive performance explicitly, it is necessary to analyze these variables at different time frames. Future research should use longitudinal studies to empirically analyze the causal relationships between mechanisms.

Fifth, this study focused on the positive effects of empowering leadership. However, in the complex dynamics of work types, methods, and relationships between leaders and members, empowering leadership may also have negative impacts. Future research should explore both the positive and negative effects of empowering leadership, striving to achieve a balanced understanding.

Finally, we used the self-reporting method, which can cause common method bias (Podsakoff et al., 2003). Future research should verify more accurate mechanisms using evaluations from supervisors and colleagues, actual performance data, along with self-reporting.

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 humans were approved by Konkuk University Center for Research Ethics. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

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Conflict of interest

S-SK was employed by company Hyundai-steel, Seoul, Republic of Korea.

The remaining author declares 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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The influence of team reflexivity on employee's feedback-seeking behavior: a multi-level perspective

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The dynamism and uncertainty of the work environment increasingly emphasize the importance of employee's feedback-seeking behavior. Based on transactive memory system theory, the current study explores the multi-level effect of team reflexivity on team member's feedback-seeking behavior. Survey data collected from 197 participants in 56 teams in China showed that team reflexivity had a positive indirect effect on team member's feedback-seeking behavior, and team transactive memory system (TMS) mediated such effect. In addition, results also indicated that team shared mental models (SMMs) moderated the effect of team reflexivity on TMS. The research findings can help organizations recognize the importance of team reflexivity, TMS, and SMMs in promoting employees' feedback-seeking behavior. Based on this understanding, organizations can better formulate strategies to leverage team reflexivity, TMS, and SMMs to enhance team member's feedback-seeking behavior, which will also be beneficial for the sustainable development of the organization.

KEYWORDS

team reflexivity, transactive memory system (TMS), feedback-seeking behavior, shared mental models (SMMs), transactive memory system theory, multi-level analysis, team dynamics, organizational behavior

1 Introduction

With the growing dynamism of the environment, team reflexivity becomes especially important as it has been proved to be a key approach for organizations to monitor and react to environmental changes (Schippers et al., 2014; Widmer et al., 2009). Team reflexivity refers to the extent to which team members overtly reflect upon and communicate about the team's objectives, strategies, and processes, and adapt themselves to current or anticipated dynamic environments (West, 1996, 2000). Previous research has mainly focused on exploring the positive effects of team reflexivity on teams, including team performance (Yang et al., 2020; Wu et al., 2019; Schmutz et al., 2018; Schippers et al., 2013), team innovation (Leblanc et al., 2022; Chen et al., 2016; Schippers et al., 2012; Tjosvold et al., 2004), team effectiveness (Widmer et al., 2009), and team ambidexterity (Li et al., 2018). Only a few studies have examined the impact of team reflexivity on team members, such as employee's psychological well-being (Chen et al., 2018) and employee's innovative behavior (Wang et al., 2021; Wang et al., 2022).

However, the influence of team reflexivity on team member's feedback-seeking behavior, which is defined as "conscious devotion of effort toward determining the correctness and adequacy of behaviors for attaining valued end states" (Ashford, 1986, p. 466) has rarely been noted in the dynamic environment. Notably, feedback-seeking behavior is encouraged by prior scholars and practitioners, because positive solicitation of feedback is related to better

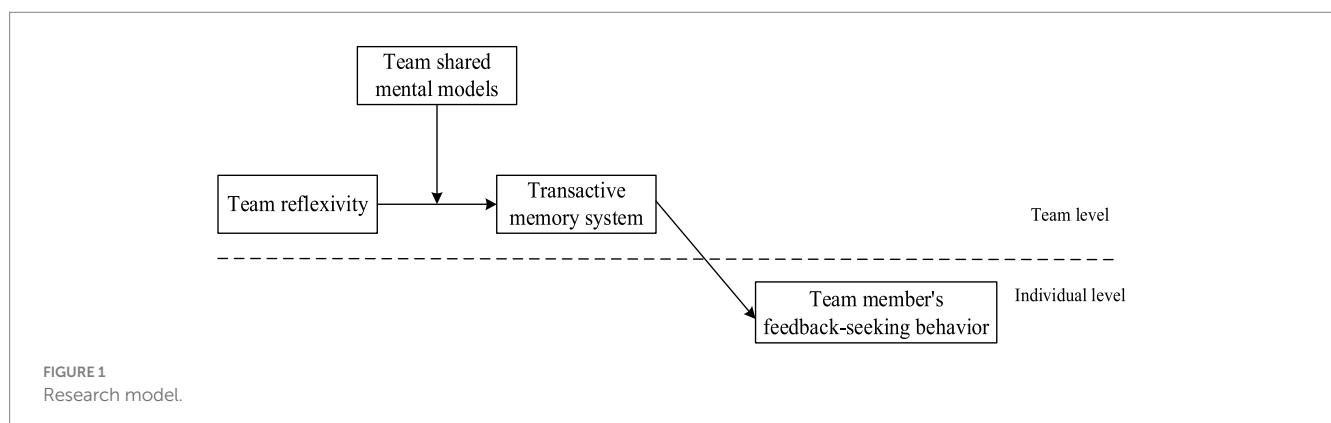
performance, effectiveness, and creativity of individuals because feedback-seeking behavior provide essential information that allows them to improve (Ashford and Tsui, 1991; De Stobbeleir et al., 2011; Gong et al., 2017; Sherf and Morrison, 2020). Particularly in the growing dynamism of the environment, information tends to be more uncertain and complex and is often not volunteered by others, which increases the value of feedback seeking (Bennett and Lemoine, 2014; Sherf and Morrison, 2020; Ashford, 1986). As a result, it becomes especially significant for employees to seek feedback from others when facing the uncertainty of the work environment. What's more, team reflexivity focuses on team level to explain the adaptation of working methods to changing environments (West, 1996). Whereas considering adaptive behavior at the micro level, it is closely related to feedback-seeking behavior in terms of collecting information by individuals to adjust their behavior to the environment (Anseel et al., 2015; Ashford and Cummings, 1983; Bălăceanu et al., 2021). In light of this, feedback-seeking can be viewed as a crucial consequence to evaluate the effectiveness of team reflexivity in practice. Accordingly, scholars believed that team reflexivity may produce a supportive feedback environment by requiring team members to openly discuss appropriate ways to collaborate and to periodically revise objectives and procedures (Sung et al., 2019; Wu et al., 2014), but they did not further reveal the mechanisms of the relationship between team reflexivity and team member's feedback-seeking behavior. Therefore, this study intends to explore how and when team reflexivity affects team member's feedback-seeking behavior.

This research draws on the transactive memory system theory (Wegner, 1987) to identify team transactive memory system (TMS) as an important mediator in explaining team reflexivity influencing member's feedback-seeking behavior. TMS refers to an interdependent cooperation and division system which formed among team members, it is used to acquire, store and use information or knowledge from different fields, which consists of three dimensions: credibility, specialization and coordination (Lewis, 2003; Bachrach and Mullins, 2019). Transactive memory system theory points that interaction and communication among team members can increase the diversity of information and mutual reliance in the team, which is one of the most essential elements for improving TMS (Wegner, 1987; Leo et al., 2022). Thus, with public reflection and communication on the team's objectives and tasks, team reflexivity may constitute the foundation of the original team TMS structure (Bachrach et al., 2018; Lewis, 2004). Besides, TMS can promote a harmonious and efficient collaborative team atmosphere by enabling members to understand team members'

expertise and increasing their trust about the knowledge and expertise of others (Lewis et al., 2005), which produces a favorable feedback environment characterized by adequate communication and mutual trust. Thus, we believe that TMS mediates the relationship between team reflexivity and team member's feedback-seeking behavior.

We further examine an important boundary condition on the extent to which team reflexivity facilitates TMS and then motivates team member's feedback-seeking behavior. Given team reflexivity involves the cooperative process of cognitive interaction (Schippers et al., 2013; West, 1996, 2000), the existing of team shared mental models (SMMs), which refers to an organized understanding or mental representation of knowledge shared by team members (Klimoski and Mohammed, 1994), provides a common cognitive basis for team cooperation (Mesmer-Magnus and Dechurch, 2009; Stasser and Titus, 1985). It is crucial to simultaneously consider the cognitive process and characteristic during team cooperation, because the characteristic of high-level shared cognition, in term of SMMs, can help members to reach a consensus on the understanding of the same task, so as to effectively communicate, exchange information as well as coordination (Yang et al., 2008). In addition, according to transactive memory system theory, team members with high-level of shared cognition will be more likely to hold common understandings about their interaction and communication, which is more beneficial to the formation of TMS (Ellis, 2006; He and Hu, 2021). Thus, we believe SMMs will moderate the relationship between team reflexivity and TMS. In particular, when team members hold similar mental models, they are more likely to reach consensus on team knowledge and desired goals during the collective reflection process, and then they can effectively coordinate and utilize their respective expertise to develop TMS of the team. A depiction of our hypothesized model is presented below in Figure 1.

This study attempts to contribute to the existing research in the following ways. First, we extend the individual-level outcomes of team reflexivity by assessing how it affects team member's feedback-seeking behavior. Previous studies on team reflexivity outcomes are mostly focused on the team level, limiting our knowledge of its impact on team members. Thus, this study extends the literature on team reflexivity by examining how it contributes to team member's feedback-seeking behavior on the individual level. Second, according to transactive memory system theory, we propose that the relationship between team reflexivity and team member's feedback-seeking behavior is mediated by TMS. Previous research have already examined the individual psychological and behavioral mechanisms



behind the link between team reflexivity on team members (Wang et al., 2021; Wang et al., 2022; Chen et al., 2018), but rarely noticed the impact of team factors. We provided a new theoretical insight on the mechanisms by which team reflexivity affects individual's behavior from the perspective of the team's cognitive process (i.e., TMS). Third, our research further contributes to the team reflexivity literature by exploring a boundary condition under which team reflexivity is more or less beneficial for team members. According to transactive memory system theory, we suggest that the relationship between team reflexivity and TMS will be moderated by SMMs.

2 Theory and hypotheses

2.1 Transactive memory system theory

TMS is defined as an interdependent cooperation and division system which formed among team members, it is used to acquire, store and use information or knowledge from different fields, which is demonstrated to consist of three dimensions, namely: (a) credibility, defined as mutual trust in the skills and knowledge of each team member; (b) specialization, defined as the specific roles that each team member has associated with their skills and knowledge; and (c) coordination, understood as the team's ability to organize and combine different skills and knowledge to be able to work effectively (Lewis, 2003; Lewis et al., 2005). Transactive memory system theory emphasizes the sense of expertise allocation among team members, and encourages members to utilize others' knowledge storage to complement and enhance their own knowledge (Wegner, 1987; Hollingshead, 1998). Thus, the effectiveness of a TMS relies on cognitive interdependence among members, as they interact with, trust and cooperate with each other.

2.2 Team reflexivity and TMS

Based on transactive memory system theory, we anticipate team reflexivity to enable team members to clarify the expertise allocation of the team, create a trusting and collaborative environment, and in turn motivate members to seek feedback from others in the team. Specifically, as a team-regulatory process, team reflexivity involves the process of team members sharing and discussing opinions and ideas about their work (Schippers et al., 2008), facilitating them to develop a more comprehensive understanding and trust of others' knowledge and expertise (West, 1996). Besides, TMS development requires frequent interaction among members which promotes the integration and utilization of knowledge (Wegner, 1987). Therefore, as a critical and unique interaction process, team reflexivity may serve as a significant factor to improve TMS of the team.

According to transactive memory system theory (Wegner, 1987), we propose that team reflexivity will influence team TMS in three aspects: credibility, specialization and coordination. First, team reflexivity encourages open and honest communication among team members, fostering an environment of trust. As team members engage in reflective discussions, they become more aware of each other's strengths and weaknesses (Hollingshead and Brandon, 2003), leading to increased credibility in the information shared within the team. This credibility in one another's knowledge and expertise is a cornerstone of a robust TMS (Brandon and Hollingshead, 2004; Hollingshead, 1998).

Second, during the process of team reflexivity, team members overtly reflect upon and discuss about the team's objectives, strategies, and processes. This allows the team to identify the current deficiencies at work (Wang et al., 2021), motivating members to share their expertise and knowledge to reconcile the discrepancies between the objectives and current performance. In this way, team reflexivity may eliminate their mutual boundaries and allow members to discover expertise within team. As each team member focuses on mutual area of expertise, they contribute to the overall efficiency of the TMS. Third, team reflexivity will enhance coordination within the team. By reflecting on their interactions and processes, team members can identify and address any gaps or overlaps in their collective knowledge. This leads to better coordination in information sharing and task execution, which is essential for the smooth operation of a TMS. In summary, team reflexivity plays a pivotal role in promoting the credibility, specialization, and coordination necessary for a well-functioning TMS.

As mentioned above, we conclude that team reflexivity will develop a trusting and collaborative environment among members, and also enable team members to clearly recognize the mutual expertise among the team, which benefits the formation of the main components of TMS including credibility, specialization, and coordination. Therefore, we propose the following hypothesis:

H1: Team reflexivity is positively related to TMS.

2.3 Team reflexivity and feedback-seeking behavior: the mediating role of TMS

Furthermore, we identify TMS as a critical determinant of team member's feedback-seeking behavior. The exploration of the antecedents of feedback-seeking behavior has mostly been conducted from the perspective of the value-cost framework (Sung and Choi, 2021). When deciding whether or not to seek feedback from others, individuals will first assess the potential cost and value involved in the behavior. Specifically, the most obvious value is the possibility of obtaining diagnostic information helping to improve one's performance and achieve the anticipated objectives (Ashford, 1986). In contrast, feedback-seeking behavior may also impose cost, including damage to one's ego (such as receiving negative feedback) or one's image (such as appearing unsure or incompetent) (Ashford, 1989). Thus, feedback-seeking behavior is more likely to emerge when the expected value exceeds its cost (Anseel et al., 2015).

As a critical factor, TMS can affect the perceived value and cost of feedback-seeking behavior in terms of credibility, specialization, and coordination. Firstly, when team members have a high level of credibility with the others of the team, they believe that the feedback they receive from others will be truthful and constructive, which will increase the perceived value of feedback-seeking behavior. At the same time, when team members have a high level of credibility with the others of the team, they are also less likely to fear embarrassment or humiliation, which are potential costs associated with feedback-seeking behavior. This increment in expected values and reduction in expected costs make the feedback-seeking behavior more appealing. Secondly, members' perception of team specialization will increase the value of feedback-seeking behavior because they can receive input from those with a deep understanding of areas they may not be as familiar with. Specialized feedback is more likely to address specific issues and

provide insights that lead to performance improvement (Ashford, 1986; Madison et al., 2021). Besides, members' perception of team specialization can also mitigate the self-esteem damage that may come with receiving negative feedback. When team members recognize and respect each other's areas of specialization, they are more likely to view negative feedback as a learning opportunity rather than a personal shortcoming, which will reduce the psychological cost of feedback-seeking behavior. Thirdly, the coordination established by TMS leads team members to believe that others will genuinely help each other to achieve the collective objectives, so they are convinced that it is reliable to seek feedback from others without being humiliated, which also increase the expected value and reduces the expected cost of feedback-seeking behavior.

In summary, TMS may increase the expected value and reduce the expected cost of feedback-seeking behavior, which encourages individuals to engage in this behavior more frequently. Therefore, we can propose the following hypothesis:

H2: TMS has a positive effect on team member's feedback-seeking behavior.

To sum up, team reflexivity in which members overtly reflect upon and discuss the team's objectives, strategies and processes may constitute the foundation for TMS structure of expertise allocation within a team. Thus, it enables members to understand each other's expertise, enhances the credibility in their expertise, and facilitates a collaborative team atmosphere (Lewis, 2003), producing a favorable feedback environment. Therefore, based on transactive memory system theory, we contend that team reflexivity positively influences TMS, which in turn stimulates team member's feedback-seeking behavior. Therefore, we propose the following hypothesis:

H3: TMS mediates the positive effect of team reflexivity on team member's feedback-seeking behavior.

2.4 The moderating role of the SMMs

SMMs, characterized as the shared knowledge structure and cognition among team members concerning critical components of a team's task environment (Lewis, 2003). In this study, we believe that SMMs will interact uniquely with team reflexivity to facilitate TMS. When team members engage in reflexivity, they are also essentially examining and adjusting their SMMs. A high level SMMs can make this process more effective, as it provides a clear framework for what needs to be examined and adjusted. Besides, researchers have provided evidence that TMS and SMMs are conceptually and empirically distinct constructs, and the efficient function of TMS relies on team members possessing a shared understanding of the cooperation patterns in the team (Austin, 2003; Lewis, 2003). Transactive memory system theory also indicates that team members with similar mental models are more likely to facilitate team TMS (Ellis, 2006; He and Hu, 2021). Therefore, we further suggest that the relationship of team reflexivity and TMS is moderated by SMMs.

As a system of knowledge structure and cognition collectively held by team members, SMMs contributes to the efficiency of team processes (Schmidtke and Cummings, 2017). On the one hand, an essential element of team reflexivity is the public discussion regarding team work. When SMMs are high, team members are more likely to

reach consensus on team objectives and strategies, and the process of team reflexivity will be more effective (Wang et al., 2021), promoting cooperation and division among team members and further facilitating the formation of TMS. On the other hand, when team members hold a high level SMMs, they are more likely to accurately understand and reach consensus on team works, which in turn encourages members to coordinate their work smoothly and utilize each other's expertise efficiently. Therefore, the respective expertise of team members can be effectively leveraged to improve the TMS.

In contrast, when the team is deficient in SMMs, it is problematic for members to reach a consensus on team tasks. Hence, during the team reflexivity process, the effectiveness of discussion may be compromised. On one hand, this will hinder members' mutual understanding and credibility in others' expertise; on the other hand, it will be inconducive to effectively integrate and utilize members' knowledge and expertise, discouraging from obtaining the effective coordination of work. To sum up, we expect that SMMs would amplify the relationship between team reflexivity and TMS. Therefore, we posit the following hypothesis:

H4: SMMs moderates the positive relationship between team reflexivity and TMS, such that the strength of this relationship is more positive for teams with more similar SMMs.

3 Methodology

3.1 Sample and procedure

We recruited 280 employees and their direct leaders from 59 teams in different industries (e.g., service, manufacture, finance and IT) in China, and all of these teams are either management or R&D teams. We chose these samples for two reasons: Firstly, influenced by China's collectivist culture, team reflexivity and feedback-seeking behavior are more likely to occur in the Chinese context. Secondly, team reflexivity is particularly important for both management teams and R&D teams. Furthermore, to improve data quality, the survey was anonymous and matched, each team leader and employee should fill out the identification number assigned to them correctly. Besides, in order to reduce possible common method bias, we collected the data in two waves with an interval of three months. At Time 1, questionnaires were sent to 280 employees from 59 teams. In specific, we invited employees to complete their demographic information, team reflexivity, and the SMMs. At the end, we screened the questionnaires and finally obtained valid questionnaires from 243 employees of 57 teams, with an effective response rate of 86.79%. At Time 2, three months later, we sent new questionnaires to 243 valid respondents, and asked them to complete a rating of the TMS. At the same time, we sent questionnaires to the direct 57 team leaders of 243 employees, which included their evaluation of employee's feedback-seeking behavior. Ultimately, we received 213 valid questionnaires from 56 teams, with an effective response rate of 87.65%. In the final sample, 67.61% were male, 52.11% were below 25 years old; About 37.56% had been working for their companies between one and three years, and 87.79% had bachelor's degrees or higher.

3.2 Measures

Considering the measurement of variables, we used scales that have been shown to have high reliability and validity to measure our

target variables. A five-point Likert scale (1 = “strongly disagree,” 5 = “strongly agree”) was used in the survey.

3.2.1 Team reflexivity

We measured team reflexivity using the 9-item scale adapted from Tjosvold et al. (2004) and Carter and West (1998). Sample items included “We regularly discuss whether the team is working effectively together.” The Cronbach’s alpha of this measurement instrument was 0.915.

3.2.2 Transactive memory system

We measured TMS using the 15-item scale adapted from Lewis (2003). Sample items included “Different team members are responsible for expertise in different areas.” The Cronbach’s alpha of this measurement instrument was 0.927.

3.2.3 Shared mental models

We measured SMMs using the 6-item scale from Cannon-Bowers et al. (1990). Sample items included “Team members are familiar with the skills and competencies of other members.” The Cronbach’s alpha of this measurement instrument was 0.870.

3.2.4 Feedback-seeking behavior

The 11-item scale adapted from Callister et al. (1999) was used to measure employees’ feedback-seeking behavior, which is rated by the direct leaders of the participants. Sample items for employees’ feedback-seeking behavior included “He/She asks me if he/she meets job requirements.” The Cronbach’s alpha of this measurement instrument was 0.917.

3.2.5 Control variables

According to existing research on individual feedback-seeking behavior (Ferris et al., 2015), we controlled for factors that may have influenced this research, such as employees’ age, gender, education level, and tenure in the current company. Besides, the participants come from different teams and the data is nested, so we further control for team size in the multi-level analysis.

3.3 Data aggregation

Our research model presents the effect of team reflexivity on team member’s feedback-seeking behavior with a multilevel nature and the employee data we collected were nested within the team. At the same time, according to the definition of team reflexivity, TMS, and SMMs,

we can see that these variables represent the collective nature of the team and only make sense when aggregated to the team level. So, we further analyzed whether the data could be aggregated. Firstly, we performed a one-way random-effects ANOVA and calculated the ICC values for the team-level focal variables. The ICC(1) values of team reflexivity, TMS, and SMMs were 0.37, 0.22, and 0.47, respectively; while the ICC(2) values of these constructs were 0.69, 0.51, and 0.77, respectively. The results indicated that team reflexivity, TMS, and SMMs varied across teams. Secondly, we further calculated the reliability of score within group (R_{wg}) across teams to test the within-team agreement (James et al., 1984). The R_{wg} values of team reflexivity, TMS, and SMMs were 0.943, 0.966, and 0.937, respectively, demonstrating a high level of agreement within the teams. Taken together, the results showed that the target variables (team reflexivity, TMS, and SMMs) can be appropriately aggregated to the team level.

4 Results

4.1 Confirmatory factor analyses

Firstly, the discriminant validity of the focal variables was tested by a series of CFA analyses using Mplus 7.4 software before we tested the hypotheses. The results are shown in Table 1, the hypothesized four-factor model (M0), which included team reflexivity, TMS, SMMs and feedback-seeking behavior fits to the data well ($\chi^2 = 317.706$, $df = 224$, CFI = 0.938, TLI = 0.929, RMSEA = 0.044, SRMR = 0.051). Besides, the results also showed that the four-factor model had the best fit validity compared to the other models, which included all three-factor models (any two of the four factors were combined). Therefore, the findings suggested that our target variables are distinctive from each other and the distinctiveness of them was supported.

4.2 Hypotheses testing

The data of this study contained both individual and team level, with employees being nested within their teams. The descriptive statistics and correlations of the variables are shown in Table 2. Then, we further performed a multi-level analysis using Mplus7.4 software to test our hypotheses. The result of coefficient estimates for our hypotheses are shown in Table 3. To test Hypothesis 1, we regressed the TMS on team reflexivity and the results demonstrated that team reflexivity was positively related to TMS ($\beta = 0.388$, $p < 0.01$). This

TABLE 1 Results of the confirmatory factor analysis.

Model	χ^2	df	CFI	TLI	RMSEA	SRMR
Four-factor model (TR, TMS, SMMs, FSB)	317.706	224	0.938	0.929	0.044	0.051
Three-factor model (TR + TMS, SMMs, FSB)	454.214	227	0.849	0.831	0.069	0.063
Three-factor model (TR + SMMs, TMS, FSB)	442.683	227	0.856	0.840	0.067	0.065
Three-factor model (TR + FSB, TMS, SMMs)	378.129	227	0.899	0.888	0.056	0.061
Three-factor model (TR, TMS + SMMs, FSB)	425.726	227	0.868	0.852	0.064	0.061
Three-factor model (TR, TMS + FSB, SMMs)	364.553	227	0.908	0.898	0.053	0.057
Three-factor model (TR, TMS, SMMs + FSB)	362.109	227	0.910	0.900	0.053	0.056

N = 213. TR, team reflexivity; TMS, transactive memory system; SMMs, shared mental models; FSB, feedback-seeking behavior.

means that team reflexivity will change in the same direction as TMS, that is, when the level of team reflexivity is high, the TMS will also be higher. Therefore, the Hypothesis 1 was supported.

Further more, to test Hypothesis 2, team member’s feedback-seeking behavior was regressed on TMS and control variables. Results showed that TMS was positively related to team member’s feedback-seeking behavior ($\beta = 0.488, p < 0.01$). This means that TMS will change in the same direction as team member’s feedback-seeking behavior, that is, when the level of TMS is high, team members will engage in more feedback-seeking behaviors. In addition, there was a positive indirect effect of team reflexivity on team member’s feedback-seeking behavior via TMS ($\beta = 0.189$) and the 95% confidence interval is [0.053, 0.325], excluding zero (see Table 4). Therefore, Hypothesis 2 and Hypothesis 3 were supported.

Lastly, we centered team reflexivity and SMMs and then interacted them to further test the moderating effect. The analysis results (see Table 3) showed that the interaction effect between team reflexivity and SMMs on TMS was significant ($\beta = 0.409, p < 0.05$). Moreover, following the suggestion of Aiken et al. (1990), we further examined the significance of simple slopes at different levels of SMMs (1 SD above the mean value and 1 SD below the mean value). Figure 2 and Table 5 showed the result of simple slope testing. In particular, the relationship between team reflexivity and TMS was stronger when SMMs was higher ($\beta = 0.572, p < 0.01$) but weaker when SMMs was lower ($\beta = 0.204, p < 0.05$); the difference between these two conditions (1 SD above the mean value and 1 SD below the mean value) was significant ($\beta = 0.368, p < 0.05$). Taken together, Hypothesis 4 was supported.

5 Discussion

Considering the importance of member’s feedback-seeking behavior in teams, it is critical to explore which team factors influence team member’s feedback-seeking behavior. Based on transactive memory system theory, our study responded to this question and proposed that team reflexivity is an important predictor of team member’s feedback-seeking behavior and subsequently proposed four hypotheses. The results of the hypotheses test in the research are summarized in Table 6. Specifically, team reflexivity is positively related to TMS, and TMS has a positive effect on team member’s feedback-seeking behavior. In addition, team reflexivity indirectly affected

member’s feedback-seeking behavior through TMS and that SMMs moderated the effect of team reflexivity on TMS, such that these effects would be stronger when the team with a high-level SMMs. Overall, this study has several theoretical and practical implications.

5.1 Theoretical implications

This study contributes to the current literature in three aspects. Firstly, this study advances the literature on the outcomes of team reflexivity at the individual level by proposing and examining a multilevel model. While the extant research on exploring team reflexivity outcomes are mostly focused on the teams (Yang et al., 2020; Wu et al., 2019; Schmutz et al., 2018; Schippers et al., 2012). Only a few studies have examined the impact of team reflexivity on team members (Chen et al., 2018; Wang et al., 2021; Wang et al., 2022). In addition, previous research also indicated that team reflexivity may produce a supportive feedback environment (Sung et al., 2019; Wu et al., 2014), but they did not further test the relationship. To advance the literature on team reflexivity and refine existing research findings, this study focused on the individual outcome, proposed and examined the multilevel effect of team reflexivity on team member’s feedback-seeking behavior.

Secondly, this research provided a new theoretical insight on the mechanisms by which team reflexivity affects individual’s behavior in the perspective of team’s cognitive process. Existing studies have pointed out that job demands, control, support (Chen et al., 2018), knowledge sharing (Wang et al., 2021) and individual intellectual capital (Wang et al., 2022) mediate the effect of team reflexivity on team members. These research mainly focused on the mechanisms of individual factors, may overlook that the impact of team reflexivity on employees may not be straightforward, as some other team factors could potentially play a pivotal role in this regard. Thus, based on transactive memory system theory, we proposed and examined TMS as a mediator in the relationship between team reflexivity and team member’s feedback-seeking behavior, providing a new perspective (team cognitive process) on the mechanism of team reflexivity influencing member’s behavior. Additionally, this study enriched transactive memory system theory by explain the relationship between team reflexivity and individual behaviors. Existing studies explored the mediating effect of TMS in the relationship between several types of antecedents (e.g. management practices, team characteristics and

TABLE 2 Descriptive statistics.

Variable	Mean	SD	1	2	3	4	5	6	7	8	9
1. Team size	3.99	0.849	—	—	—	—	—	−0.039	−0.165*	0.018	—
2. Employee gender	1.320	0.469	—	—	—	—	—	—	—	—	—
3. Employee age	1.460	0.536	—	−0.039	—	—	—	—	—	—	—
4. Employee education	1.990	0.523	—	−0.161*	−0.052	—	—	—	—	—	—
5. Employee tenure	1.460	0.578	—	−0.025	0.136*	−0.017	—	—	—	—	—
6. TR	4.015	0.533	—	−0.136*	−0.138*	−0.031	−0.024	—	0.524**	0.610**	—
7. SMMs	3.822	0.590	—	−0.109	−0.136*	0.040	−0.029	0.487**	—	0.661**	—
8. TMS	4.124	0.564	—	0.005	−0.169*	0.074	0.005	0.564**	0.560**	—	—
9. FSB	3.322	0.402	—	0.209**	−0.059	0.018	0.036	0.212**	0.276**	0.289**	—

N = 213. *p < 0.05; **p < 0.01. Correlations below the diagonal represent individual level correlations, and correlations above the diagonal represent team level correlations.

TABLE 3 Results of hypothesis testing.

	TMS			Feedback-seeking behavior		
	Estimate	S.E.	95% CI	Estimate	S.E.	95% CI
<i>Within level</i>						
Employee gender				0.090**	0.031	[0.028, 0.152]
Employee age				0.058*	0.025	[0.009, 0.107]
Employee education				−0.025	0.026	[−0.076, 0.026]
Employee tenure				0.000	0.031	[−0.061, 0.061]
<i>Between level</i>						
Team size	0.051	0.034	[−0.017, 0.118]			
Team reflexivity	0.388**	0.094	[0.204, 0.572]	0.072	0.140	[−0.202, 0.346]
TMS				0.488**	0.128	[0.238, 0.738]
SMMs	0.367**	0.059	[0.252, 0.482]			
Team reflexivity × SMMs	0.409*	0.208	[0.002, 0.816]			

N = 213, Team = 56. * $p < 0.05$; ** $p < 0.01$.

TABLE 4 Results of mediating effect.

Path	Estimate	S.E.	95% CI	Hypothesis test
Team reflexivity→TMS→ Feedback-seeking behavior	0.189**	0.069	[0.053, 0.325]	Support H3

N = 213, Team = 56. * $p < 0.05$; ** $p < 0.01$.

environment characteristics) and performance outcomes (e.g., [Chiang et al., 2014](#); [Argote et al., 2018](#); [Bachrach et al., 2018](#); [Huang and Chen, 2018](#)). Thus, our study provided a new application of transactive memory system theory by explain the relationship between the team interaction characteristic and the individual-behavior outcome.

Thirdly, our study further makes a contribution to team reflexivity literature by exploring an essential boundary condition for its effects on TMS. Existing studies have mainly investigated the moderating effects in the process of team reflexivity, such as team tenure ([Chen et al., 2018](#)), team size ([Schmutz et al., 2018](#)), team diversity ([Yang et al., 2020](#)), team context ([Schippers et al., 2012](#)) and leadership style ([Wang et al., 2021](#)), etc. However, coherent cognition among team members would improve the effectiveness of team reflexivity ([Konradt et al., 2021](#)), which has not attracted the attention of scholars. Therefore, according to transactive memory system theory, we examined the moderating role of SMMs featuring team coherent cognition in the effect of team reflexivity on TMS and team member’s feedback-seeking behavior. By doing so, we enriched the literature of team reflexivity and provided a fuller understanding of the effects of team reflexivity on individual-level outcomes.

5.2 Practical implications

Practically, the present study also offers several valuable implications. Firstly, the results encourage team leaders to recognize the importance of team reflexivity and better leverage team reflexivity to enhance team member’s feedback-seeking behavior. Specifically, in the perspective of team routine, team leaders should actively create an

atmosphere of adequate communication and mutual trust among team members, and encourage them to discuss team objectives and processes in public, thereby increasing the expected value and reducing the cost of feedback-seeking behavior. However, there are limits to what leaders can do individually, and organizations need to find more ways to support the team reflexivity in the management process, for example, setting up guided reflexivity sessions, in other words, team debriefings or after action reviews ([Leblanc et al., 2022](#)). These ways have been proved to be efficient to encourage reflexive activities of employees in following work routine ([Konradt et al., 2015](#)).

Second, the findings also show that team reflexivity can facilitate team member’s feedback-seeking behavior by enhancing TMS. Therefore, leaders and organizations should focus more on the development of the TMS. Specifically, in the process of recruiting, the leader and human resource department should have regard to building a well-conceived knowledge structure by incorporating individuals with differentiated and complementary expertise. Meanwhile, during team operations, the team should be expected to provide platforms and opportunities conducive to communication among members. Additionally, organizations should enhance the exchange of knowledge, information and emotions among members to accelerate the flow of knowledge and information. At the same time, organizations could set team communication space and fixed communication schedule in order to build a foundation of practice. By doing so, it will foster mutual understanding and trust, and strengthen TMS of the team, thus encouraging individuals to engage in feedback-seeking behavior more frequently.

Third, our study reveals that SMMs, as a key moderator, amplifies the positive effects of team reflexivity on TMS in teams. Accordingly, managers should keep track of the development of SMMs by encouraging team members to communicate information and share knowledge for achieving the common objectives, which may promote members to generate a consistent expectation for objectives and a collective understanding of task-related knowledge. In the perspective of human resource management, organizations can implement training on interpersonal communication and interaction to foster a common understand about social roles and norms, which can help to built SMMs of teams ([Arendt et al., 2024](#)). As such, SMMs can

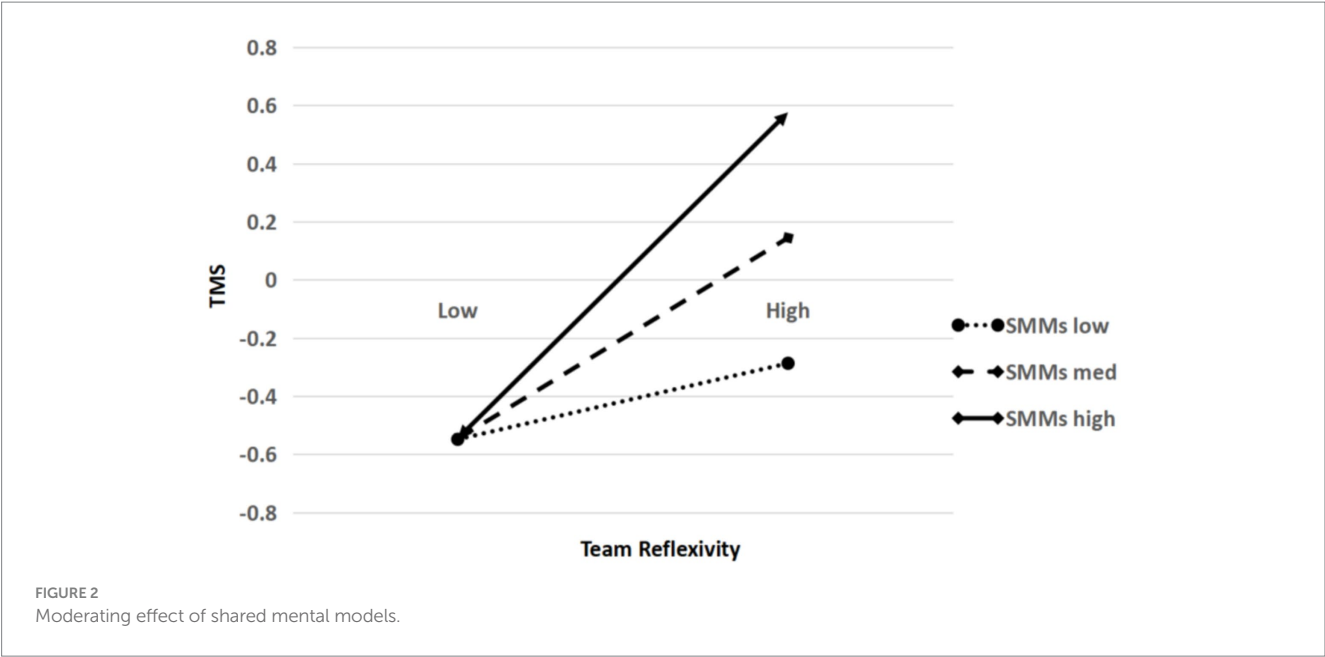


TABLE 5 Results of simple slope analyses.

SMMs	Estimate of simple slope	S.E.	95% CI	Hypothesis test
High (+SD)	0.572**	0.167	[0.245, 0.898]	Support H4
Low (-SD)	0.204*	0.085	[0.037, 0.371]	
Difference	0.368*	0.187	[0.002, 0.734]	

N = 213, Team = 56. Simple slope indicates the relationship between team reflexivity and transactive memory system. * $p < 0.05$; ** $p < 0.01$.

TABLE 6 Summary of the hypotheses test.

Hypotheses	Content of the hypotheses	Test results
Hypothesis 1	Team reflexivity is positively related to TMS.	Support
Hypothesis 2	TMS has a positive effect on team member's feedback-seeking behavior.	Support
Hypothesis 3	TMS mediates the positive effect of team reflexivity on team member's feedback-seeking behavior.	Support
Hypothesis 4	SMMs moderates the positive relationship between team reflexivity and TMS, such that the strength of this relationship is more positive for teams with more similar SMMs.	Support

effectively improve team communication, trust and collaboration, leveraging upon member's knowledge and expertise.

5.3 Limitations and future research directions

Although this study has some theoretical and practical implications, there are still some limitations that can be addressed in the future. First, based on transactive memory system theory, we proposed and examined TMS and SMMs as the mediator and the moderator in the relationship of team reflexivity-team member's feedback-seeking behavior. Yet, there may be other theoretical perspectives that can explain the relationship between team reflexivity and team member's feedback-seeking behavior, such as social cognitive theory, self-determination theory, etc. At the same time, there may be other factors that may mediate the relationship between team reflexivity and team member's feedback-seeking behavior,

including individual-level factor (e.g., the motivation of feedback-seeking behavior, self-efficacy), internal team-level factors (e.g., inter-member trust, conflict resolution), etc. Thus, in the future, researchers can further explore other significant mechanisms how team reflexivity affects team members from different perspectives, and deeply discuss interplay between TMS, SMMs and other internal team-level factors.

Second, given the availability of data, we only conducted the study with companies in different regions of China. However, as Chinese employees may be profoundly influenced by China's collectivist culture, their acceptance of feedback-seeking behavior may differ from that in other countries. Therefore, we need to be cautious when generalizing our conclusions to other countries. At the same time, we also call for more studies to increase the sample size and include a large number of companies from other countries to enhance the generalizability of the findings in the future.

Third, the measure of team reflexivity in our research focused mainly on the quantity and number of reflection. However, several

scholars have pointed out that assessing quality (i.e., the depth of information processing) in team reflexivity constructs could be more relevant to team and individual than assessing quantity (Moreland and McMin, 2010; Schippers et al., 2014; Otte et al., 2017). Therefore, the present study did not consider comprehensively when exploring the mechanism of action of team reflexivity, and in the future, the quality and quantity of team reflexivity should be both taken into account to reveal its unique mechanism.

Fourth, according to existing research on individual feedback-seeking behavior (Ferris et al., 2015), we controlled for factors that may have influenced this research, such as employees' age, gender, education level, and tenure in the current company. However, we ignored some other team factors, such as industry type and team tenure, which may also influence team reflexivity, TMS and SMMs in this study. Therefore, we will fully consider the possible influencing factors of each variable and reasonably select control variables to ensure the accuracy of the research results in future related studies.

Fifth, although we used a two-wave, time-lagged design to minimize common method bias, we measure each construct only once, and since this study was essentially cross-sectional, causal inferences could not be established explicitly. The results reported in the text can only represent the correlation between the variables, and cannot accurately reflect the causal inference. Therefore, longitudinal or experimental studies could be conducted in the future to better validate the causal inferences of research model in this paper.

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

ML: Conceptualization, Data curation, Investigation, Methodology, Resources, Supervision, Writing – original draft,

Writing – review & editing. BL: Conceptualization, Data curation, Funding acquisition, Resources, Supervision, Writing – review & editing. QS: Data curation, Formal analysis, Investigation, Methodology, Writing – review & editing. HW: Data curation, Investigation, Software, Visualization, Writing – original draft. YZ: Conceptualization, Methodology, Supervision, Project administration, Investigation, Writing – review & editing.

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The influence of teachers' psychological capital on the quality of work life: exploring the mediating impact of emotions

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Introduction: The aim of this study is to investigate whether emotions play a mediating role in determining the effect of teachers' psychological capital (PsyCap) on the quality of work life (QWL).

Methods: The current study presents an investigation on the mediating role of emotions and their effect on teachers' PsyCap at their work life. The study used scales including Psychological Capital Scale (PsyCapS), Quality of Work Life Scale (QWLS) and Emotions Scale (ES). The scales were all applied to administrators and teachers in state schools in TRNC. The sample of the study consists of 369 teachers and school administrators. Data were analyzed using SPSS 27.0 for descriptive statistics and correlation analyses. In addition, structural equation modeling was performed with AMOS to examine the potential mediating effect of emotions on the relationship between PsyCap and QWL.

Results: As a result, the mediating role of emotions in the relationship between teachers' PsyCap and perceptions of QWL was fully supported. There was a significant correlation between teachers' PsyCap, perceptions of QWL and emotions. PsyCap was found to have a significant and positive effect on both emotions and perceptions of QWL. In addition, PsyCap was found to have a significant positive relationship with QWL.

Discussion: Among TRNC teachers, PsyCap has a significant positive relationship with both emotions and perceptions of QWL. PsyCap can directly or indirectly increase the perception of QWL through the relationship with emotions. Therefore, teachers' positive PsyCap can positively increase their emotions and perceptions of QWL.

KEYWORDS

psychological capital, emotions, quality of work life, mediating impact, teachers

1 Introduction

Emotions play a crucial role in our daily lives. Goleman (1995) notes that they provide meaning to our experiences and guide our behaviors both personally and professionally. American Psychological Association (2021) defines emotion as "a complex response pattern that includes experiential, behavioral, and physiological elements." Lawler and Thye (1999, p. 219) describe emotions as brief evaluative states-either positive or negative-with physiological, neurological, and cognitive aspects. Understanding emotions is vital in organizational behavior, as they influence actions in various ways (Akçay and Çoruk, 2012).

Emotions motivate us, prompting behaviors that address the immediate concerns that triggered them (Frijda, 1986).

The school has an organizational structure centered on people who come from and return to society (Bursalıoğlu, 2011). It features multidimensional interactions among various groups, including administrators, teachers, students, and parents, as well as external sources. This leads to intense human relations and emotions within the school (Barutçugil, 2002; Oplatka and Arar, 2018; Yamamoto et al., 2013). Hargreaves (1998) emphasized the significance of teachers' emotional dimensions, and recent research on teacher emotions has notably increased (Šarić, 2015; Burić et al., 2017; Frenzel et al., 2016).

Emotion is a powerful force that shapes our thinking, decision-making, actions, social relationships, wellbeing, and overall physical and mental health (Izard, 2010). Güngör and Titrek (2024) have demonstrated that school principals' emotional management skills are effective in the decision-making process. Within the educational realm, teachers are aptly designated as emotion workers (Yin et al., 2019). Recognizing the significance of teachers' emotions is essential, as they profoundly influence professional development and the quality of teaching (Lavy and Eshet, 2018). Various factors affect teachers' emotional states, encompassing personal characteristics, evaluative processes, and broader social, cultural, and political contexts (Fried et al., 2015). Furthermore, Lai et al. (2024) argue that the elements influencing teachers' emotions can be streamlined into three overarching levels: the personal qualities of teachers, the contextual factors of their work environment, and the surrounding sociocultural influences. By understanding these dynamics, the teaching profession can be enhanced, ultimately improving educational outcomes for students.

Teachers bring a multitude of personal qualities to their roles, including unique characteristics, educational beliefs, professional identities, emotional intelligence, and essential competencies. The work context plays a critical role as well, shaped by the organizational climate, institutional norms, interpersonal interactions, availability of educational resources, and the physical environment. Furthermore, sociocultural factors—such as the culture surrounding curriculum reform, family education approaches, and community values—are vital to a teacher's experience. The Theory of Emotional Events highlights that experiences in the workplace evoke emotional responses, which significantly influence attitudes and behaviors (Weiss and Cropanzano, 1996). Teachers' emotions are intricately connected to their students and the learning process, their own identities as educators, and the relationships they cultivate with colleagues. These feelings are also influenced by support from school leaders, expectations from parents, and overarching educational policies, all contributing to the context in which teaching occurs (Wu and Chen, 2018). While external factors from within the school, community, and society can impact teachers' feelings, the emotional responses triggered by engaging with students remain the most common and intense (Chen, 2019). Recognizing and addressing these emotional dynamics is crucial for fostering a positive educational environment.

Teachers frequently experience a wide range of discrete emotions such as joy, contentment, pride, love, anger, fatigue, hopelessness, anxiety, shame, or boredom when teaching and interacting with students (Sutton and Wheatley, 2003; Frenzel et al., 2016; Burić et al., 2017; Chen, 2019). Yıldırım (2019) determined that schools have the strongest structure in the relationship network, which includes the

feelings of trust, pride, enthusiasm, courage, satisfaction, contentment, belief and peace.

Hargreaves (2005) proposed the theory of emotional geography as a framework for studying the relationship between teachers' emotions and educational change. This theory has five dimensions: cultural, moral, professional, political and physical geography. The concept of affective geographies helps to identify supports and threats to the basic affective bonds and understandings of schooling that arise from forms of distance or closeness in people's interactions or relationships. To ensure the effectiveness of educational changes and policies, administrators need to consider the emotional factors that influence teachers (Hargreaves, 2005).

While good working conditions can enable teachers to work comfortably and satisfactorily, poor working conditions not only affect the quality of work but can also negatively affect teachers' mental health (Kidger et al., 2016). They also make it difficult to retain talented teachers in the system. Negative emotions are considered to be direct reactions to specific events that are related to the individual. They are especially likely to occur when events are perceived as threatening or when individuals perceive that they lack the ability to manage (Kiefer and Barclay, 2012).

Teachers' emotional states affect many factors such as the quality of education, quality of teaching, school climate, students' achievements, behaviors, participation in classroom activities, teachers' classroom discipline behaviors, classroom management, teaching styles and self-efficacy beliefs (Frenzel, 2015; Frenzel et al., 2009; Hagenauer et al., 2015; Hosotani and Imai-Matsumura, 2011; Pekrun, 2014; Taxer and Frenzel, 2015). In this sense, regulating emotions is almost essential for daily functioning and wellbeing in itself (Cohen and Ochsner, 2018).

1.1 The effect of PsyCap on emotions

In recent years, the increasing interest in positive psychology and the increase in studies in this field have led to the emergence of concepts that include positive approaches, leaving aside negative emotions and behaviors (Klusmann et al., 2008; Ma, 2023; Sun et al., 2022; Zewude and Hercz, 2022).

PsyCap is a concept that tries to explain organizational life and employee characteristics by emphasizing the positive characteristics of the employee. Teachers with strong PsyCap are more likely to engage in effective emotion regulation strategies, which help them manage workplace challenges. Emotional regulation serves as a key mediator between PsyCap and teacher burnout, suggesting that those with greater psychological resources experience fewer negative emotional states (Liu and Du, 2024; Madigan et al., 2023). Similarly, Sun et al. (2022) highlighted that ego-resiliency, a component of PsyCap, strengthens emotional stability and fosters a sense of purpose in work. Another theoretical relationship of PsyCap is the model of expanding and building positive emotions (Fredrickson, 1998). This model suggests that positive emotions lead to higher levels of cognitive and emotional functioning (Fredrickson and Losada, 2005). Similarly, a high level of PsyCap not only reduces stress but also enhances positive emotions, such as enthusiasm and job satisfaction. Positive emotions, in turn, contribute to increased work engagement, as teachers who feel emotionally supported are more likely to be motivated and effective in their roles (Ma, 2023). This aligns with

research emphasizing the role of optimism in maintaining emotional balance under pressure (Zewude and Hercz, 2021).

In this context, harnessing positive psychological resources can enhance an individual's range of behaviors and serve as a vital shield against negative or adverse situations. Research indicates a positive and moderate correlation between positive emotions and PsyCap, while negative emotions demonstrate a negative and low correlation with it (Altunok, 2021). Moreover, employees with high PsyCap tend to experience diminished superficial and deep acting, while their natural emotional expressions flourish positively (Beğenirbaş, 2015). This highlights the critical importance of nurturing PsyCap for improved emotional wellbeing in the workplace. Overall, psychological capital has a profound effect on emotions by fostering resilience, reducing stress, and promoting positive emotional experiences. By strengthening PsyCap through training and interventions, individuals, especially those teaching and serving at the educational arena, can develop better emotional coping mechanisms, leading to improved wellbeing and job performance (Gupta et al., 2019; Luthans et al., 2006).

1.2 The effect of emotions on the QWL

Emotions play a critical role in shaping the QWL, influencing motivation, job satisfaction, and overall wellbeing. Positive emotions such as enthusiasm, joy, and fulfillment enhance workplace engagement, while negative emotions like stress, frustration, and burnout can lead to decreased productivity and dissatisfaction. For educators, in particular, emotions affect personal wellbeing and impact their ability to create a supportive learning environment for students (Zewude and Hercz, 2022).

Ashforth and Humphrey (1995) emphasized that emotions are intertwined with organizational life and are an inseparable part of organizational life, and therefore more importance should be given to the emotional states of employees. According to Pugh (2001), work life is an emotional experience and employees express their emotions while performing their roles. When employees experience positive emotions, they are more likely to feel motivated and engaged in their work. Research suggests that psychological capital (PsyCap), a combination of optimism, resilience, hope, and self-efficacy, helps foster these positive emotional states, leading to a better work life experience (Luthans et al., 2007b). Teachers with higher PsyCap, for example, report greater job satisfaction and lower levels of stress, which enhances their overall QWL (Ma, 2023). Furthermore, positive emotions contribute to stronger relationships with colleagues, fostering a more collaborative and supportive work environment (Liu and Du, 2024; Madigan et al., 2023).

According to Hareli, Rafaeli and Parkinson, the theory of emotional events is basically based on the theory that emotions affect behavior. They explained this as follows; the emotions an individual experiences while performing a task affect their performance while performing the next task. They also emphasized that the general emotional climate of a group affects the performance of individuals and the overall performance of the group (Hareli et al., 2008). Conversely, negative emotions can significantly hinder job performance and QWL. Chronic stress and emotional exhaustion have been linked to burnout, a common issue in demanding professions like teaching (Sun et al., 2022). Teachers who struggle with

emotional regulation may find it difficult to maintain engagement, leading to reduced effectiveness in the classroom and increased job dissatisfaction (Zewude and Hercz, 2021). Studies indicate that emotional regulation plays a crucial role in mediating the relationship between psychological capital and burnout, emphasizing the importance of developing coping strategies to maintain emotional balance (Liu and Du, 2024; Madigan et al., 2023).

QWL is the general quality of an individual's work life. Quality of life includes factors such as income, health, social relationships, as well as other factors such as happiness and satisfaction. The emotions experienced by an individual significantly affect their organizational behavior (Weiss and Cropanzano, 1996). It shows that emotional exhaustion can be managed by ensuring QWL (Permarupan et al., 2020). In organizations with a positive emotional climate, relationships between employees are more effective, which makes it difficult for negative emotions to be present. Synergy occurs within organizations and is believed to enhance performance. To improve QWL, organizations should prioritize emotional wellbeing by creating a supportive work environment, promoting stress management programs, and fostering psychological capital among employees. Encouraging the development of resilience and emotional regulation strategies can help individuals manage workplace challenges more effectively, ultimately leading to a more positive and fulfilling work experience (Monteiro and Joseph, 2023).

Emotions influence people, especially by those around their physical surroundings, and the variations in task completion. Organizational life elicits a range of emotions, and the emotional exchanges among members shape the environment. These emotional experiences impact behaviors, attitudes, and cognition. The interplay of emotions within a team creates a complex network of relationships, where collaboration can either thrive or falter based on the prevailing emotional climate. Positive emotional exchanges, such as mutual support and recognition, can motivate individuals toward shared goals, fostering a sense of belonging and commitment to the organization's mission. Conversely, negative emotions like frustration or jealousy can create divisions, leading to disengagement and decreased productivity. Additionally, the spatial configuration of an organization plays a crucial role in shaping emotional dynamics. Open office layouts may encourage spontaneous interactions and camaraderie, while isolated workspaces can lead to feelings of disconnection and loneliness. Therefore, it is essential for leaders to create environments that promote not only physical accessibility but also emotional connectivity among team members. As organizations deal with the complexities of collective emotions, it becomes increasingly vital to embrace emotional intelligence as a cornerstone of effective leadership. Leaders who are attuned to the emotional needs of their teams can implement strategies that enhance morale and cultivate resilience in the face of challenges. By recognizing and valuing the emotional contributions of each member, organizations can harness a richer tapestry of collaboration that drives innovation and growth. Ultimately, the emotional landscape of an organization can be both a source of strength and a potential pitfall. By fostering a culture that prioritizes open communication, empathy, and genuine appreciation for one another, organizations can maximize the synergy that arises from their shared emotional experiences, unlocking significant potential for collective achievement. Emotional expressions enhance our performance and contribute to a better work environment (Elfenbein, 2023). The QWL encompasses factors such as employee

satisfaction, employer attitudes, social dynamics, work-family balance, and the overall impact of work on individuals (Martel and Dupuis, 2006). Thus, it is likely that emotions influence perceptions of QWL.

1.3 The effect of PsyCap on the QWL

PsyCap is an entity composed of individual characteristics and qualities that support the expression of positive resources and abilities, and from this perspective, it can be considered close to the definition of eudemonic wellbeing. This structure supports people to cope effectively with daily life: acting proactively, trusting in their possibilities, and looking positively at future scenarios without being discouraged by difficulties (Santisi et al., 2020).

PsyCap consists of four basic components: resilience, optimism, hope, and self-efficacy. Resilience refers to an individual's mental ability to quickly adapt to and recover from difficulties, failures, and setbacks. Optimism refers to an individual's positive attitudes and attributions about real and future objective events. Hope refers to an individual's mental state of adjusting their cognitive pathways to meet the needs of a goal. Self-efficacy refers to an individual's sense of competence to challenge a goal and trust in success. These processes reflect to some extent how emotion regulation strategies are employed. Bertieaux et al. (2024) found that PsyCap and wellbeing, which is a dimension of QWL, are closely linked and have been studied especially in the field of educational sciences. They determined that there is a significant relationship between English teachers' positive PsyCap and their work engagement (Xu, 2023).

Emotions significantly influence the QWL, shaping job satisfaction, engagement, and overall wellbeing. While positive emotions enhance motivation and workplace relationships, negative emotions can contribute to stress and burnout. By investing in emotional wellbeing and psychological capital, organizations can create a healthier, more productive work environment, ultimately benefiting both employees and the organization as a whole (Bakker et al., 2014; Luthans and Broad, 2022).

1.4 The mediating effect of emotions

Emotions are internal psychological processes that consist of multiple components, including an emotional core, cognitions, physiological arousal, expressive behavior, and action tendencies (Scherer, 1984). In the field of organizational behavior, one might question the impact of emotional events on data related to perception, attitudes, or behaviors. For instance, when evaluating the perceived support an individual experiences, could an emotional event from that day or from the past influence their perception? Numerous studies have explored the mediating role of emotions in organizational contexts. Notable examples include: the impact of stereotype threat as a determinant of burnout or work engagement (Bedynska and Żolnierczyk-Zreda, 2015); the mediating role of positive and negative emotions in the relationship between emotional contagion and empathy fatigue (Soyumert, 2021); and the effect of exploitative leadership on counterproductive work behavior through a dissociated emotions approach (Guo et al., 2023). Additionally, there are investigations into the effect of perceived organizational justice on counterproductive work behaviors, focusing on the mediating role of

negative emotions (Aisha et al., 2022), as well as studies on nurses' emotions, emotional labor, and job satisfaction (Lee and Jang, 2020), and the mediating role of emotions in fatigue and burnout among police officers (Basinska et al., 2014). This study aims to examine the relationship between teachers' PsyCap and their perceptions of QWL, particularly emphasizing the mediating role of perceived emotions.

The current study presents an investigation on the mediating role of emotions and their effect on teachers' PsyCap at their work life. The hypotheses on PsyCap and its relationship with QWL and with emotions, as well as emotions and their relationships with QWL and their mediation role between PsyCap and QWL will be tested. This study offers significant contributions to the existing literature by examining the intricate relationships between teachers' PsyCap, their emotional experiences, and the overall QWL.

Teaching is a demanding profession that often leads to stress and burnout, which can negatively impact educators' wellbeing and performance. Therefore, it is essential to understand the factors that can enhance teachers' QWL to develop effective support interventions. This study examines the potential mediating role of emotions in the relationship between teachers' PsyCap and their perceived QWL.

PsyCap consists of hope, efficacy, resilience, and optimism, and has been connected to various positive organizational outcomes. Previous research has indicated that teachers' PsyCap is a positive predictor of workplace wellbeing, with work-meaning cognition acting as a mediator in this relationship. However, the specific role of emotions in mediating the relationship between PsyCap and QWL in the education sector has not been thoroughly explored. Teachers play a critical role in shaping future generations, yet many struggles with burnout due to high workloads, emotional strain, and increasing professional demands (Agyapong et al., 2022). If emotions do mediate the PsyCap, QWL relationship, interventions aimed at enhancing emotional regulation and resilience could significantly improve teacher retention, satisfaction, and performance.

Given the myriad challenges faced by educators, it's crucial to foster PsyCap among them. This research aims to clarify how positive psychological resources, mediated by emotional experiences, contribute to an improved QWL. It specifically seeks to identify whether positive emotions can act as a conduit through which PsyCap enhances teachers' QWL. While previous studies have shown that PsyCap improves workplace engagement and wellbeing (Zewude and Hercz, 2022), research on how emotions function as a bridge between PsyCap and QWL in teachers is still limited (Ma, 2023).

Despite growing interest in the role of PsyCap in workplace settings, few studies have investigated how emotions specifically influence the relationship between PsyCap and QWL in the education sector. Sun et al. (2022) seek to fill that gap by providing a more nuanced understanding of how positive psychological resources contribute to teachers' professional wellbeing. Recent studies have delved into the intricate dynamics between teachers' PsyCap, their emotional experiences, and the overall QWL. Similarly, Ma (2023) explored how emotion regulation influences work engagement among English teachers, highlighting the mediating role of PsyCap in this relationship. At the same way, Zewude and Hercz (2021) investigated the mediation role of coping with stress between PsyCap and teacher wellbeing, providing insights into how these factors interplay in educational settings. These studies contribute to understanding of how emotions and PsyCap collectively impact teachers' professional experiences. By leveraging concepts from positive psychology and

organizational behavior, the current study enhances understanding of the psychological mechanisms involved, particularly the mediating role of emotions in the influence of PsyCap on QWL.

2 Methods

2.1 Participants

The sample of the study consists of a total of 369 teachers and school administrators working in TRNC state primary, secondary and high schools and willing to participate in the study. Simple random sampling strategy was used in the current study. 323 of the participants in the study were teachers and 46 were school administrators. In Northern part of Cyprus, to become a school administrator a teacher takes an exam, and school administrators are basically teachers. 277 (75.1%) of the total participants were female and 92 (24.9%) were male. Table 1 provides demographic information about the participants in the study as frequencies and percentages.

2.2 Research model and hypotheses

The study is a research in the relational screening model. In this study, based on the literature review mentioned above, a conceptual research model is given in Figure 1. According to this model, PsyCap is the independent variable, emotions are the mediator variable and QWL is the dependent variable. The mediator variable is defined as the variable that mediates the effect of the independent variable on the dependent variable (Saruhan and Özdemirci, 2013, p. 168). Using this model, the following hypotheses will be tested:

H1: PsyCap has relationships with QWL.

H2: PsyCap has relationships with emotions.

H3: Emotions have relationships with QWL.

H4: Emotions have mediation role between PsyCap and QWL.

The study first examined the predictive role of PsyCap on the perception of QWL using path analysis. Next, it investigated how PsyCap predicts the perception of QWL through emotions, as depicted in the model in Figure 1, using structural equation modeling.

2.3 Ethics statement

The data collection processes carried out within the scope of this research were approved by the Final International University Ethics Committee with the decision number 2024/13/19 dated 07.06.2024.

2.4 Data analysis

Data analysis was performed using SPSS 27 and AMOS 22 software programs. The SPSS 27 software package was specifically used to conduct descriptive statistics, correlation analysis, and mediation analysis. In

TABLE 1 Occupational and demographic characteristics of the study sample.

Variable	Level	N	Percentage
Sex	Female	277	75.1
	Male	92	24.9
Marital status	Married	277	75.1
	Single	92	24.9
Age	Below 30	38	10.3
	Between 31 and 40	133	36.0
	Between 41 and 50	143	38.8
	Above 51 and over	55	14.9
Educational status	Bachelor's degree	200	54.2
	Master's degree	155	42.0
	Doctorate	14	3.8
Title	Teacher	323	87.5
	School administrator	46	12.4
Seniority	Between 1 and 10	124	33.6
	Between 11 and 20	117	31.7
	Above 21 and over	128	34.7
School type	Primary school	108	29.3
	Secondary school	55	14.9
	General high school	101	27.4
	College	68	18.4
	Vocational high school	37	10.0
Years teaching at school	Between 1 and 10 years	270	73.2
	Between 11 and 20 years	75	20.3
	Above-21 and over	24	6.5

parallel, the AMOS 22 software package was effectively employed for structural equation modeling (SEM). Confirmatory factor analysis was conducted to rigorously evaluate the fit of the scales utilized in this study. A range of fit indices, including χ^2/df , RMSEA, TLI, NFI, GFI, CFI, and SRMR, were systematically applied to assess the models' goodness of fit.

The construct validity of the measurement tools used in the study was tested using confirmatory factor analysis based on the data collected in this study. Bootstrapping method was used to examine the mediation effect.

The goodness of fit values in Table 2 show the cut-off points of good fit and acceptable fit values for the confirmatory factor analysis and hypothesis testing of the QWLS.

2.5 Measurements

The PsyCapS and QWLS were used in the study with permission. Information about the validity and reliability of the scales is given below.

2.5.1 PsyCap scale

The PsyCap Scale (PCQ-24) was developed by Luthans et al. (2007a). Erkuş and Afacan Fındıklı (2013) adapted the scale to Turkish. The scale was translated from English to Turkish using the

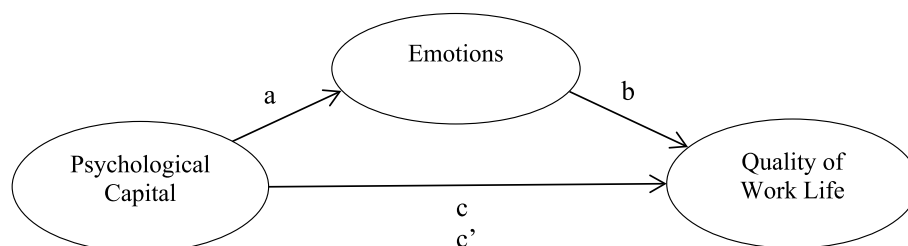


FIGURE 1
Conceptual model of the current study.

TABLE 2 Model goodness of fit.

Fit measure	Good fit	Acceptable fit
χ^2/sd	$0 \leq \chi^2/sd \leq 3$	$3 < \chi^2/sd \leq 5$
RMSEA	$00 \leq RMSEA \leq 0.05$	$0.05 < RMSEA \leq 0.08$
TLI	$0.95 \leq IFI \leq 1.00$	$0.90 \leq IFI < 0.95$
NFI	$0.95 \leq NFI \leq 1.00$	$0.90 \leq NFI < 0.95$
CFI	$0.95 \leq CFI \leq 1.00$	$0.90 \leq CFI < 0.95$
SRMR	$0.00 \leq SRMR \leq 0.05$	$0.05 < SRMR \leq 0.10$
GFI	$0.95 \leq GFI \leq 1.00$	$0.90 \leq GFI < 0.95$

Byrne (2016), Kline (2016) and Meydan and Şeşen (2011).

translation-back translation method. This translation was then checked by English Language and Literature faculty members. The questionnaire includes four dimensions (self-efficacy, hope, optimism and resilience) and a total of 24 items for determining PsyCap (Erkuş and Afacan Fındıklı, 2013, pp. 307–308). The self-efficacy dimension was measured by the first six items, the hope dimension by the 7th–12th items, and the resilience dimension by the 13th–18th items. Items and the optimism dimension are measured by items 19–24. The reverse expressions in the original scale have been corrected. As a result of the reliability analysis performed in line with the validity and reliability studies of the scale, the total Cronbach's Alpha reliability coefficient is 0.89. As a result of the reliability analyses performed for each sub-factor; it was found that the Cronbach's Alpha reliability coefficient of the self-efficacy factor was 0.90, the hope factor was 0.79, the psychological resilience factor was 0.72 and the optimism factor was 0.68 (Erkuş and Afacan Fındıklı, 2013).

2.5.2 QWLS

The QWLS was developed by Erdem (2008). The scale consists of 43 items. The scale has four items (1–4) in the total living space sub-dimension, seven items (5–11) in the safe and healthy life sub-dimension, six items (12–17) in the employee capacity development sub-dimension, seven items (18–24) in the social responsibility sub-dimension, five items (25–29) in the social integration sub-dimension, seven items (30–36) in the democratic environment sub-dimension and seven items (37–43) in the appropriate and fair wage sub-dimension.

Since the scale does not have exploratory and confirmatory factor analysis, its structural validity was tested with exploratory factor analysis with SPSS 27. Factor analysis was performed to examine the structural validity of the scale formed as a result of the analysis; The

KMO coefficient and Barlett Sphericity value of the 43 items that passed the reliability test were found to be 0.928 and 0.000, respectively. As a result of direct oblimin rotation, the items were divided into seven factors and the total variance was found to be 63.64%. The lower limit of the item factor loadings was 0.40 and the difference between two factor loadings of the same item was at least 0.10. Items 11, 12, 13, 14, 15, 27 and 35 that did not meet this criterion were removed from the scale. Exploratory factor analysis was performed on 36 items again to observe the change after the items were removed from the scale.

The general reliability of the scale, KMO value, Barlett Sphericity sig. value was found to be 0.000 and the total variance was found to be 66.71%. The scale was again divided into seven factors. However, the factor names were renamed in accordance with the literature. Cronbach Alpha Coefficient of the 1st factor was found as 0.789, Cronbach Alpha Coefficient of the 2nd factor was found as 0.870, Cronbach Alpha Coefficient of the 3rd factor was found as 0.869, Cronbach Alpha Coefficient of the 4th factor was found as 0.532, Cronbach Alpha Coefficient of the 5th factor was found as 0.813, Cronbach Alpha Coefficient of the 6th was found as 0.904 and Cronbach Alpha Coefficient of the 7th was found as 0.929. The general reliability of the scale was found as 0.937. Table 3 shows the items and factor names, factor loadings, item total correlations, Composite Reliability and Average Variance Extracted values.

A multiple normality test was conducted to assess the normality distribution of the QWLS. In addition to this, Skewness and Kurtosis values of the distributions were examined. The analysis was performed using data collected from 369 participants. The results indicated that the subscales, wellbeing (Skewness = −0.167, Kurtosis = 0.038), Suitable Fair Fee (Skewness = −0.188, Kurtosis = −0.545), Democratic Environment (Skewness = −0.479, Kurtosis = −0.345), Social Integration (Skewness = −0.388, Kurtosis = −0.002), Accountability (Skewness = 0.126, Kurtosis = −0.040), Social Responsibility (Skewness = −0.368, Kurtosis = −0.296), Work Conditions (Skewness = −0.096, Kurtosis = −0.038), had skewness and kurtosis values within the accepted range −1.5 ile +1.5, as suggested by Tabachnick and Fidell (2013). This confirms that the data distribution meets the normality assumption.

In order to see the convergent validity of the QWLS, the average variance explained (AVE) values and the composite reliability value (CR) were calculated. As a result of the calculations, the AVE values of the scale were determined as 0.53–0.70; and the CR values were determined as 0.74–0.94. Cronbach's Alpha is widely used to determine internal consistency. In a data set analysis, the Cronbach Alpha value range; 0–0.49 unacceptable; 0.50–0.59 weak; 0.60–0.69

TABLE 3 Quality of work life scale factor names, factor loadings and item-total correlations.

Factor name	Items	Factor loadings	Item total correlation	CR	AVE
General wellbeing alpha: 0.789	Item 1	0.753	0.582	0.87	0.62
	Item 2	0.731	0.534		
	Item 3	0.859	0.703		
	Item 4	0.796	0.603		
Working conditions alpha: 0.870	Item 5	0.643	0.534	0.90	0.60
	Item 6	0.784	0.642		
	Item 7	0.849	0.762		
	Item 8	0.826	0.703		
	Item 9	0.771	0.712		
Social responsibility alpha: 0.869	Item 10	0.740	0.701	0.88	0.59
	Item 16	0.681	0.670		
	Item 17	0.768	0.685		
	Item 18	0.884	0.767		
	Item 19	0.833	0.739		
Accountability alpha: 0.532	Item 20	0.650	0.609	0.74	0.59
	Item 21	0.867	0.374		
Social integration alpha: 0.813	Item 22	0.661	0.374	0.82	0.53
	Item 23	0.796	0.682		
	Item 24	0.655	0.593		
	Item 25	0.768	0.699		
Democratic environment alpha: 0.904	Item 26	0.680	0.561	0.92	0.58
	Item 28	0.812	0.751		
	Item 29	0.803	0.689		
	Item 30	0.709	0.681		
	Item 31	0.763	0.750		
	Item 32	0.799	0.650		
	Item 33	0.762	0.713		
Reasonable and fair wage alpha: 0.929	Item 34	0.808	0.749	0.94	0.70
	Item 36	0.646	0.598		
	Item 37	0.823	0.746		
	Item 38	0.851	0.780		
	Item 39	0.769	0.699		
	Item 40	0.874	0.818		
	Item 41	0.845	0.793		
	Item 42	0.870	0.820		
	Item 43	0.826	0.766		

questionable; 0.70–0.79 acceptable; 0.80–0.89 good; 0.90–1.00 shows that it has an excellent level of value (Sarmiento and Costa, 2017).

Factor loadings are expected to be ≥ 0.45 (Büyükoztürk, 2014); item total correlations are expected to be ≥ 0.30 (Büyükoztürk, 2014); Cronbach Alpha and composite reliability coefficients are expected to be ≥ 0.70 ; and the average variance explained is expected to be ≥ 0.50 (Hair et al., 2017; Fornell and Larcker, 1981). Nunnally (1967)

suggested that values as low as 0.50 are appropriate for exploratory studies.

In addition to this, another perspective assumes that the AVE value above 0.40 and the CR value above 0.70 indicates convergent validity (Shrestha, 2021). Also, the fact that the composite reliability is greater than the average variance extracted ($CR > AVE$) (Hair et al., 2017) shows that the convergent validity values of the QWLS are sufficient.

CFA findings regarding the sub-dimensions of the QWLS prepared within the scope of the study are shown in Figure 2.

The values obtained as a result of the confirmatory factor analysis of the QWLS confirm the factor structure of the scale when the goodness of fit values in Table 2 are taken as basis. In the model fit assessment of structural equation modeling; χ^2/sd , NFI, TLI, CFI, GFI, SRMR and RMSEA fit indices were included. It was determined that the goodness of fit index findings was within the threshold values and that the structure of the QWLS was compatible with the obtained data, and it was seen that the structural validity of the scale was ensured. The χ^2/sd value of the QWLS was found to be $2.25 < 3$. Since this result is less than 3, it can be said that the model provided a good fit (Kline, 2016; Meydan and Şeşen, 2011). The QWLS demonstrates the validity of the model in the model fit goodness indices as $RMSEA = 0.058 < 0.08$ (Acceptable), $TLI = 0.96$ (Good fit), $NFI = 0.96$ (Good fit), $CFI = 0.98$ (Good fit), $SRMR = 0.02$ (Good fit) and $GFI = 0.98$ (Good fit).

2.5.3 The scale on emotions

The Positive and Negative Affect Schedule (PANAS) was developed by Watson et al. (1988). The scale was adapted to Turkish by Gençöz (2000). The sub-dimensions of the scale were defined as independent concepts. The scale's positive and negative emotional dimensions include 10 statements. The statements in the positive emotional dimension are: 1 (interested), 3 (excited), 5 (strong), 9 (enthusiastic, willing, voluntary), 10 (proud), 12 (alert, alert), 14 (inspired, creative), 16 (determined), 17 (attentive) and 19 (active, lively). The statements in the negative emotionality dimension are as follows: 2 (distressed), 4 (unhappy), 6 (guilty), 7 (frightened), 8 (hostile), 11 (nervous), 13 (shy), 15 (nervous, tense), 18 (uneasy) and 20 (afraid). In the study by Watson et al. (1988), the reliability coefficient of the statements related to positive emotions was found to be 0.88, and the reliability coefficient of the statements related to negative emotions was found to be 0.85. In the study of the scale's adaptation to Turkish by Gençöz (2000), the reliability coefficients were found to be 0.86 for positive emotionality and 0.83 for negative emotionality.

3 Results

3.1 Descriptive statistics and inter-correlations

Table 4 shows the minimum, maximum, average and standard deviation values according to the sub-areas of the scales.

Table 5 shows the correlation analysis findings to reveal the relationships between PsyCap, emotions and QWL.

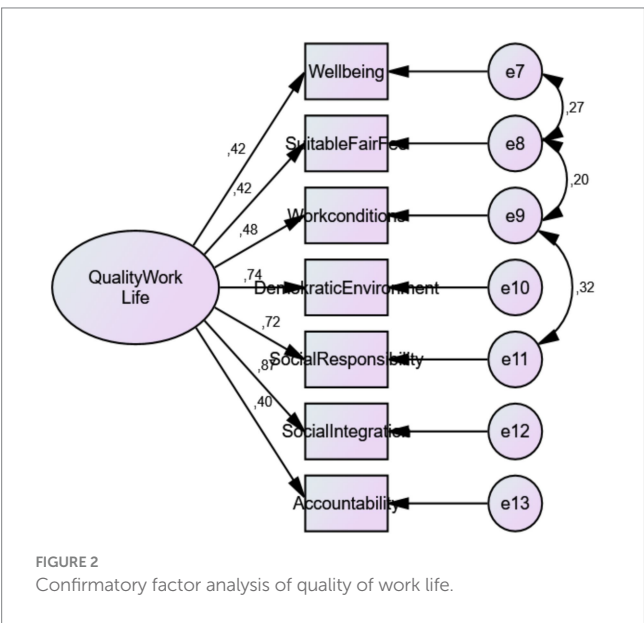
Table 5 shows that teachers' perceptions of PsyCap ($\bar{x} = 4.19$; $SD = 0.417$) and QWL ($\bar{x} = 3.54$; $SD = 0.498$) are higher than their perceptions of emotions ($\bar{x} = 2.66$; $SD = 0.321$). Correlation coefficient values are also given in Table 5. Correlation coefficient values;

0.10–0.29 are interpreted as small, 0.30–0.49 as medium and 0.50–1.00 as high (Cohen, 1988). Accordingly, when Table 5 is examined, it is seen that there is a positive and significant and positive relationship between all variables at the $p < 0.01$ level. It was concluded that there is a positive and moderate relationship between PsyCap and emotions ($r = -0.331$; $p < 0.01$), a positive and moderate relationship between PsyCap and QWL ($r = 0.414$; $p < 0.01$), and a positive and low relationship between emotions and QWL ($r = -0.274$; $p < 0.01$).

3.2 Examining the effect of emotions on QWL in the context of PsyCap

3.2.1 Testing measurement models

A confirmatory factor analysis was conducted to test the compliance of the subscales in the PsyCap, emotion and QWL scales



to the structure they are in, which will be used in the mediator variable analysis.

The fit values and results obtained from the Confirmatory Factor Analysis performed are given in Table 2 according to the criteria of good fit and acceptable fit values. According to the principles and criteria of structural equations (Kline, 2016; Kang et al., 2018), the CMIN/DF of the structural equation model in this study was $2.86 < 3$, a good fit; RMSEA = $0.071 < 0.08$, SRMR = $0.55 < 0.10$ and all other fit indices, GFI = 0.935, TLI = 0.920, CFI = 0.942, NFI = 0.914, which are all greater than 0.9, indicating that the data and the model are in good agreement. It can be said that the model-data fit is achieved by evaluating the fit index values from a holistic perspective, together with the t values of the items in the established model being not significant and the errors not being high. The standardized path coefficients for the established model are shown in Figure 3.

Examining the Relationship Between PsyCap and QWL to test the hypothesis of PsyCap $\rightarrow$ QWL (Assumption 1), a Structural Equation Model (SEM) was used with PsyCap as an external variable and QWL as an internal variable. The SEM results indicated that PsyCap significantly predicted QWL ($\beta = 0.49$; $p < 0.01$). The established model and its standardized path coefficients are illustrated in Figure 4.

As seen in Figure 4, only one modification was made in the path analysis. The model fit indices related to the path analysis ($\chi^2/df = 3.32$; RMSEA = 0.079, NFI = 0.92, TLI = 0.92, CFI = 0.94, GFI = 0.94 and SRMR = 0.059) indicate that the model has an acceptable fit according to the fit criteria in Table 2. The path coefficients obtained as a result of the analysis are given in Table 6.

As can be seen in Table 6, PsyCap ($\beta = 0.49$, $t = 6.001$, $p < 0.001$) was determined to be a positively significant predictor of the perception of QWL. It was determined that PsyCap explained 24% of the variance in the perception of QWL ($R^2 = 0.24$).

3.2.2 Testing the mediating relationship

When the methods applied to test the mediating effect were examined, it was seen that two different methods were applied. The first of these is the causality approach known as the traditional approach, and the second is the use of bootstrap or resampling

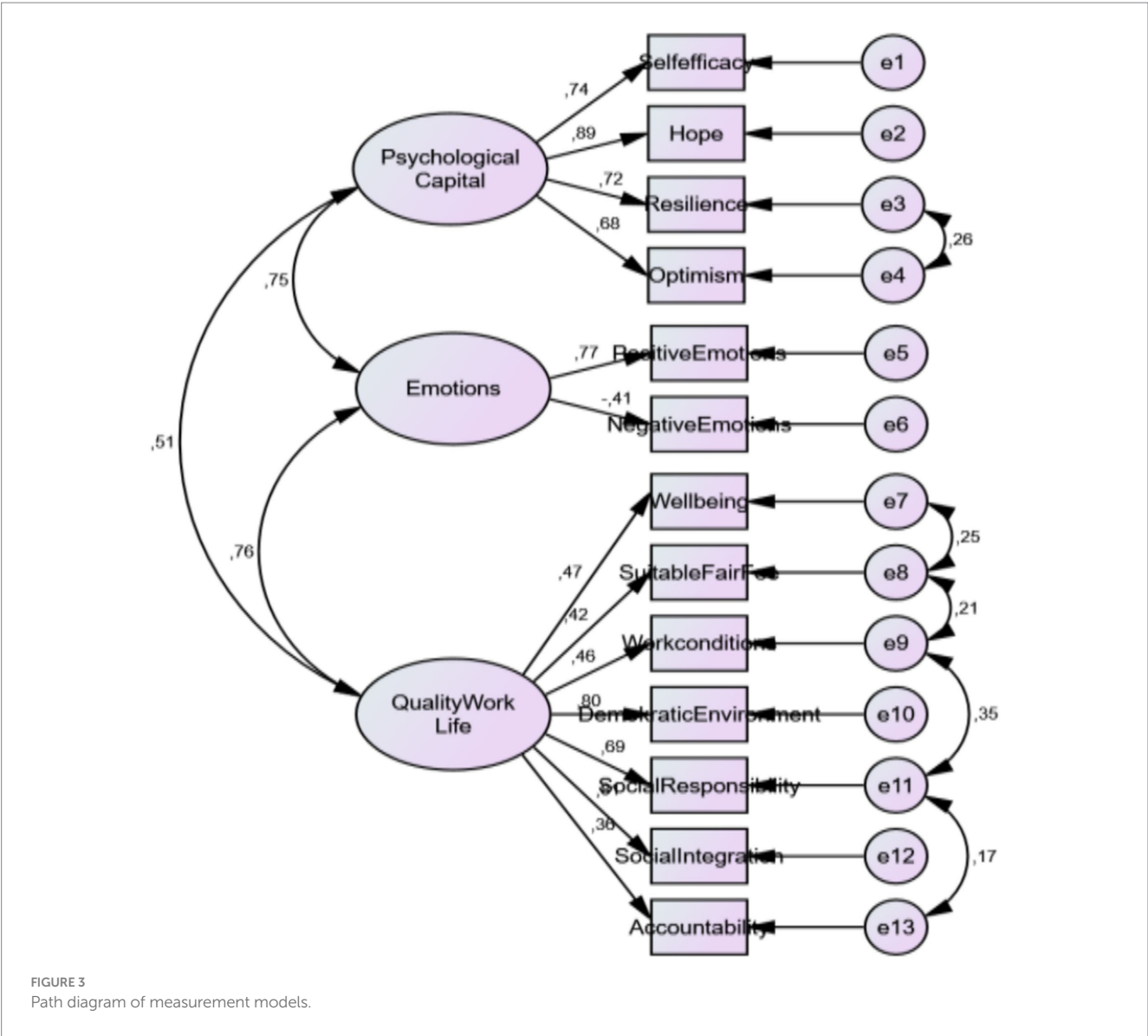
TABLE 4 Scores obtained from the scales.

Scale	Sub-scale	N	Min	Max	X	S.D
Psychological capital scale	Self-efficacy	369	18	30	26.27	2.838
	Hope	369	18	30	25.55	2.769
	Optimism	369	15	30	24.01	3.440
	Resilience	369	15	30	24.77	2.970
Emotion scale	Positive emotions	369	20	50	37.85	6.161
	Negative emotions	369	10	31	15.36	4.679
Quality of work life scale	Living space	369	8	20	14.75	2.409
	Safe and healthy life	369	7	35	22.84	5.217
	Development of employee	369	8	30	21.75	4.313
	Capacity	369	9	35	25.00	4.573
	Social responsibility	369	11	25	19.93	3.059
	Social integration	369	16	35	28.73	4.342
	Democratic environment adequate and fair wage	369	7	35	21.29	6.549

TABLE 5 Correlation values between variables.

Variables	<i>M</i>	<i>SD</i>	Psychological capital	Emotions	Quality of work life
Psychological capital	4.19	0.417	1		
Emotions	2.66	0.321	0.331**	1	
Quality of work life	3.54	0.498	0.414**	0.274**	1

**Significant at $p < 0.01$ level.



methods, which are the contemporary approaches frequently seen in studies recently. In this study, a path analysis based on the bootstrap method was conducted in order to test whether the emotion variable has a mediating role in the relationship between PsyCap and QWL. The 5,000 resampling option was preferred in the bootstrap analysis. In order to support the research hypotheses in the mediation effect analyses conducted with the bootstrap technique, the values in the 95% confidence interval (CI) obtained as a result of the analysis should not include the value zero (0) (Baron and Kenny, 1986; Hayes, 2009).

The model mediated by emotions and its standardized path coefficients are shown in Figure 5. The fit indices obtained as a result of the path analysis are within the acceptable threshold value according to the fit indices in Table 2, indicating that the model is compatible with the data ($X^2/sd = 2.86$; RMSEA = 0.071, NFI = 0.914, TLI = 0.92, GFI = 0.935, CFI = 0.942, and SRMR = 0.055). The path diagram of the model is shown in Figure 5. According to the results of the mediated structural model analysis presented in Table 7, PsyCap significantly predicted emotions

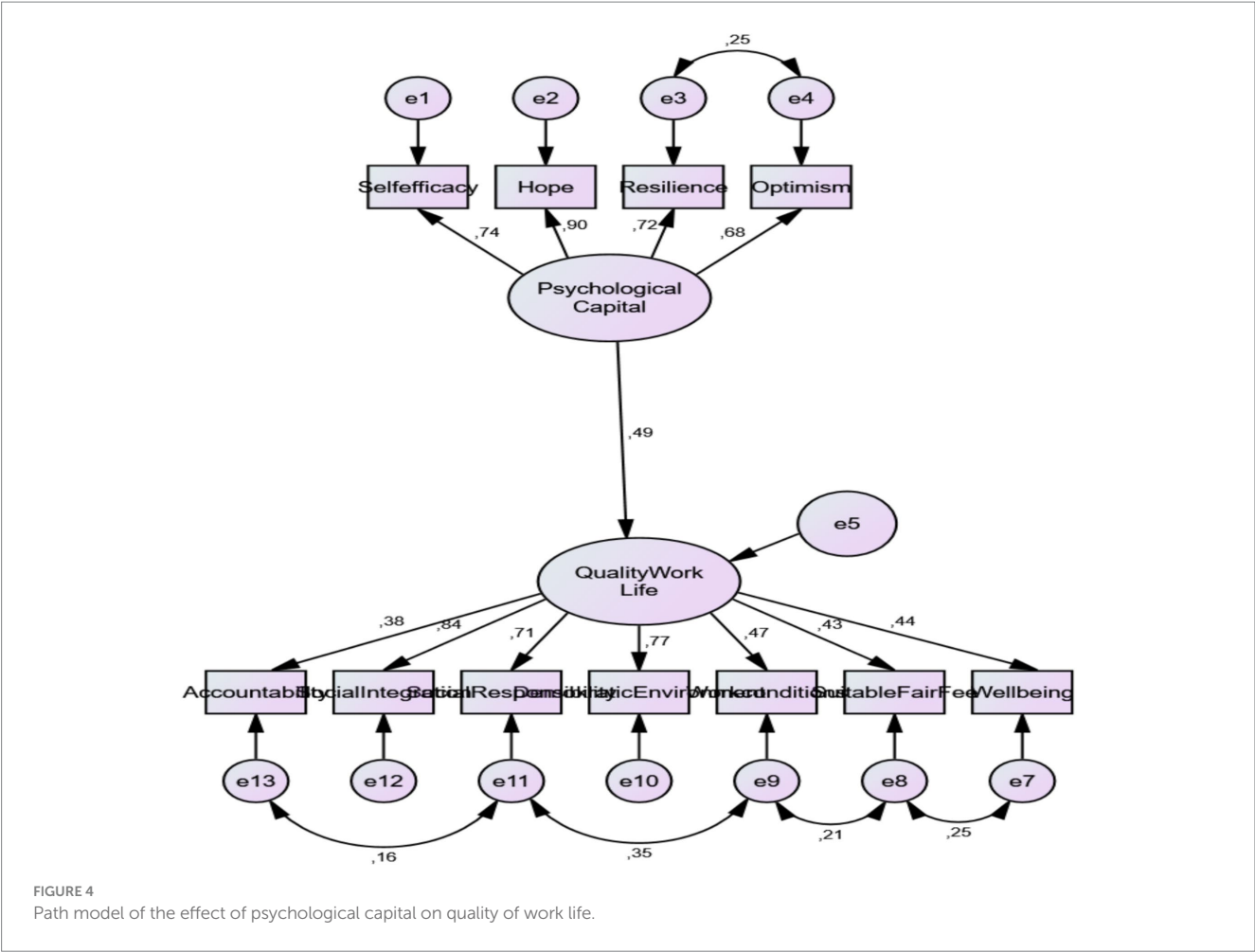


TABLE 6 Path analysis coefficients related to the prediction of the perception of quality of work life by psychological capital.

Predictor		Predicted	B	Standard β	t	SE	p
Psychological capital	→	Quality of work life	0.25	0.49	6.001	0.42	0.000*

*Significant at $p < 0.001$ level.

($\beta = 0.75$; $p < 0.01$), thus supporting assumption 2. Additionally, the mediating variable, emotions, had a significant effect on the QWL ($\beta = 0.88$; $p < 0.01$), which supported assumption 3. However, when emotions were included as a mediating variable in the model, the path coefficient from PsyCap to the QWL became non-significant ($\beta = -0.15$; $p > 0.05$).

Moreover, Table 7 shows that the total effect of PsyCap on the QWL was found to be statistically significant ($\beta = 0.251$; $p < 0.001$). The bootstrap results indicated that the indirect effect between PsyCap and the QWL was calculated as 0.159, with a 95% confidence interval ranging from 0.353 to 1.467. Since this interval did not include the value 0, the indirect effect was deemed statistically significant. If there is a non-significant relationship between X (PsyCap) and Y (QWL, represented as c'), it suggests a full mediation effect. Conversely, if there is a decrease in the relationship ($c' < c$, but c' is significant), it indicates a partial mediation effect (Baron and Kenny, 1986). In this study, emotions were found to have a full mediation effect since there was no significant relationship between PsyCap and the QWL when the mediator variable was considered. Thus, 0.51 of the total predictive

effect of PsyCap on the perception of QWL, 0.66 of the total predictive effect of PsyCap is realized through emotions.

4 Discussion

The results of this study compellingly support all four hypotheses, revealing the crucial mediating role of emotions in the relationship between PsyCap and QWL.

Hypothesis 1 was clearly validated, demonstrating that PsyCap profoundly enhances the QWL, as confirmed by the analysis ($\beta = 0.49$; $R^2 = 0.24$; $p < 0.001$). These findings resonate with those of Biyik and Aydoğan (2014), who, in their study of bank employees, established a positive and significant connection between dimensions of PsyCap- such as optimism, resilience, hope, and self-efficacy- and QWL. Their research indicated that these dimensions accounted for an impressive 47% of the variance in QWL. Similarly, Nguyen and Nguyen (2012) corroborated these results in their investigation of PsyCap's impact on job performance and quality of life among marketers, further strengthening the argument.

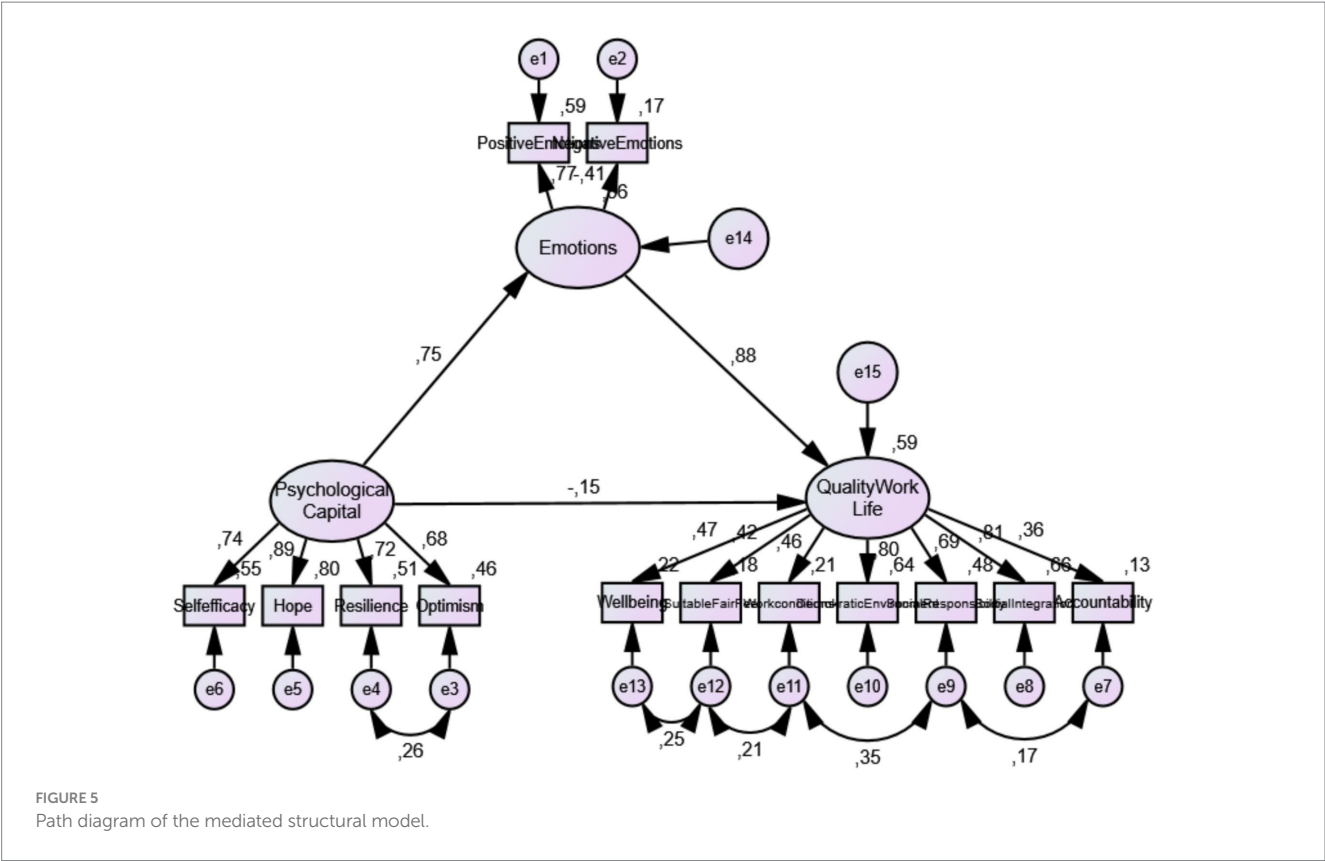


TABLE 7 Direct, total and indirect effect SEM analyses.

Direct effect	<i>B</i>	β	S.E.	<i>p</i>	95% CI	
					LLCI	ULCI
PC → E	1.521	0.750	0.151	0.001	0.634	0.874
PC → QWL	−0.37	−0.151	0.050	0.459	−0.932	0.175
E → QWL	0.105	0.876	0.035	0.002	0.523	1.653
Total effect						
PC → QWL	0.123	0.506	0.026	0.001	0.397	0.600
Indirect effect						
PC → E → QWL	0.159	0.657	0.327	0.001	0.353	1.467

All model explained 59% of the variance in quality of work life.
PC, Psychological Capital; QWL, Quality of Work Life; E, Emotions; SE, Standard errors; CI, Confidence interval; LLCI, Lower limits confidence interval; ULCI, Upper limits confidence interval.

Additionally, [Mortazavi et al. \(2012\)](#) highlighted the significant influence of PsyCap on QWL and organizational performance in a sample of nurses. Furthermore, in their research on hotel employees, [Soybali and Akerik \(2022\)](#) concluded that a moderately strong and significant relationship exists between PsyCap and QWL. Notably, this study involving teachers also affirmed that PsyCap plays a vital role in shaping the perception of QWL. The evidence is clear: investing in PsyCap is key to fostering a thriving work environment.

Hypothesis 2 was confirmed through analysis, demonstrating that PsyCap positively and significantly influences emotions ($\beta = 1.521$; $R^2 = 0.563$; $p < 0.001$). [Avey et al. \(2008\)](#) found that PsyCap is linked to positive emotions, suggesting that employees with high PsyCap can positively impact their attitudes and behaviors at work through their

emotional states. Most research on PsyCap and emotions is related to emotional intelligence ([Şener, 2021](#); [Zhang and Xu, 2024](#); [Rodrigues and Junça Silva, 2024](#)) and emotional labor ([Tosten and Toprak, 2017](#); [Çelik, 2023](#)). [Özdemir and Tarım \(2022\)](#) discovered that PsyCap positively affects emotional commitment among teachers. [Beğenirbaş \(2015\)](#) reported that PsyCap significantly predicts all sub-dimensions of emotional labor. Similarly, [Tosten and Toprak \(2017\)](#) found that teachers' PsyCap competencies influence their tendency to exhibit emotional labor behaviors. [Gong et al. \(2018\)](#) also identified a positive relationship between employees' positive emotions and PsyCap. [Huang and Lee \(2013\)](#) revealed a negative correlation between emotional exhaustion and PsyCap, as well as between a healthy lifestyle and emotional exhaustion.

Hypothesis 3 was confirmed, indicating that emotions positively and significantly affect the perception of QWL ($\beta = 0.88$; $R^2 = 0.563$; $p < 0.001$). Elmas and Yildiz (2021) found a positive and moderate relationship between teachers' perceptions of QWL and positive emotions, while identifying a negative and low-level relationship between negative emotions and perceptions of QWL. Dreer (2021) noted that positive emotions in the workplace play a crucial role in teachers' job satisfaction. The working conditions of an organization, along with its cultural and psychological structure, can influence productivity. By prioritizing employee wellbeing and fostering a positive perception of the QWL, organizations can enhance this effect. Bilgin (2019) suggested that individuals with positive emotions experience higher job satisfaction and improved job performance. Similarly, Robbins and Judge (2024) asserted that emotional reactions-whether positive or negative- can affect job satisfaction and involvement. People with positive emotions are more likely to perceive their QWL favorably. Events in the workplace can trigger positive or negative emotional responses from employees. Mustafayeva and Ustun (2018) found that increased emotional intelligence correlates with a higher perception of QWL. Titrek (2004) conducted a study with university faculty members and found an interesting contrast. While the faculty generally perceived themselves as competent in using emotional intelligence skills, they still faced significant challenges in several key areas. These included balancing positive and negative emotions, accurately understanding their own feelings, maintaining self-control in stressful situations, sensing opportunities, influencing colleagues, understanding social networks, helping pessimistic coworkers adopt a more optimistic mindset, recognizing different perspectives, interpreting gestures and facial expressions, working effectively within a team, demonstrating leadership, and persuading others.

In Hypothesis 4, the study examined the relationship between PsyCap and QWL, finding that emotions play a full mediating role. The analysis yielded a coefficient (β) of -0.159 , with an R^2 value of 0.591 and a p -value of less than 0.001 . According to the Bootstrap results, the indirect effect of PsyCap on QWL was calculated to be 0.159 , with a 95% confidence interval ranging from 0.353 to 1.467 . Since this interval did not include the value of 0 , the indirect effect was considered statistically significant. Emotions can be understood as complex psychological states that are generally intense but short-lived, arising from a person's interpretation and reaction to specific events or situations. They encompass a variety of feelings, physiological responses, and expressions, and play a crucial role in influencing an individual's cognition, behavior, and overall wellbeing (Izard, 2009). This study also underscored the importance of emotions as strong mediators in this context.

5 Conclusion

This study investigated the mediating role of emotions in teachers' perceptions of their QWL and PsyCap. Four hypotheses were developed and tested, revealing that emotions fully mediate the relationship between teachers' PsyCap and their QWL perceptions. The findings demonstrate positive relationships among teachers' PsyCap, their emotions, and QWL. All four hypotheses were

supported, and recommendations for practitioners and academics in the field were provided.

Teaching is a highly respected and valuable profession that deserves recognition and support. It is crucial for teachers to feel valued, as their emotional wellbeing directly impacts their effectiveness in the classroom. By fostering a positive emotional environment, teachers can be empowered to develop constructive approaches to their profession, ensuring sustainability in their growth. Recognizing that teachers' perceptions of their work life are deeply affected by their emotions, teachers' mental health of must be prioritized by providing continuous feedback and support. A teacher who is frustrated, unhappy, or stressed- expressing these feelings through raised voices- will struggle to connect with both colleagues and students. This negative energy does not just affect personal interactions; it can lead to unfavorable outcomes throughout the entire school community. Emotions are inherently contagious, influencing everyone they touch, which is why cultivating a positive emotional climate is essential. By prioritizing teacher wellbeing, organizational behavior can be enhanced and ultimately a thriving educational environment for all stakeholders can be created.

To foster a positive emotional climate among teachers, it is crucial to recognize the impact that school principals and vice principals have in shaping teacher experiences. Oppressive attitudes must be replaced with supportive and participatory approaches that empower teachers. While adherence to lesson regulations is important, the emotional states of teachers- whether uplifting or challenging- can drastically influence lesson outcomes. Therefore, school leaders hold a vital responsibility in cultivating a positive organizational culture. The findings inform the development of targeted interventions designed to bolster teachers' PsyCap and help manage their emotional experiences, leading to an overall enhancement of their QWL. Potential interventions could include professional development programs aimed at fostering resilience, optimism, and emotional regulation among educators (Liu and Du, 2024; Madigan et al., 2023). Professional development programs could include workshops, emotional regulation trainings and mentorship programs fostering emotions of people serving at the educational arena. Teachers especially strengthened with such kind of professional development programs can self-control their emotional regulation skills. Educators equipped with strategies on managing their emotions and how to maintain a positive outlook, can create a more supportive teaching and work environment and can improve teacher-satisfaction and student-outcomes positively. Therefore, implementing professional development programs focused on understanding and managing emotions seems essential. These kinds of programs should also be integrated into teacher training programs, ensuring that emotional intelligence becomes a core component of continuous professional development before and after service. Research by Waber et al. (2021) underscores the importance of emotional awareness during teacher internships, calling for greater emphasis on the emotional dimensions of teaching within teacher education.

This study addresses a significant gap in the literature by exploring how emotions mediate the relationship between teachers' PsyCap and their QWL. It offers valuable theoretical insights and practical applications aimed at enhancing teacher wellbeing and performance, ultimately benefiting both educators and educational institutions. In

conclusion, enhancing the emotional environment within schools will not only benefit teachers but also lead to improved student success, creating a thriving educational ecosystem for all.

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

The studies involving humans were approved by Final International University Ethics Committee with the decision number 2024/13/19 dated 07.06.2024. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

HE: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Supervision, Validation, Writing – original draft, Writing – review & editing.

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Boosting work engagement through leader tolerance: the chain mediation role of perceived organizational support and organizational identification

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Introduction: To enhance competitiveness, numerous organizations have introduced control and penalty systems to manage employee work errors. However, these systems have often backfired, negatively impacting employees' emotions and behaviors. Recognizing the critical role of leadership in error management, this study examines how leaders' tolerance of their followers' mistakes influences employees' work engagement, drawing on Affective Events Theory (AET).

Methods: Analyzing data from 435 front-line public health service staff, this study investigates the relationship between leader tolerance and employees' work engagement. First, the Harman one-factor test was employed to assess common method variance (CMV) in the research data. Second, the reliability and validity of the data were evaluated using the Cronbach's α , KMO, AVE, CR, and CFA. Finally, the proposed mediating hypotheses were tested using Model 6 in the SPSS Process macro (version 4.1).

Results: We found that leader tolerance significantly boosts employees' work engagement. Furthermore, our results confirm the mediating roles of perceived organizational support (POS) and organizational identification in the relationship between leader tolerance and work engagement. This study also validates the hypothesized chain mediation model, demonstrating how POS and organizational identification together mediate the influence of leader tolerance on employees' work engagement.

Discussion: These results underscore the importance of leadership styles that accommodate employees' errors and emphasize the crucial roles of organizational support and identification. The findings highlight the need for organizations to adopt more supportive leadership approaches rather than relying solely on control and penalty systems. The study concludes by stating the theoretical and practical implications, along with recommendations for future research on leader tolerance.

KEYWORDS

leader tolerance, work engagement, affective events theory, perceived organizational support, organizational identification

1 Introduction

Workplace errors, defined as unintentional deviations from goal achievement, can jeopardize organizational performance (Reason, 1995; Hofmann and Frese, 2011). Despite the inevitability of these errors (Chen et al., 2021), organizations have implemented strict error prevention measures to mitigate adverse outcomes (Frese and Keith, 2015), such as the widely

adopted “zero-tolerance policy,” especially in the public health service industry. This policy enforces strict accountability for any mistakes, often leading to increased workloads, heightened psychological strain, and reduced job satisfaction, which can ultimately hinder organizational growth.

However, errors can also have positive effects, such as enhancing employees’ task competence and adaptability (Bell and Kozlowski, 2008). Several scholars advocate for error management strategies that promote open communication, thorough analysis, and corrective actions (Frese and Keith, 2015; Dimitrova and Van Hooft, 2021). Notably, leadership performs a vital role in this approach, as leaders’ attitudes and decisions significantly influence how organizations respond to errors (Van Dyck et al., 2013). Leader tolerance, defined as the willingness to excuse employees’ minor mistakes (Tang et al., 2015), has emerged as a crucial factor, with research indicating its profound impact on employees’ attitudes and behaviors.

Existing research, primarily grounded in Social Information Processing theory (SIP), suggests that leader tolerance fosters proactive employee behaviors by creating initiative climate and psychological safety (Zhou and Cheng, 2020). It motivates employees to reflect on their errors and strengthens their resilience (Zhang et al., 2024). Moreover, leader tolerance can enhance subordinates’ psychological ownership by improving leader-member exchange (Cao et al., 2024).

While Zhou and Cheng (2020) have shown that leader tolerance in nurturing employee proactivity, there is limited empirical evidence connecting this concept to employees’ work attitudes and behaviors. Also, work engagement, a critical indicator of work attitude, serves as a strong predictor of pro-organizational behavior (Bledow et al., 2011). Additionally, fostering work engagement can help organizations become more adaptable and flexible, enabling them to better navigate the uncertainty and complexity of external environments.

In this context, this research aims to contribute theoretically by proposing a conceptual model that links leader tolerance with employees’ work engagement. Building on Affective Events Theory (AET) and existing literature, the research examines how leader tolerance can enhance subordinates’ work engagement by sequentially influencing their perceived organizational support (POS) and organizational identification.

Unlike previous studies that have primarily focused on enterprise employees, we target a sample of Chinese hospital staff. In recent years, medical professionals have faced exceptionally high occupational stress and increased professional risks, along with the need to stay current with rapidly advancing medical technologies. In this high-pressure environment, strict error prevention policies can intensify heightened anxiety, leading to feelings of abandonment and mistrust among staff. This atmosphere may encourage individuals to conceal their mistakes or disengage from their work, ultimately harming both individual well-being and organizational development.

Understanding the influence of leader tolerance on employee engagement is crucial in this context. Our research aims to deepen our understanding of leader tolerance and provide practical insights specifically tailored for the effective error management in high-pressure industries. The results emphasize the importance of managing employees’ work errors effectively to foster work engagement.

2 Theory and hypotheses

2.1 Leader tolerance

Leader tolerance denotes the degree to which leaders are willing to excuse non-principled errors made by their subordinates, thereby fostering a learning environment (Cao et al., 2024; Zhang et al., 2021). Comparatively, leaders who exhibit high tolerance levels are more likely to forgive mistakes without imposing harsh penalties, while also promoting a culture of learning by offering constructive feedback and necessary resources (Zhou and Cheng, 2020). In contrast, leaders with low tolerance create a stressful work environment, characterized by strict supervision, frequent criticism, and punishment (Zhou and Cheng, 2020). These leaders often fail to provide the support and guidance needed when errors occur.

Taken together, the study of leader tolerance has often been overshadowed by the broader concept of inclusive leadership, which aims to foster belongingness and appreciation inside teams (Carmeli et al., 2010). Inclusive leadership is characterized by three key attributes: accessibility, availability and openness, which together foster a respectful and inclusive atmosphere for team members (Carmeli et al., 2010). While both leader tolerance and inclusive leadership share the common goal of promoting a positive organizational environment and performance, they differ in focus (Tang et al., 2015). Therefore, leader tolerance specifically addresses how leaders handle employees’ errors (Tang et al., 2015), whereas inclusive leadership emphasizes leveraging team diversity to achieve synergistic outcomes (Carmeli et al., 2010; Shore and Chung, 2022).

Besides, it also differs from other broader leadership construct. Compared with servant leadership which prioritize empowering subordinates holistically (Eva et al., 2019), leader tolerance specifically mitigates fear of blame after errors, crucial in high-stakes healthcare settings. And for learning-oriented leadership, both encourage error reporting, but leader tolerance emphasizes post-error support, for instance, non punitive actions, whereas learning-oriented leadership focuses on pre-error skill-building, for instance, training (Wallo et al., 2024), and transformational leaders inspire their followers through vision and charisma but may unintentionally stigmatize failures (Bass and Avolio, 1990). In contrast, leader tolerance explicitly normalizes errors as improvement opportunities.

Empirical research regarding the impact of leadership tolerance have yielded inconsistent outcomes. Most studies agree that leader tolerance positively influences employee behavior, with evidence showing it can enhance proactive customer service by fostering both initiative and psychological safety at group and individual levels (Zhou and Cheng, 2020). Leader tolerance has also been associated with improved error reflection and resilience among employees, as suggested by SIP theory (Zhang et al., 2024). Nevertheless, some studies reveal that leader tolerance may inadvertently lead to green silence behavior, where employees refrain from speaking up about environmental issues. This occurs through the parallel mediation of psychological ownership and moral disengagement, potentially hindering long-term organizational sustainability (Cao et al., 2024).

A significant limitation in current research is its heavy emphasis on the cognitive impacts of leader tolerance, often framed through SIP theory, while largely overlooking the affective experiences of employees. This exclusive concentration on cognitive factors has led to an inadequate comprehension of the complex interplay between leaders being tolerant and the behaviors of employees.

The perception of leader tolerance may vary across different culture. In collectivist culture, where the emphasis is on group harmony and interdependence (Oyserman and Lee, 2008), leader tolerance may be more readily accepted and valued by employees. Employees in such culture may regard leader tolerance as an indication of their leaders' empathy and encouragement, which can enhance their sense of inclusion to the organization. In contrast, in individualist culture, leader tolerance may indeed be perceived as a form of loose management. Given that employees in such culture tend to focus more on personal values rather than collective values and interests (Oyserman and Lee, 2008), leader tolerance can trigger negative impacts such as a decline in work efficiency and an increase in counterproductive work behavior (CWB).

Against such background, SIP theory has paid limited attention to the context of how leader tolerance influence employees' behavior, restricted the reflection of the actual situation. In comparison, AET theory is more sensitive to cultural differences in the perception and impact of leader tolerance. It recognizes that emotions and their expression vary across cultures, and take these differences into account when examining the relationship between leader tolerance and employee behavior. This helps to overcome the cultural bias that may be present in SIP theory.

To address these gaps, AET is introduced as a complementary framework that provides a more nuanced, dynamic and accurate perspective on the connection between leader tolerance and employees' work engagement.

2.2 Affective events theory

AET offers a robust framework for understanding the immediate emotional responses to work-related events and how these emotions subsequently impact employees' attitudes and behaviors (Weiss and Cropanzano, 1996). According to AET, work events are specific incidents within the workplace that have the potential to trigger emotional shifts among employees (Weiss and Cropanzano, 1996). The concept was further developed by identifying five types of affective work events: leaders' behaviors, working conditions, group characteristics, stressful incidents, and organizational rewards and punishments (Brief and Weiss, 2002). This framework highlights the need for considering emotional responses when analyzing the impact of leader tolerance on employee engagement.

AET describes a causal chain where specific work events serve as immediate triggers for emotional responses, which then lead to behavioral changes (Weiss and Cropanzano, 1996; Ashkanasy and Dorris, 2017). Unlike other models that focus on broad environmental factors or individual traits, AET emphasizes the impact of particular work events. It suggests that employees' behaviors are better predicted by their emotional reactions to these events than by stable workplace attributes (Weiss et al., 1999; Fisher, 2000). Furthermore, AET also distinguishes between affect-driven behaviors, which are spontaneous and emotion-based, and judgment-driven behaviors, which are more deliberate and based on rational evaluation (Weiss and Cropanzano, 1996).

Moreover, AET further recognizes that employees' interpretations of work events determine the emotional responses they trigger (Weiss and Cropanzano, 1996; Higgins, 2001). Positive working events, such as receiving constructive feedback or recognition, tend to evoke positive emotions, leading to increased job satisfaction, motivation, and a stronger sense of organizational commitment. These positive outcomes can enhance job performance and overall employee

well-being, ultimately benefiting the organization. On the other hand, negative work events, like perceived unfairness or job insecurity, can provoke feelings of threat, dissatisfaction, and stress, which may lead to higher turnover intentions and reduced performance.

Most research has predominantly concentrated on the outcomes of negative work events, often overlooking the potential benefits of positive events on employee well-being. In the current post-pandemic environment, where employees face increased stress and uncertainty, exploring the impact of positive work events becomes crucial. Such research can provide practical guidance to organizations on how to utilize these events to enhance employees' work performance and overall well-being.

2.3 Leader tolerance and work engagement

Work engagement measures the extent to which employees invest their mental, emotional, and physical resources into their job performance (Kahn, 1990). It is defined as a favorable motivational state comprising three core components: vigor, dedication, and absorption (Schaufeli et al., 2002; Bakker et al., 2014). These characteristics represent high energy and mental resilience (vigor), a strong sense of meaning and enthusiasm (dedication), and deep focus and enjoyment (absorption) that employees display in their work (Schaufeli et al., 2002). Increasingly, it is recognized as a key indicator of employee well-being and is closely linked to improved performance and adaptability within organizations (Ouweneel et al., 2011). Based on the meta-analysis performed by Björk et al. (2021), leadership plays a significant role in enhancing work engagement among employees. Positive leadership approaches, such as engaging, transformational, and servant leadership, have proven effective in this regard (De Clercq et al., 2014; Monje-Amor et al., 2020; Schaufeli, 2021).

When employees perceive that their leaders are tolerant of unintentional mistakes, such as allowing employees to correct errors without public blame, it triggers a positive work event with significant emotional implications. In high-pressure and high-risk medical environments, where errors can lead to serious consequences, leaders' tolerant attitudes stand out and have a strong emotional impact on employees. This is due to the salience of such events in these contexts.

Drawing on AET, leader tolerance directly influences employees' work engagement through two main paths. First, it stimulates their followers' positive emotions to elevate work engagement. For instance, when a leader offers constructive feedback instead of punishment for a minor error, it triggers positive emotions like gratitude and relief in employees. Positive emotions can enhance employees' well-being, which often acts as a precursor to enhanced work engagement (Avey et al., 2008; Ouweneel et al., 2012). Leader tolerance can also make employees feel trusted and respected, creating a psychologically safe atmosphere (Zhou and Cheng, 2020; Zhang et al., 2024). This sense of psychological safety encourages employees to take risks and engage in learning and development activities, which in turn enhances their work engagement (Kahn, 1990; Qasim et al., 2022).

Second, leader tolerance reduces employees' negative emotions, which is crucial for maintaining their work engagement (Yukl, 2008). Negative emotions such as shame, anxiety, and fear of punishment often arise when employees make mistakes. These emotions can be highly distressing and can significantly impact employees' well-being, making them feel less motivated and engaged in their work.

Leaders' tolerant behaviors can not only reduce the immediate negative emotional impact but also helps prevent long-term distress. For example, instead of publicly criticizing an employee for a minor error, a leader might offer guidance and support, helping the employee to correct the mistake without feeling ashamed or anxious. This approach not only alleviates the negative emotions associated with the mistake but also prevents the frustration that may arise from resource loss, such as time and reputation, due to errors (Hobfoll, 1989).

In high-pressure and high-risk medical environments, leader tolerance not only creates a psychologically safe atmosphere, but also fosters a learning-oriented culture. This encourages employees to engage in learning and development activities, further enhancing their work engagement.

According to Abdullah et al. (2021), work engagement has an emotional component and can be influenced by positive organizational indicators. When employees experience positive emotions due to leader tolerance, their work engagement is likely to increase. Increased positive emotions and decreased negative emotions can directly boost employees' energy levels and focus (Sonnentag, 2003). Experimental studies have shown that positive emotions can form intellectual resources (Fredrickson, 1998), enabling employees to become more involved in their work. Additionally, a tolerant leadership style can enhance intrinsic motivation, encouraging followers to invest more energy into their tasks due to a diminished fear of failure (Zhang et al., 2024).

On the contrary, leaders who exhibit low tolerance can be perceived as a source of unfavorable events at work. For instance, employees may face penalties for their errors and lose future development opportunities. These can trigger adverse emotions such as anxiety, fear, distrust, and burnout. These negative emotions can, in turn, affect their well-being appraisals, making them feel that their well-being is compromised and leading to decreased work engagement. Moreover, the psychological insecurity resulting from these negative feelings may also reduce their job investment as they try to avoid further losses. Abdullah and Al-Abrow (2024) demonstrated that abusive leadership, such as criticizing and blaming subordinates for their mistakes, can damage the psychological contract between leaders and their followers. This damage can lead to job stress and burnout among employees (Abdullah and Al-Abrow, 2024), potentially reducing their investment and engagement in their work.

Thus, we propose:

H1: Leader tolerance positively influences employees' work engagement.

2.4 Mediating role of perceived organizational support

POS captures how employees interpret the organization's appreciation of their input and concern for their personal welfare (Eisenberger et al., 1986). Factors influencing POS include organizational justice, leadership styles, human resource management practices, and work conditions (Eisenberger et al., 2020). Leaders enhance POS by fostering internal trust and respect and by providing essential resources for employees to perform their tasks (Liu et al., 2023; Jun et al., 2023). With strong support from the organization, employees are inclined to display enhanced commitment, loyalty and enthusiasm for their work (Eisenberger et al., 2020). Additionally, a strong sense of POS is associated with fewer counterproductive work behaviors (De Clercq et al., 2021).

It is posited that leader tolerance influences employees' work engagement through POS. As stated in Section 2.3, leader tolerance

affects employees' emotions by increasing positive emotions and reducing negative ones. According to AET, positive emotions lead employees to make positive evaluations of the organizational environment. When employees feel supported due to leader tolerance, they perceive the organization as supportive and attribute the leader's behavior to the organization's overall supportive policies and culture (Eisenberger et al., 1986). This strengthens their belief that the organization is committed to their well-being and development, thereby increasing their POS (Jun et al., 2023).

The relationship between POS and work engagement can be explained by the Conservation of Resources (COR) theory and Social Exchange Theory. According to COR theory, POS acts as a psychological resource that can reduce employees' concerns about resource depletion, allowing them to invest more energy into their work (Hobfoll, 1989). Social Exchange Theory posits that employees' perception of organizational support can lead to heightened work engagement as a reciprocal action (Blau, 1964). Empirical evidence suggests that a strong sense of POS can significantly boost work engagement, particularly in high-stress occupations like nursing (Aldabbas et al., 2023; Al-Hamdan and Issa, 2022; Mehrad et al., 2022; Wang et al., 2017).

As demonstrated by Abdullah et al. (2021), organizational support practices can create a sense of safety, leading employees to become more physically and psychologically linked to their work. POS plays a crucial role in this process by mediating the relationship between leader tolerance and work engagement. It transforms the positive emotions triggered by leader tolerance into a stronger commitment to the organization and a higher level of work engagement. Research has empirically validated the mediating role of POS between supervisor support and employee engagement (Mehrad et al., 2022). Therefore, leader tolerance, through the mediating effect of POS, can significantly enhance employees' work engagement.

Noticeably, leaders with low tolerance levels can trigger negative emotional responses, such as anxiety, among employees, which may weaken their perception of organizational support. This reduced perception can strain the supervisor-subordinate relationship, leading employees to feel unacknowledged and deprived of career growth opportunities (Cole et al., 2006; Eisenberger et al., 2020). As POS diminishes, employees might disengage from their work, resulting in lower overall engagement. The study by Sun et al. (2022) among Chinese nurses proved that leaders' blame on their subordinates' mistakes can deprive their perceived support from organizations, and thus, negatively influence their work engagement.

Thus, we propose that:

H2: POS mediates the positive relationship between leader tolerance and employees' work engagement.

To examine the mediating role of POS, we will employ the Bootstrap method, which provides confidence intervals to assess the significance of the indirect effect. A detailed explanation of the Bootstrap method and its implementation will be provided in Chapter 3, "Methods."

2.5 Mediating role of organizational identification

Organizational identification measures the degree to which individuals incorporate their organization into their self-concept

(Mael and Ashforth, 1992). Strong organizational identification indicates that employees are more inclined to embrace organizational values and norms and develop a stronger organizational affiliation (Simbula et al., 2023). Researchers have noted that it can encourage favorable work attitudes and practices, benefiting both individuals and organizations (Karanika-Murray et al., 2015; Lee et al., 2015).

Equally, leadership style and interactions with leaders profoundly affect the cultivation of employees' affiliation with the organization (Weisman et al., 2023). For example, servant, transformational, and self-sacrificial leadership styles have been effective in fostering organizational identification by demonstrating leaders' genuine concern for their followers' well-being and professional growth (Weisman et al., 2023). Conversely, abusive leadership tends to diminish employees' organizational identification and increase deviant behaviors (Liu et al., 2021).

Based on AET, leader tolerance positively influences employees' work engagement, with organizational identification acting as a crucial mediator. When leaders demonstrate tolerance toward employees' unintentional mistakes, it is perceived as a positive work event that generates positive emotions, for instance, gratitude, and diminishes negative emotions, such as shame and anxiety. These positive emotional reactions can stimulate affective-driven identification.

In line with Appraisal Theory (McEachrane, 2009), positive emotions lead employees to regard the organization as an extension of the "self," thereby strengthening their identification with the organization. The study by Ko and Choi (2021) in South Korea demonstrated that positive emotion can increase employees' organizational identification. Therefore, when employees feel respected due to leader tolerance, they are more likely to internalize organizational values. This internalization, combined with the sense of being valued by the organization, cultivates a strong psychological attachment to the organization, which is the essence of organizational identification (Allen et al., 2021).

Employees with a strong sense of organizational identification are more likely to actively engage in their work tasks (Karanika-Murray et al., 2015). Employees with high organizational identification are inclined to engage in behaviors to maintain their social identity as "organizational members" (Mael and Ashforth, 1992). They are more likely to be committed to the organization and exert extra effort to attain organizational goals. Moreover, organizational identification functions as a psychological resource that mitigates stress and promotes energy investment (Allen et al., 2016). The study conducted by Arshad et al. (2022) showed that support from leaders can boost followers' work engagement through organizational identification. Hence, it is expected that leader tolerance can enhance employees' identification with their organizations, and subsequently, increase their work engagement.

Conversely, leaders with low tolerance can negatively influence employees' work engagement by diminishing their organizational identification. When leaders are intolerant, it can be perceived as a negative work event, leading to adverse emotions such as depression, guilt, and sadness (Allen et al., 2021). Such adverse emotions can reduce employees' sense of belonging to the organization and reduce their willingness to invest effort and resources into their work. Additionally, the disrespect and distrust from intolerant leaders can create feelings of isolation, further lowering employees' engagement with their work.

Hence, it is posited:

H3: Organizational identification mediates the positive relationship between leader tolerance and employees' work engagement.

The mediation effect of organizational identification will be tested using the Bootstrap method, as mentioned in Section 2.4.

2.6 The chain mediating role of perceived organizational support and organizational identification

We propose a sequential mediation model where leader tolerance influences employees' work engagement through two key pathways: POS and organizational identification. When leaders show tolerance toward their followers' mistakes, employees view these actions as positive work events, which generate favorable emotions and restrain negative feelings. These emotions lead to an increased perception of organizational support. The positive relationship between leader tolerance and POS is evident when employees view tolerant leaders as a sign that the organization values and supports them. For instance, a leader who offers guidance instead of blame for a minor error makes employees feel highly supported.

This enhanced POS then strengthens organizational identification. Employees who feel supported by the organization see themselves as valued members and internalize its values and goals, thus increasing their identification with the organization (Edwards and Peccei, 2010). For example, a supported employee may actively participate in organizational activities and promote interests, showing a strong sense of identification.

This increased organizational identification further results in higher work engagement (Karanika-Murray et al., 2015). Staff members who have a strong sense of identification with the organization are more inclined to put their physical, cognitive, and psychological resources into their work. They take on challenging tasks, work longer hours, and are more focused and committed, all of which contribute to higher work engagement. The chain mediation process is clear: leader tolerance enhances POS, which in turn strengthens organizational identification, and finally leads to increased work engagement.

Conversely, leaders who exhibit low tolerance, for example, public criticism or blame for minor errors, it can trigger immediate negative emotional responses from employees, such as feelings of frustration, disappointment, and being undervalued. These negative emotions often lead employees to perceive a lack of organizational support. When employees feel unsupported, their sense of organizational identification is negatively affected. The relationship between POS and organizational identification is such that when POS is low, organizational identification is also likely to be weak. This weakened connection between employees and the organization can result in decreased work engagement. Employees who feel unsupported and have a weak sense of identification with the organization are less likely to be motivated to invest their physical, cognitive, and psychological resources into their work, leading to lower levels of work engagement. The chain mediation process here is that low leader tolerance leads to

low POS, which in turn leads to weak organizational identification, and finally results in decreased work engagement.

Our proposed chain mediation model suggests that leader tolerance affects work engagement in two stages: first by enhancing POS and then by strengthening organizational identification. The process can be described as follows: leader tolerance → POS → organizational identification → work engagement.

Therefore, it is posited:

H4: POS and organizational identification sequentially mediate the positive relationship between leader tolerance and employees' work engagement.

To more clearly depict the hypothesized model, Figure 1 presents a theoretical framework diagram that illustrates the relationships between the variables and indicates the corresponding hypothesis numbers. To examine the mediating roles of both POS and organizational identification, we will employ the Bootstrap method. This approach generates confidence intervals, enabling us to evaluate the significance of the indirect effects. A comprehensive explanation of the Bootstrap method and its implementation will be provided in Chapter 3, "Methods."

3 Methods

3.1 Sample

The participants in this study were employees from a public hospital in Shandong Province, China. The hospital was selected for several reasons. First, as the largest municipal hospital in a third-tier city in the Province, it boasts a large size and comprehensive services. This translates to a diverse patient population and a wide array of medical staff roles, ensuring a comprehensive and representative sample. Second, the hospital had previously encountered issues stemming from low leader tolerance, which led to employee dissatisfaction and low work engagement. It is currently undergoing reforms to address these problems, making it an ideal setting to study

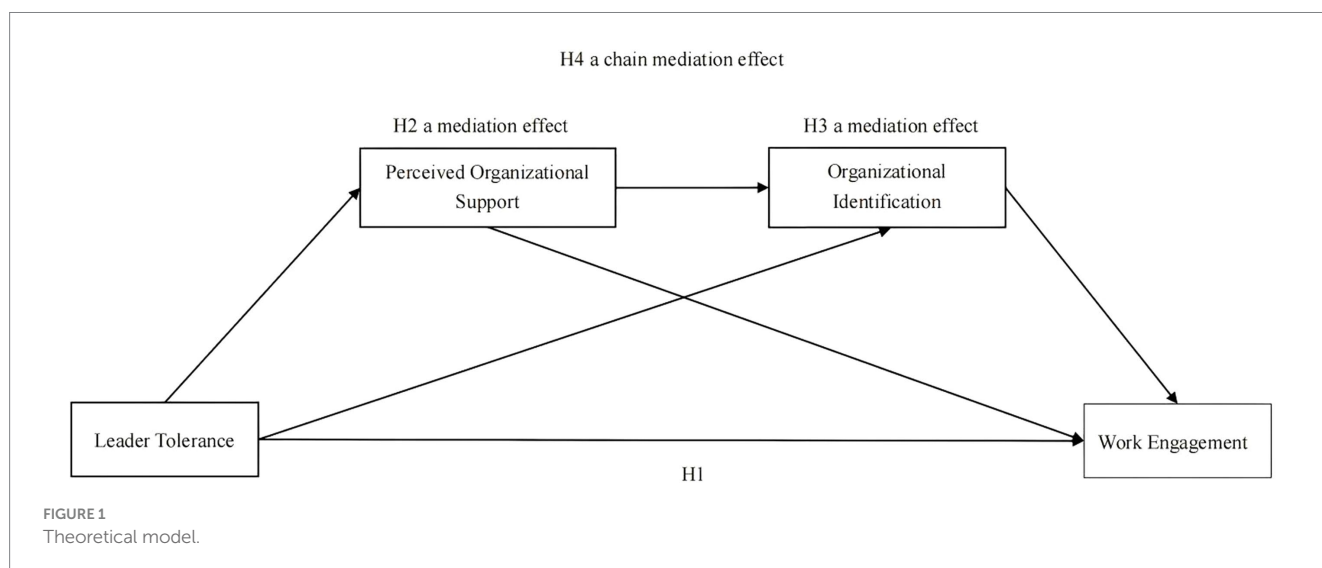
the impact of leader tolerance on work engagement. Over the past few years, many hospitals in China have carried out similar management adjustments to cope with the changing environment. Lastly, the high-pressure work setting in the hospital also adds to the significance of the study. For instance, the hospital's average number of outpatient and emergency department visits from 2023 to 2024 was approximately 1.25 million per year, which is indicative of the overall situation of hospitals in China.

In this study, we adopted random sampling. The logic behind this selection is that random sampling ensures each individual in the population has an equal likelihood of selection. This approach effectively reduces selection bias and enhances the representativeness of the sample. In a large-scale and complex setting like a hospital, where numerous factors may influence employees' work engagement, using random sampling ensures that the sample more accurately reflects the true characteristics of the entire medical staff population. Consequently, the research findings are more likely to be generalizable to the whole hospital and even similar medical institutions.

A department manager initially contacted potential participants and invited the front-line staff to take part in an anonymous online survey. The survey introduction expressed gratitude for their participation, explained its objectives, and assured the confidentiality of their responses. We distributed 737 questionnaires to the front-line staff and received 500 responses. After conducting data cleaning, we retained 435 valid responses, achieving an effective response rate of 59.02%.

The data cleaning process involved 3 steps to ensure data quality. First, we removed incomplete responses, eliminating questionnaires that were not fully completed. Second, we excluded invalid responses. Such as those where respondents had filled in the same number for all items, as these are unlikely to provide meaningful data. Third, we corrected erroneous information, removing questionnaires with illogical personal details, such as cases where the reported age was less than the reported work tenure.

The demographic details of the participants are provided in Table 1. The average age of the respondents is 37.29 years, ranging from 21 to 61 years. Their average tenure with the organization is 12.34 years, with the longest tenure being 41 years and the shortest



1 year. The sample includes 22.30% male and 77.70% female participants. Among them, 116 are doctors, 257 are nurses, and the remaining respondents hold other front-line positions such as b-ultrasound technicians and pharmacists.

We compared the demographic attributes of the sample with the overall hospital population to make sure the sample was representative. The proportion of participants in our sample aligns with the overall distribution of employees in the hospital, particularly in terms of gender, education, and department. For instance, the gender distribution in our sample (22.30% male and 77.70% female) closely mirrors the gender distribution of the hospital's front-line staff. Additionally, the sample includes a diverse range of job roles, which reflects the actual composition of the hospital's workforce. The average age and tenure of the participants also align with the hospital's demographic profile, ensuring that the sample is not skewed toward any particular age group or level of experience.

3.2 Measurement

We used a 5-point Likert scale for survey responses, where “1” represented “strongly disagree” and “5” represented “strongly agree.” All scales, except for the leader tolerance scale, were

originally in English. To ensure accuracy, we adopted the method of translation and back-translation following [Brislin's \(1970\)](#) guidelines.

3.2.1 Leader tolerance

We used the four-item scale developed by [Zhang and Tang \(2016\)](#), which was culturally adapted for Chinese organizational contexts with high power distance. Sample items include “When subordinates make mistakes unintentionally, my leader tolerates their errors,” and “My leader forgives errors or failures made by his or her subordinates. Although the scale was initially validated in general enterprises, its applicability to healthcare settings was confirmed through the following steps. First, cognitive interviews with 12 medical staff (6 nurses, 4 physicians, and 2 technicians) were conducted during the pilot phase. Participants confirmed that the four items clearly reflected error tolerance dynamics in hospital workflows without needing medical jargon. Second, the scale demonstrated strong reliability ($\alpha = 0.807$) in a pre-study of 157 employees from high-stress manufacturing firms with zero-tolerance management practices, a context psychologically analogous to healthcare. In the current study, the scale exhibited high internal consistency ($\alpha = 0.874$).

3.2.2 Perceived organizational support

POS was assessed using the six-item scale developed by [Eisenberger et al. \(1986\)](#). Item 5 is reverse-scored. Sample items are “The hospital values my contribution to its well-being,” “The hospital shows very little concern for me,” and “Help is available from the hospital when I have a problem.” This scale demonstrated an internal consistency coefficient (α) of 0.892 in our study.

3.2.3 Organizational identification

We used a six-item scale from [Mael and Ashforth \(1992\)](#) to measure organizational identification. Sample items include “When someone criticizes the hospital, it feels like a personal insult,” and “The hospital's success is my success.” In this research, the Cronbach's α coefficient of this scale was 0.871.

3.2.4 Work engagement

We assessed work engagement using the three-item short form of the Utrecht Work Engagement Scale (UWES-3, [Schaufeli et al., 2019](#)), a globally validated tool widely applied in healthcare research. Items including “At work, I feel bursting with energy,” “I am enthusiastic about my job,” and “I am immersed in my work” were retained verbatim. This can be explained as the core constructs are context-agnostic. Its applicability in the healthcare industry has been demonstrated by extensive research. For instance, For example, [Muroi et al. \(2023\)](#) applied the scale to Japanese nurses, and [Su et al. \(2023\)](#) validated its usage in the public service sector in China. The Cronbach's α coefficient was 0.850.

3.2.5 Control variables

Following previous research on work engagement, we controlled gender, age, and educational background. We coded gender as a dummy variable, with “1” for males and “2” for females. Educational background was also dummy-coded, with “1” representing Junior high school diploma and below, “2” for High school diploma or equivalent, “3” for College degree, “4” for Bachelor's degree, “5” for Master's degree and above.

TABLE 1 Sample description.

Individual characteristics	Category	Quantity	Percentage
Gender	Male	97	22.30%
	Female	338	77.70%
Age	21–30	55	12.64%
	31–40	252	57.93%
	41–50	83	19.08%
	51–61	45	10.35%
Organizational tenure	1–10 years	233	53.56%
	11–20 years	135	31.03%
	21–30 years	34	7.82%
	32–41 years	33	7.59%
Educational background	Junior high school and below	2	0.46%
	Senior high school or equivalent	4	0.92%
	College diploma	40	9.20%
	Bachelor degree	308	70.80%
	Master degree and above	81	18.62%
Job	Doctor	116	26.67%
	Nurse	257	59.08%
	Others	62	14.25%

N = 435.

3.3 Mediation effect testing

To comprehensively test the mediation effects in the relationship between leader tolerance and employees' work engagement, we used the Bootstrap method with the SPSS Process macro (v4.1). The SPSS Process macro is a commonly utilized instrument for performing mediation, moderation, and conditional process analysis. The Bootstrap method involves repeated sampling to generate confidence intervals for the indirect effects, offering a robust assessment of the mediation effects. Specifically, we conducted the following 4 steps.

First, we specified four models. The first model had leader tolerance as the independent variable, and work engagement as the dependent variable to test the direct and total effect. The second model added POS as the mediator. The third model had leader tolerance as the independent variable, work engagement as the dependent variable, and organizational identification as the mediator. The fourth model have leader tolerance as the independent variable, work engagement as the dependent variable, and both POS and organizational identification as sequential mediators.

Second, using the Model 6 in the SPSS Process macro (v4.1), we generated 5,000 bootstrap samples to create a distribution of the indirect effects for each mediation model. Third, the SPSS Process macro (Model 6) calculated the 95% confidence intervals for the indirect effects. A confidence interval not including zero indicates a statistically significant indirect effect (MacKinnon et al., 2004). Fourth, the confidence intervals from the SPSS Process macro (Model 6) will be used to test the significance of the mediation effects of POS, organizational identification, and the chain mediation of POS and organizational identification.

By using the SPSS Process macro (Model 6) and the Bootstrap method, we provide a comprehensive and reliable assessment of the mediation effects, ensuring the robustness of our findings. This approach allows us to test the individual mediation effects of POS and organizational identification, as well as their combined effect in a chain mediation model.

3.4 AI-assisted processes

AI-assisted tools including Kimi (Moonshot AI, 2024) and DeepSeek-R1 (DeepSeek, 2024) were employed during the literature synthesis and data analysis phases. Researchers maintained full control over study design, result interpretation, and critical decision-making, with all AI-generated content undergoing rigorous human validation and scholarly compliance checks.

4 Data analysis and results

4.1 Test of common method biases

To address common method biases, we implemented several strategies. First, we designed the questionnaire with reverse-scored items to mitigate the impact of common method variance (CMV). We also informed participants about the study's objectives, assuring them that their responses would be used exclusively for academic purposes and that their anonymity and confidentiality would be maintained. To further assess common method biases, we performed a Harman one-factor test. The exploratory factor analysis, conducted without rotation, revealed 4 factors with eigenvalues greater than 1. The primary factor explained 38.321% of

the variance, which is below the 50% threshold (Harman, 1960). This result suggests that CMV did not significantly affect our findings.

4.2 Assessment of reliability and validity

We used SPSS 25.0 to evaluate the reliability of the research variables, finding that all variables had a Cronbach's alpha coefficient (α) above 0.80, indicating acceptable reliability. The KMO values exceeded 0.70, and Bartlett's test of sphericity was significant ($p < 0.05$). The average variance extracted (AVE) ranged from 0.766 to 0.826 with composite reliability (CR) all exceeding 0.90. The findings demonstrate good convergent validity of the scale.

The assessment of discriminant validity was based on the results of the Confirmatory Factor Analysis (CFA). CFA is a statistical technique used to verify the factor structure of a set of observed variables and is an essential tool in structural equation modeling (SEM) for evaluating the validity of a measurement model (Byrne, 2012; Kline, 2005). In CFA, the selection of appropriate model fit indices is crucial. The indices we chose— χ^2/df , Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR)—are widely used in SEM.

In addition to using these fit indices, we employed a series of competing models to further validate the discriminant validity of the constructs. Competing models are alternative specifications of the factor structure that are hypothesized to fit the data differently. Through comparing the fit indices between the proposed model and competing models, researchers can determine whether the original model is superior in explaining the data (Kline, 2005; Byrne, 2012). CFA results of the hypothesized and 5 competing models are reported in Table 2.

Based on the index evaluation criteria suggested by Byrne (2012), the four-factor model demonstrated an acceptable fit: $\chi^2 = 456.417$, $df = 146$, $\chi^2/df = 3.126$, CFI = 0.905, TLI = 0.889, RMSEA = 0.070, SRMR = 0.062. The value of χ^2/df is less than 5, which is acceptable. Although TLI is slightly lower than the acceptable criteria of 0.900, other indicators all indicate good model fit. CFI is higher than 0.900, both RMSEA and SRMR are less than 0.080 (Hu and Bentler, 1999; Schreiber et al., 2006; Steiger, 1990).

Moreover, the competing models showed inferior fit indices compared to the hypothesized model. This confirms the high discriminant validity of the constructs in the original model. The use of competing models helps to ensure that the proposed model is not only statistically sound but also theoretically justified, providing a robust validation of the factor structure.

4.3 Descriptive statistics and correlations

The means, standard deviations, reliabilities and correlation coefficients for the research variables are presented in Table 3. The correlation analysis indicates significant relationships between work engagement and organizational identification ($r = 0.348$, $p < 0.01$), POS ($r = 0.517$, $p < 0.01$), and leader tolerance ($r = 0.335$, $p < 0.01$). Organizational identification is positively associated with both POS ($r = 0.360$, $p < 0.01$) and leader tolerance ($r = 0.346$, $p < 0.01$). There exists a strong positive relationship between POS and leader tolerance ($r = 0.471$, $p < 0.01$). These correlations provide preliminary support for the proposed hypotheses.

TABLE 2 Confirmatory factor analysis.

Models	Factors	χ^2	df	χ^2/df	CFI	TLI	RMSEA	SRMR
Baseline model	Four factors: LT, POS, OI, WE	456.417	146	3.126	0.905	0.889	0.070	0.062
Model 1	Three factors: LT + POS, OI, WE	942.443	149	6.325	0.757	0.721	0.111	0.104
Model 2	Three factors: LT, POS, OI + WE	900.110	149	6.041	0.770	0.736	0.108	0.118
Model 3	Two factors: LT + POS, OI + WE	1361.398	151	9.016	0.630	0.581	0.136	0.140
Model 4	Two factors: LT + POS + OI, WE	1566.583	151	10.374	0.567	0.510	0.147	0.136
Model 5	One factor: LT + POS + OI + WE	1803.777	152	11.867	0.495	0.432	0.158	0.140

N = 435. LT, leader tolerance; POS, perceived organizational support; OI, organizational identification; WE, work engagement; χ^2 , chi-square; df, degree of freedom; CFI, comparative fit index; TLI, Tucker-Lewis Index; RMSEA, root mean square error of approximation; SRMR, standardized root mean square.

TABLE 3 Descriptive statistics and analysis.

Variables	Mean	SD	1	2	3	4	5	6	7
1. Gender	1.780	0.417	–	–0.110*	–0.111*	–0.023	0.053	–0.090	–0.121*
2. Age	37.290	7.788	–0.110*	–	–0.026	–0.097*	0.044	0.156**	0.156**
3. EDU	4.060	0.594	–0.111*	–0.026	–	0.095*	0.052	0.119*	0.023
4. LT	3.626	0.738	–0.023	–0.097*	0.095*	(0.874)	0.471**	0.346**	0.335**
5. POS	3.407	0.671	0.053	0.044	0.052	0.471**	(0.892)	0.360**	0.517**
6. OI	4.067	0.625	–0.090	0.156**	0.119*	0.346**	0.360**	(0.871)	0.348**
7. WE	3.516	0.793	–0.121*	0.156**	0.023	0.335**	0.517**	0.348**	(0.850)

N = 435. * $p < 0.05$, ** $p < 0.01$, (2-tailed). SD, standard deviation; EDU, educational background; LT, leader tolerance; POS, perceived organizational support; OI, organizational identification; WE, work engagement. For gender, 1 = male, 2 = female. For educational background, 1 = junior high school and below, 2 = high school or equivalent, 3 = College diploma, 4 = Bachelor degree, 5 = Master degree and above. Cronbach's alphas are shown in in the parentheses on the diagonal.

In addition to the main research findings related to the hypotheses, several other important correlations were observed. The negative correlation between female gender and work engagement ($r = -0.121$, $p < 0.05$) may reflect women's overrepresentation in high-burnout clinical roles and greater familial care responsibilities in China's healthcare sector (Yuan et al., 2024). The positive education-organizational identification link ($r = 0.119$, $p < 0.05$) may reflect higher-educated employees' stronger mission alignment. Age is observed negatively correlated with leader tolerance ($r = -0.097$, $p < 0.05$) but positively with work engagement ($r = 0.156$, $p < 0.01$). This may be due to the fact that leaders are more tolerant of errors made by younger employees than those made by older employees. Besides, older employees may have a clearer understanding of their career goals and responsibilities, and a better balance between work and life, thus showing higher work engagement.

4.4 Hypothesis testing

For this study, the Process macro v4.1 in SPSS was utilized to test the sequential mediation model. Applying a bootstrapping method with 5,000 resamples and a 95% confidence level, we assessed the mediating roles of POS and organizational identification while controlling for age, gender and educational background. As shown in Table 4, leader tolerance has a positive and significant effect on work

engagement ($\beta = 0.377$, $p < 0.001$), confirming Hypothesis 1. This effect size indicates a moderately strong relationship between leader tolerance and work engagement. It also significantly predicts POS ($\beta = 0.437$, $p < 0.001$) and organizational identification ($\beta = 0.203$, $p < 0.001$), suggesting that leader tolerance has a substantial impact on there variables. POS significantly impacts organizational identification ($\beta = 0.223$, $p < 0.001$). Moreover, both POS ($\beta = 0.501$, $p < 0.001$) and organizational identification ($\beta = 0.174$, $p < 0.05$) positively predict work engagement. Even after accounting for these mediating effects, the link between leader tolerance and work engagement remains significant ($\beta = 0.106$, $p < 0.05$), indicating that POS and organizational identification partially mediate the impact of leader tolerance on work engagement. The practical significance of these findings is notable, as the effect sizes suggest that leader tolerance has a meaningful impact on work engagement, POS, and organizational identification.

We conducted additional validation of the hypothesized mediation effects using bootstrapping, as detailed in Table 5. The results confirm significant mediating effects of POS and organizational identification. The total effect of leader tolerance on work engagement is 0.377, with a direct effect of 0.106. Likewise, the total mediating effect is 0.271, which can be divided into three distinct pathways. First, the indirect effect of leader tolerance on their followers' work engagement through POS is 0.219, with a 95% confidence interval (CI) of [0.156, 0.290], which does not include zero, thus supporting

TABLE 4 Regression analysis.

Outcome variable	Predictor	<i>R</i>	<i>R</i> ²	<i>F</i> -value	<i>β</i>	<i>t</i> -value
WE		0.396	0.157	19.964***		
	Gender				−0.181	−2.115*
	Age				0.018	3.995***
	EDU				−0.021	−0.359
	LT				0.377	7.862***
POS		0.485	0.236	33.142***		
	Gender				0.124	1.806
	Age				0.009	2.326*
	EDU				0.020	0.414
	LT				0.437	11.292***
OI		0.459	0.211	22.907***		
	Gender				−0.105	−1.605
	Age				0.013	3.747***
	EDU				0.084	1.848
	LT				0.203	4.864***
	POS				0.223	4.886***
WE		0.575	0.331	35.297***		
	Gender				−0.229	−2.988*
	Age				0.011	2.718*
	EDU				−0.047	−0.876
	LT				0.106	2.120*
	POS				0.501	9.121***
	OI				0.174	3.091*

N = 435. **p* < 0.05, ***p* < 0.01, ****p* < 0.001, (2-tailed). EDU, educational background; LT, leader tolerance; POS, perceived organizational support; OI, organizational identification; WE, work engagement. For gender, 1 = male, 2 = female. For educational background, 1 = junior high school and below, 2 = high school or equivalent, 3 = College diploma, 4 = Bachelor degree, 5 = Master degree and above.

TABLE 5 Analysis of the mediating effect of POS and OI.

	Effect	BootSE	95% LLCI	95% ULCI
Total effect	0.377	0.048	0.283	0.472
Direct effect	0.106	0.050	0.008	0.205
Total indirect effect	0.271	0.038	0.200	0.352
Path 1: LT → POS → WE	0.219	0.034	0.156	0.290
Path 2: LT → OI → WE	0.035	0.016	0.009	0.071
Path 3: LT → POS → OI → WE	0.017	0.007	0.005	0.033

N = 435. Bootstrap *n* = 5,000. LT, leader tolerance; POS, perceived organizational support; OI, organizational identification; WE, work engagement; LLCI, lower level confidence interval; ULCI, upper level confidence interval.

Hypothesis 2. Furthermore, the second mediation path, from leader tolerance through organizational identification to work engagement, shows an indirect effect of 0.035 (95% CI [0.009, 0.071]), supporting Hypothesis 3. Equally, the sequential mediation effect from leader tolerance through both POS and organizational identification to work engagement is 0.017, with a 95% CI of [0.005, 0.033], confirming Hypothesis 4 of the chain mediation effect.

5 Discussion

This study sought to explore how leader tolerance affects employees’ work engagement, focusing specifically on the mediating roles of POS and organizational identification. Our research provides an in-depth understanding of the link between leaders’ behaviors and the engagement of their subordinates.

Our first hypothesis, which proposed that leader tolerance positively impacts employees’ work engagement, received strong empirical support. This finding aligns with AET, which suggests that leaders’ tolerance for employees’ mistakes is perceived as a positive work event. When leaders show tolerance, they create a sense of psychological safety and reduce employees’ stress, making them feel more secure and valued. This recognition of effort, even when mistakes occur, motivates employees to engage more with their work. The findings confirm previous research that highlights how leader tolerance fosters proactive work behaviors through psychological safety (Zhou and Cheng, 2020) and strengthens employees’ mental resilience (Zhang et al., 2024). The findings also reinforce the idea that supportive leadership, which includes tolerance for mistakes, promotes a more engaged and committed workforce.

Our second hypothesis examined whether POS mediates the association between leader tolerance and employees’ work

engagement. The empirical analysis indicates significant mediation, showing that employees who experience greater tolerance from their leaders also perceive higher organizational support. Hence, this enhances the sense of support and also increases work engagement. This finding emphasizes the crucial role of POS as a key mechanism linking leadership behaviors to employees' attitudes and work-related behaviors.

Contemporaneously, organizational identification emerged as a significant mediator in our study. The results supported the hypothesis that leader tolerance enhances employees' organizational identification, which subsequently boost their work engagement. This finding builds on [Cao et al. \(2024\)](#), who put forward that leader tolerance boosts employees' psychological ownership, which can develop into organizational identification. Our research underscores the importance of organizational identification as a vital psychological process linking leadership practices to employee engagement.

The final hypothesis, which proposed a chain mediation model involving POS and organizational identification as sequential mediators between leader tolerance and work engagement, was also verified. The results demonstrate that leader tolerance influences work engagement through the serial pathways of POS and organizational identification. This finding highlight that the effects of leadership behaviors on employees' work attitudes are not merely direct but are mediated through a series of psychological states, such as POS and organizational identification. This complexity emphasizes the nuanced association between leadership practices and employee engagement.

5.1 Theoretical contributions

This study makes several significant theoretical contributions that address the gaps in prior research and provide new insights into the emotional responses to leadership behaviors and their effects on work engagement.

First, this study delves into the emotional impact of leader tolerance through the lens of AET, filling a crucial gap in the literature. Previous studies using AET have largely focused on negative work events such as negative performance feedback ([Alam and Singh, 2021](#)), leader narcissism ([Chen et al., 2020](#)), and abusive supervision ([Tillman et al., 2018](#)). While these studies have provided valuable insights into the negative emotional impacts of leadership behaviors, they have largely overlooked the positive emotional effects of leader tolerance. By highlighting the positive emotions generated by leader tolerance, this study offers a new perspective on the affective dynamics of leader-follower relationships and their influence on work engagement. It expands the application of AET to positive emotional responses in the workplace, complementing the existing literature that has primarily focused on negative events and emotions. The research results echo the suggestion by [Abdullah et al. \(2021\)](#) that work engagement has emotional components, emphasizing the need for managers to pay attention to their subordinates' emotional experiences.

Second, the study introduces POS as a mediating variable, providing a broader perspective than previous research that focused on individual psychology. POS reflects employees' perception of the organization's resource allocation and other supportive actions. While prior studies have explored the role of mediating variables such as psychological ownership and moral disengagement in leader

tolerance, these variables mainly center on employees' individual psychological states or behavioral inclinations, with a lack of systematic investigation into organizational-level support. Our research incorporates POS as a mediating variable, underscoring that leader tolerance not only influences employees' individual psychological states but also amplifies their work engagement by elevating their overall perception of support from the organization. Compared to previous mediators that focused on individual psychology and behavior, POS offers a more comprehensive understanding of the impact of leader tolerance on employee behavior, revealing how leader tolerance can have an impact beyond the individual level through the lens of employees' perception of organizational support.

Third, this research investigates the impact of leader tolerance on employees' work engagement, which is directly related to job performance. While prior research has mainly focused on how leader tolerance affects employees' psychological states, such as psychological resilience and psychological safety, paying little attention to its influence on job performance. This study addresses this gap by considering work engagement as the final outcome variable and exploring the mechanism through which leader tolerance affects work engagement via the mediating effects of POS and organizational identification. This comprehensive exploration not only compensates for the shortcomings of previous research but also provides a new perspective on the antecedents of work engagement, enabling organizations to better utilize leadership behaviors to enhance employees' work engagement and improve organizational performance.

Finally, by incorporating AET theory along with psychological safety and learning - oriented leadership to explain the influence of tolerant leadership, this study expands the theoretical framework of inclusive leadership. Inclusive leadership is characterized by openness, acceptance, and support for diverse perspectives and ideas. Leader tolerance is an important aspect of inclusive leadership, as it demonstrates the leader's willingness to accept and support employees' mistakes and learning processes. This study highlights the importance of leader tolerance in fostering psychological safety and a learning-oriented culture, which are crucial for enhancing employee engagement and performance. By emphasizing the emotional mechanisms through which leader tolerance influences employees' attitudes and behaviors, this study provides a deeper understanding of the role of emotions in inclusive leadership and how it can positively impact employees. This, in turn, enriches the theoretical framework of inclusive leadership and provides new insights into how leaders can create a more supportive and engaging work environment.

In terms of challenging the traditional Leader-Member Exchange (LMX) theory, this study emphasizes the emotional mechanisms of leader tolerance. LMX theory focuses on the cognitive aspects of the leader - member relationship, such as resource exchange and trust. However, this study highlights the importance of emotions in the leader-follower relationship. By showing that leader tolerance can generate positive emotions among employees, which in turn enhance their work engagement. This study also challenges the assumption of differentiated relationships in LMX theory. It demonstrates that leader tolerance can positively impact all followers, establishing high-quality relationships and questioning the difficulty of achieving consensus in traditional LMX theory.

5.2 Practical implications

In high-pressure fields like public health, leaders are pivotal in boosting employees' work engagement and psychological safety. To better utilize the research findings and improve work engagement in such demanding environments, this study offers the following practical advice for leaders.

First, leaders should cultivate a growth-oriented mindset among employees. This means that mistakes are seen as opportunities for learning and development rather than as signs of failure. For example, when a public health campaign to promote healthy eating habits does not achieve the expected results, the leader can guide the team to analyze the reasons from a psychological perspective. It could be that the messages were not effectively communicated to the target audience, or the incentives offered were not attractive enough. By focusing on these psychological factors and adjusting the strategies accordingly, employees will feel more supported and their sense of organizational identification will be enhanced, leading to increased work engagement.

Second, leaders in high-pressure environments should engage in transparent communication with their team members. For instance, in a public health organization dealing with an infectious disease outbreak, the leader can regularly hold team meetings to share the latest information about the situation, including the challenges and the uncertainties. At the same time, the leader should encourage team members to express their concerns and ideas freely. When an employee makes a mistake, such as a wrong prediction about the spread of the disease, the leader can use this as an opportunity to emphasize that it's normal to have different opinions and that everyone's input is valued. This kind of transparent communication can greatly enhance psychological safety and make employees more willing to engage in their work.

Third, in high-pressure work settings, leaders should provide psychological support and resources to help employees cope with the stress caused by mistakes. For example, a public health organization can offer access to professional counseling services for employees who are feeling overwhelmed after a project failure. The leader can also organize stress-management workshops to teach employees techniques such as mindfulness and relaxation exercises. These psychological support measures can help employees recover from the negative emotions caused by mistakes and improve their work engagement.

Fourth, leaders should provide timely and constructive feedback to employees. In high-pressure environments like public health, employees often face complex and challenging tasks. Leaders should not only point out mistakes but also offer specific suggestions for improvement. For example, when an employee makes an error in data analysis during a public health research project, the leader can provide detailed feedback on the correct analytical methods and tools, and guide the employee to re-analyze the data. This kind of timely and constructive feedback can help employees quickly correct their mistakes and improve their work skills, which in turn enhances their work engagement.

The final recommendation is leaders should encourage team collaboration and knowledge sharing. In public health work, different team members may have different areas of expertise and experience. Leaders can organize regular team meetings or knowledge-sharing sessions to encourage employees to share their

work experience and insights. For example, after a successful public health intervention, the leader can ask team members to share their experiences and lessons learned in the project, so that other members can learn from them. This kind of team collaboration and knowledge sharing can not only improve the overall work efficiency of the team but also enhance employees' sense of organizational identification and work engagement.

6 Limitations and future research directions

Despite the theoretical and practical contributions, this research has limitations that warrant consideration. First, the sample comprises hospital staff, whose experiences may differ from those of employees in other industries due to unique management systems and organizational structures. This specificity may constrain the applicability of the results across different context. Given the ongoing organizational restructuring and digital transformation across various sectors, which can induce job insecurity, the roles that tolerant leaders can play may differ. Future research should include diverse samples to validate the observed relationships, thereby enhancing the validity of the findings and providing a broader understanding of leader tolerance in various contexts. Additionally, it should be noted that all participants in this study are Chinese. Given that Chinese culture is characterized by high power distance and collectivism, it is recommended that future research can be conducted in countries with different cultural backgrounds. This will help to verify the contextual boundaries of the research findings and facilitate cross-cultural comparisons.

Second, the reliance on self-reported data collected at a single time point may constrain the ability to make causal inferences. Although we considered conducting the survey across different shifts to mitigate common method biases, this approach was not feasible due to the high workload of medical staff. Efforts to control for common method biases included using reverse-scored questions, and the Harmon one-factor test suggested minimal bias. However, this does not entirely eliminate the potential influence of common method biases. Future studies should utilize multi-source and multi-wave surveys to strengthen result validity. Engaging both leaders and followers in surveys could provide a more comprehensive dataset. Additionally, incorporating techniques such as response surface analysis and multilevel regression could enrich the research outcome by accounting for variability and complexity.

Third, this study concentrated on a chained mediation model, highlighting opportunities to explore contextual variables in leader tolerance research. Based on AET (Weiss and Cropanzano, 1996), individual traits might moderate how work events affect employees' emotional responses. Future research can examine how individual traits, such as age and gender, moderate the relationship between leader tolerance and employees' reactions. While previous research has noted the cross-level moderation effect of team initiative climate (Zhou and Cheng, 2020), other potential organizational and occupational moderators remain under-explored. For example, strict organizational policies may limit the impact of leader tolerance on employee behavior, while more flexible policies may enhance this impact. Similarly, different job roles may have different expectations and responsibilities, which may moderate the relationship between leader tolerance and employee behavior. Future studies can also address these limitations by investigating the moderating roles of

organizational contexts, and job characteristics. Identifying these factors will help organizations create more targeted and effective error management strategies.

7 Conclusion

In conclusion, this research underscores the significant impact of leader tolerance on employee work engagement, highlighting its role as both a direct influence and a mediator through POS and organizational identification. By demonstrating that leader tolerance enhances employees' affective experiences and engagement, our research provides valuable insights into how positive leadership behaviors can foster a more engaged and resilient workforce. This study advances theoretical understanding by applying AET to positive work events and offers practical implications for developing supportive error management strategies and leadership training programs. Future research should explore additional contextual and individual moderators to further refine strategies for enhancing employee engagement and organizational effectiveness.

Based on this study, organizations should focus on fostering a leadership culture that emphasizes tolerance and support to enhance employee engagement and resilience. Although the study provides valuable insights, it has limitations, including the focus on hospital staff, which may not generalize to other industries, and the reliance on self-rated data at a single point in time. Future studies should address these limitations by using diverse samples from various industries and utilizing multi-source, longitudinal data to better understand the dynamics of leader tolerance. Additionally, investigating potential contextual and individual moderators could provide a deeper understanding of how leader tolerance influences employee attitudes and behaviors across different settings and circumstances.

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 or patients/participants legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

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YZ: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. JQZ: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Investigation. KH: Conceptualization, Resources, Writing – review & editing, Investigation.

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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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Error management climate, psychological security, and employee bootleg innovation behavior: the moderating role of risk-taking traits

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Employee bootleg innovation behavior is the key to helping enterprises get rid of the “innovator’s dilemma” and achieve innovative development. This article constructed a model of the relationship between error management climate, psychological security, risk-taking traits, and employees’ bootleg innovation behaviors based on social cognitive theory and tested the model empirically. The results show that error management climate has a significant positive influence on employees’ bootleg innovation behavior; psychological security plays a mediating role between error management climate and bootleg innovation behavior; and risk-taking traits play a moderating role in the relationship between psychological security and employees’ bootleg innovation behavior. The results of the study provide valuable insights for guiding employees’ bootleg innovation behaviors and help organizations in effectively managing these behaviors, thus enhancing organizational innovation performance.

KEYWORDS

bootleg innovation behavior, error management climate, psychological security, risk-taking traits, creativity

1 Introduction

With the rapid development of the global economy and the unpredictable social market environment, innovation has increasingly become the core competitiveness of countries and enterprises. Whether it is a country or an enterprise, only through continuous innovation and change can it continuously increase its value and gain a stronger competitive advantage (Farida and Setiawan, 2022). National innovation relies on firm innovation, which is driven by the innovative ideas of individuals and ultimately realized through their innovative behavior (Wang and Bai, 2020). Therefore, for countries and enterprises to achieve innovation goals, it is crucial to effectively motivate and guide the innovative behaviors of employees involved in management, research and development, production, sales, and other areas within the enterprise. However, there is a common paradox in the current practice of organizational innovation: organizations will give employees a high degree of work autonomy to stimulate their willingness to innovate, but strict rules and regulations and management processes within the organization will constrain their innovative behaviors. Gilson (2024) states that when employees are expected to be creative but are not in a position to achieve innovative behavior, the only way to creativity is to break the established rules, i.e., to innovate informally, in a bootleg manner. Bootleg innovation is an innovative activity initiated by employees

autonomously from the bottom up, without formal support from the organization, unknown to top management, and expected to contribute to enhancing the interests of the organization, although contrary to organizational norms or regulations (Criscuolo et al., 2014). Bootleg innovation behavior is closely related to innovation performance. Employees with bootleg innovation behavior are able to actively search for the required resources, extend their working hours, show more creativity and initiative, and thus have a positive impact on innovation performance (Wang and Wan, 2020). It was found that 63.6% of employee bootleg innovation behavior leads to product innovation and 10.9% of bootleg innovation behavior promotes corporate knowledge creation and learning (Masoudnia and Szwajczewski, 2012). Therefore, employees, as an important force for change in corporate development, are highly likely to help companies escape from the “innovator’s dilemma” and achieve better development through bootleg innovation for the purpose of promoting organizational development.

As employee bootleg innovation behavior plays an important role in improving organizational innovation performance, scholars have conducted a large number of studies around employee bootleg innovation behavior, among which the exploration of its formation mechanism is the most abundant. There is an interaction between environment, individual, and behavior, in which the environment plays a guiding role in behavior (Bandura and Walters, 1977). Error management climate as one of the organizational cultures can have a profound effect on the bootleg innovation behavior of employees. Error management climate refers to the perception of errors held by the organization as well as the processes and behavior associated with the organization’s handling of errors as perceived by employees (Yang et al., 2024). In essence, bootleg innovation behavior is a kind of trial-and-error learning behavior. Due to limited information, knowledge, and ability, coupled with a lack of organizational support, employees are likely to make mistakes while implementing bootleg innovation behaviors. These behaviors are largely affected by how the organization handles these mistakes. If organizations and managers focus on creating an error management climate in their daily management, fostering a culture that tolerates mistakes, encourages trial and error, and supports innovation, it can help alleviate employees’ fear of making errors and encourage them to step out of their comfort zones in the pursuit of innovation. This environment will make employees take risks, innovate, and engage in more innovative behaviors. Therefore, in order to more effectively manage the staff’s innovative behavior and promote their contribution to organizational innovation and change, it is necessary to enhance the understanding of the deep-rooted mechanisms and effects of the staff’s innovative behavior under the error management climate.

When employees consider implementing bootleg innovation behavior, given the high risk of the behavior, they go through a crucial stage of psychological weighing, carefully evaluating the potential benefits and potential losses that the behavior may bring (Huang et al., 2022). An error management climate creates a work environment where errors are treated positively and can lead to a high level of psychological security for the individual (Maqsoom et al., 2023). Psychological security, as a positive psychological perception, can effectively reduce the depletion of psychological resources for employees to make bootleg innovation behavior. Therefore, psychological security may play a mediating role between error management climate and employees’ bootleg innovation behavior. In addition, as bootleg innovation behavior require employees to hide their behavior from the organization

and superiors, or to carry out activities against the orders of the organization and superiors (Criscuolo et al., 2014). Therefore, bootleg innovation behavior is more likely to require the addition of employee risk-taking traits than general innovation behavior. Employees with higher risk-taking traits have higher motivation for bootleg innovation drive violation and thus are more likely to engage in bootleg innovation behavior. In view of this, this paper intends to introduce risk-taking traits as a moderating variable to unravel the influence mechanism between psychological security and employee bootleg innovation.

To sum up, based on the theoretical framework of social cognition, this paper starts from two dimensions of error management climate and psychological security, integrates the consideration of employees’ risk-taking traits, and follows the logical path of “scene-cognition-behavior” to deeply explore the specific impact of error management climate on employees’ bootleg innovation behavior. This study not only helps deepen the understanding and discussion of the theory of bootleg innovation behavior but also has important practical significance for reasonably stimulating employees’ innovation potential and effectively guiding enterprises to build scientific innovation management systems.

2 Literature review and hypotheses development

2.1 Error management climate and bootleg innovation behavior

An error management climate is the creation of a cultural environment in an organization or team that encourages employees to report errors, share lessons learned, and improve work processes (Jia et al., 2023). It emphasizes open acceptance of mistakes and positive responses to facilitate learning and continuous improvement. In this cultural environment, employees are more likely to engage in bootleg innovation behavior (Liang et al., 2023). On the one hand, this is because organizations with a good error management climate actively confront errors, rather than blindly rejecting them, which reduces employees’ fear of taking risks and trying new approaches, and encourages them to be more willing to try out new ideas and approaches, which, in turn, stimulates employees’ potential for innovation and makes them willing to engage in challenging work (Geng et al., 2022b). On the other hand, organizations with a fault-tolerant atmosphere regard errors as learning opportunities, encourage employees to report errors, share lessons learned, and discuss improvement measures together. This culture encourages employees to communicate more willingly when facing errors, to pass on information about errors, and to discuss solutions together, so that they can share and learn from error knowledge, accumulate error experience, and improve their ability to detect and correct errors (Geng et al., 2022a). In summary, the organization’s encouragement, tolerance, and support for employees in an error management climate not only alleviates employees’ concerns about failure and risk but also makes them more willing to share mistakes and lessons learned, and inspires them to be bolder in exploring new territories and engaging in bootleg and innovative behaviors. In view of the above analyses, this study proposes the following hypotheses:

H1: Error management climate positively influences employee bootleg innovation behavior.

2.2 Mediating role of psychological security

Organizations with a good error management climate have a high degree of tolerance for errors, are tolerant of those who make mistakes, motivate them to make progress, and advocate employees to communicate with each other, learn from each other, and continuously improve and perfect their own abilities. Psychological security refers to the staff's perception of the degree of safety in their surrounding environment. A positive error management climate can effectively enhance the level of psychological security among staff. The higher the employee's sense of psychological security, the more they are not afraid of difficulties, the more courageous they are to challenge, and the more out-of-role behaviors they show (Zheng et al., 2024). The error management climate focuses on opportunities to improve employee workflow rather than the negative consequences of work errors. It encourages employees to share rather than cover up information about mistakes, which gives employees confidence that they will not be mocked and punished for making mistakes, reducing the risk they may take for making mistakes at work, resulting in a higher level of psychological security (Zhao et al., 2023). In addition, the error management climate encourages employees to communicate openly with other members of the organization when errors occur, and this open communication of errors allows employees to learn not only from their own errors but also from the sharing of errors with others, which enhances the understanding and connection between employees, forming a trusting and mutually supportive interpersonal relationship (Zhang et al., 2024). This supportive work environment not only meets the instrumental resource needs of employees but also meets the socio-emotional resource needs of employees, so that employees can psychologically experience a sense of security in working in the organization (Agarwal and Farndale, 2017). In view of the above analysis, the following hypotheses were formulated for this study:

H2: Error management climate positively affects employees' psychological security.

Psychological security can enhance employees' perceptions of organizational inclusiveness on the one hand, and on the other hand, it can circumvent the emergence of employees' worrying emotions, thus daring them to pursue their personal values and goals. Bootleg innovation as a challenging extra-role behavior may also be influenced by psychological security. Bootleg innovation as an extra-role behavior is usually carried out clandestinely behind the backs of the organization or superiors and carries a certain amount of risk (Liu et al., 2024). In general, employees who engage in exploratory risk-taking activities are usually affected by risk perception (Elsayed et al., 2023). However, a good sense of psychological security can lead to employees believing that it is safe to implement challenging behaviors in organizations and that they are willing to continue to learn, change, and innovate in complex and high-risk work environments (Edmondson et al., 2016). When employees have a high sense of psychological security, they can express their ideas and opinions freely without any constraints and without worrying about their status, position, etc. being affected (Kyambade et al., 2024). As a result, the perceived risk of bootleg innovation can be reduced, whereas employees with a low level of psychological security tend to avoid bootleg innovation because they are concerned that it is illegal and

involves a high level of risk. In addition, when employees have a high level of psychological security, they will worry less about their own behavior and are willing to put forward more innovative ideas for the enterprise; on the contrary, when employees have a low level of psychological security, they will worry about whether their words and deeds are appropriate and safe, and will often be "tied up," not daring to show themselves too much. They tend to be "tied up" and do not dare to express themselves too much. In conclusion, the following hypotheses are proposed in this study:

H3: Psychological security positively influences employee bootleg innovation behavior.

Eivazzadeh and Nadiri (2022) proposed that psychological security is a level of perception in which individuals are not worried about being affected by unfavorable factors in their surroundings and are able to express their thoughts truthfully and display different behaviors. It promotes employee transgression and innovation. Employees in an organizational environment with a good error management climate will perceive a higher level of psychological security, which will motivate them to initiate bootleg innovation as the perception of an organizational safety climate will enable them to overcome their fear of the unknown and to actively engage in self-accepted work behavior (Frazier et al., 2017). Furthermore, when the sense of psychological security is high, employees will believe that they will not be punished by the organization even if they make mistakes when implementing bootleg innovation behavior, and be sure that implementing challenging behavior is safe in the organization, and their focus will be on how to innovate, rather than fearing the risks, and then, they will be willing to continue to learn and innovate in their work; when the sense of psychological security is low, employees will be worried that the bootleg innovation behavior will not be able to achieve the expected results, and they will be repulsed by the consequences of the subsequent mistakes they will need to bear and the interpersonal risks, and they will refuse to break the rules in order to transgress the rules and innovate (Hood et al., 2016). Based on this, Hypothesis 4 is proposed in this study.

H4: Psychological security mediates the relationship between error management climate and employee bootleg innovation behavior.

2.3 The moderating role of risk-taking traits

Bootleg innovation behavior requires employees to resist social pressures and deviate from norms (Yang et al., 2024). Moreover, although bootleg innovation behavior aims to enhance the wellbeing of the organization and the employees' intentions are good, its results are uncertain and may lower the image of the employees in the organization or it may invite resentment and rejection from others. Therefore, bootleg innovation behavior carries some risks. It is argued that risk-taking behavior is determined by the decision maker's perceived risk and attitude toward the perceived risk (Jochemczyk et al., 2017). Risk-taking traits are an individual's tendency to take or avoid risks and describe an employee's attitude toward perceived risk. Risk-taking traits as an employee's assessment of risk and reward can influence an employee's expectations of outcomes (Rahim et al., 2024). It can be a good explanation of risky behavioral differences between

individuals and can serve as a boundary condition for psychological security to effectively motivate employees to commit constructive bootleg behavior. When employees are low in risk-taking traits, risk-avoidant individuals may focus too much on negative consequences (Pearsall et al., 2023). For example, they may worry about the ridicule and isolation they may receive if they break the rules, they may worry that their behavior will be seen as a show, and they may worry that they will be seen as an outlier, so these individuals prefer to follow the rules. With low risk-taking traits, employees may choose not to act even if they possess a strong sense of psychological security, preferring not to excel and ensuring conformity. They may exaggerate the likelihood of loss and worry that a failed outcome will ruin everything, while ignoring potential gains. Out of concern for negative outcomes, they are thus reluctant to make bootleg innovations (Choma et al., 2014). On the contrary, when employees are high in risk-taking traits, individuals who tend to take risks are subjectively more concerned about the benefits of bootleg innovation behavior for the organization and other members, are willing to invest significant resources in developing opportunities or engaging in behavior with uncertain outcomes, and are willing to engage in the behavior even if the bootleg innovation poses risks and may be misinterpreted (Jia et al., 2021). Individuals high in risk-taking traits amplify factors that favor risky behavior and tend to arrive at a higher likelihood of success in the face of risky behavior than the norm. Individuals high in risk-taking traits have fewer concerns when making risky decisions and appear bolder. In short, risk-taking traits are individuals' perceptions and perceptions of risk and opportunity. At the same time, employees' concerns about risk lead to conservative behavior, while the emphasis on returns leads to the courage to break the rules (Luo et al., 2024). In view of the above analyses, this study proposes the following hypotheses:

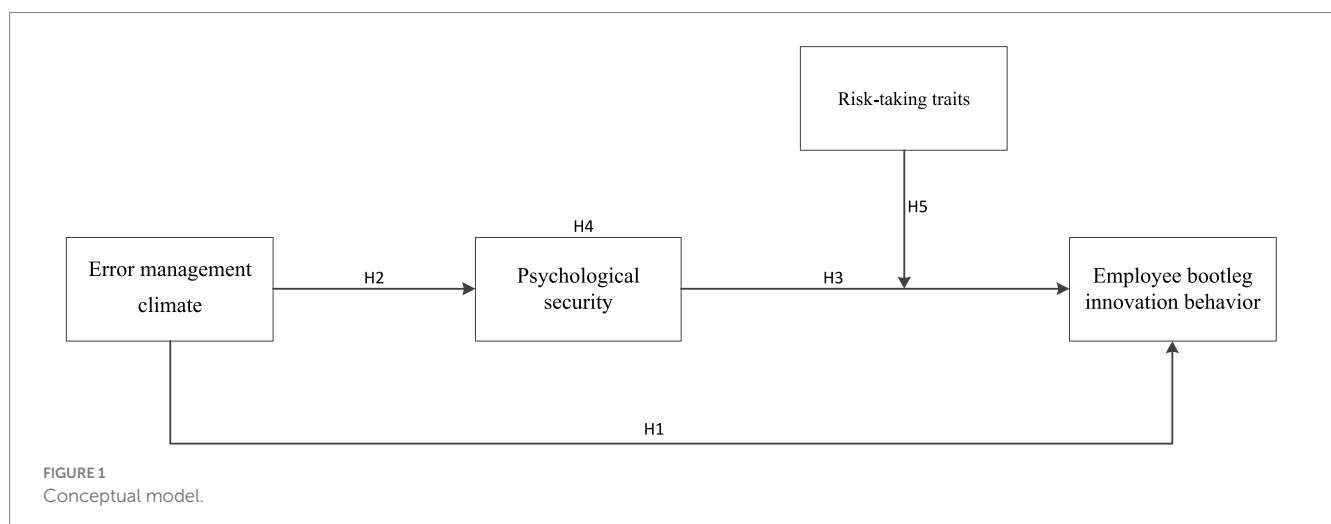
H5: Risk-taking traits positively moderate the relationship between psychological security and employees' bootleg innovation behavior.

Through the variables designed in this paper and the summary of related literature, the interrelationships between error management climate, psychological security, risk-taking traits, and employees' bootleg innovation behavior are analyzed based on social cognitive theory, and the following theoretical model is proposed in this paper (Figure 1).

3 Research design

3.1 Questionnaire design

In this paper, the research hypotheses are verified by means of a questionnaire survey. The target of the survey is the working staff of enterprise units in Beijing, Dalian, Yantai, and Taiyuan and involves different industries and positions such as finance, manufacturing, IT, real estate, and so on. As the capital, Beijing has a high degree of economic, cultural, and political influence. Dalian is an important seaport city located in northeast China. Yantai, located in the Shandong Peninsula, is an open coastal city. Taiyuan, the capital of Shanxi Province, has the characteristics of an inland city. These four cities differ in geographical location, economic development level, cultural background, and other factors, which helps enhance the regional representativeness of the study. At the same time, finance, manufacturing, IT, real estate, and other industries occupy an important position in the national economy, and each has a different operation model, working environment, and personnel quality. Choosing these industries as research objects can fully reflect the commonalities and differences of staff in different industries. In the process of questionnaire collection, we follow the principle of voluntariness and anonymity and do not affect the normal life of the respondents. At the same time, strict data protection measures are in place to ensure that participants' answers are not disclosed to third parties during the collection, storage, and analysis process. The research was mainly carried out through the distribution of electronic questionnaires; first, 105 questionnaires were distributed for pre-survey, which were used for the initial questionnaire variables such as the reliability test, the results show that a coefficient is greater than 0.8, and the questionnaire reliability is good. After that, the formal research was carried out, in order to ensure the quality of the questionnaire, one-on-one explanation of the research problems and precautions will be given when the questionnaire is distributed online. A total of 282 electronic questionnaires were collected and screened. First, according to the response time of the questionnaires, by analyzing and discussing the response time of the sample as a whole, it was considered that the response time of a valid questionnaire should be more than or equal to 100 s, so questionnaires with a response time less than this criterion were treated as "did not fill out



the questionnaire carefully.” Second, the questionnaires that all chose the same option or showed a clear pattern in their responses were deleted. Finally, 241 valid questionnaires were selected, with a validity rate of 85.46%.

The Statistical Package for the Social Sciences (SPSS) offers a wide range of data analysis functions, including descriptive statistics, inferential statistics, non-parametric testing, analysis of variance, regression analysis, correlation analysis, cluster analysis, factor analysis, and structural equation modeling. Therefore, this paper uses SPSS to process and analyze the data.

3.2 Demographic characteristics of participants

Gender differences may lead to differences in employees' innovation motivation, risk appetite, and innovation methods. For example, some studies suggest that male employees may be more inclined to take risky and innovative behaviors, while female employees may be more detail-oriented and robust. These differences may affect whether employees choose deviant innovation behavior and the specific performance of their behavior. Age may affect an employee's ability and willingness to innovate. Young employees usually have a stronger willingness to innovate and take risks and are more willing to try new ideas and methods; older workers, on the other hand, may be more focused on stability and experience accumulation and may be more cautious about bootleg innovation. Education level is usually closely related to employees' knowledge

reserve, learning ability, and innovation ability. Length of service may affect employee loyalty to the organization, familiarity with the job, and decision-making processes for innovative behavior. At the same time, the enterprise size may affect the innovation atmosphere, resource input, and management style of the organization. Large enterprises may have stronger innovation strength and better innovation systems, but they may also have problems such as slow decision-making and bureaucracy. Small businesses may be more flexible and innovative but have limited resources. These differences may influence employees' bootleg innovation behavior. Therefore, we use the above five variables as demographic variables. The results of the analysis of the basic information of the sample show that 48.96% of all subjects were male and 51.05% were female; the proportion of those under 35 years of age amounted to 63.07%; the proportion of those with a bachelor's degree or higher was 54.77%; the proportion of those who had worked for less than 3 years was 79.67%; and the proportion of those who came from enterprises of a size of less than 500 employees was 55.60%. [Table 1](#) summarizes the demographic information of the sample of subjects in this study.

3.3 Measurement of variables

The survey measured four variables: error management climate, psychological security, risk-taking traits, and bootleg innovation behavior, and the scales chosen were all mature scales. The scale was based on a 5-point Likert scale, with scores ranging from 1 to 5, indicating “not at all compliant” to “fully compliant.”

TABLE 1 Demographic characteristics of participants.

	Options	Frequency	Percentage	Cumulative percentage
Sex	Male	118	48.963	48.963
	Female	123	51.037	100
Age	18–25 years	75	31.12	31.12
	25–35 years	77	31.95	63.071
	35–45 years	63	26.141	89.212
	45–55 years	19	7.884	97.095
	55 years and over	7	2.905	100
Education	Undergraduate or below	109	45.228	45.228
	Undergraduate	81	33.61	78.838
	Bachelor's degree	41	17.012	95.851
	Doctoral degree	10	4.149	100
Length of service	Less than 1 year	59	24.481	24.481
	1–3 years	133	55.187	79.668
	4–10 years	32	13.278	92.946
	11–25 years	12	4.979	97.925
	More than 25 years	5	2.075	100
Enterprise size	Less than 100	32	13.278	13.278
	100–500 persons	102	42.324	55.602
	500–1,000 persons	97	40.249	95.851
	More than 1,000 people	10	4.149	100
Total		241	100	100

3.3.1 Error management climate

Combined with the relevant theories of error management, and based on the research of Zhang (2021), this paper constructs an error management climate measurement scale, with a total of seven items, including “the enterprise has relevant error prevention measures,” “the enterprise has a sound error management system and regulations,” and so on. Cronbach’s alpha coefficient of this scale in this study is 0.917, which has a good reliability level.

3.3.2 Psychological security

This paper adopts the Individual Psychological Security Scale developed by Li and Yan (2007) as a measurement tool to measure the psychological security level of the respondents in the work process, with a total of five question types, such as “At work, I express my true feelings,” “At work, I do not worry that expressing my true thoughts will be detrimental to me,” “I do not worry that expressing my true thoughts will be detrimental to me,” and so on. Cronbach’s alpha coefficient of this scale in this study is 0.88, which has a good reliability level.

3.3.3 Risk-taking traits

By modifying the research scales of Gomez-Mejia and Balkin (1989) and Chen and Yang (2021), this paper identifies specific measures of risk-taking traits, including four items, such as “I am willing to take risks when choosing a job or a company” and “I prefer high risk, high reward jobs to low risk, stable salary jobs.” Cronbach’s alpha coefficient of this scale in this study was 0.855, which has a good level of reliability.

3.3.4 Employee bootleg innovation behavior

In this study, the scale developed by Lin and Chen (2012) containing nine items to measure bootleg innovation behavior was chosen. The scale was verified to have good reliability and validity, so this study only modified the wording of the scale appropriately according to the actual research content in order to measure employees’ bootleg innovation behavior. The scale includes such phrases as “I continue to optimize some innovative ideas without authorization from my supervisors” and “While working, I often think about how to make ideas that have been rejected better.” Cronbach’s alpha coefficient of this scale in this study was 0.926, which has a good level of reliability.

The results of the Kaiser–Meyer–Olkin (KMO) and Bartlett’s test of sphericity were analyzed. As can be seen from the result table, the KMO measure of sampling adequacy is 0.949, much higher than the standard of 0.7, indicating that there are strong correlations among the questions tested, and the level of these correlations is significantly higher than the level of partial correlation, indicating that the validity test of this study has passed the test (Table 2).

4 Result analysis

4.1 Validation factor analysis

To test the discriminant validity of all variables, this study conducted a validated factor analysis using the common method biases statistical approach proposed by Hao and Lirong (2004) for the four variables involved in this study: error management climate, psychological security, risk-taking traits, and employee bootleg innovation behaviors. The results are shown in Table 3, where the

TABLE 2 Validity test.

KMO		0.949
Bartlett’s test of sphericity	Approximate chi-square	7790.953
	Degree of freedom	300
	Significance	0

TABLE 3 Results of validation factor analysis.

Factor	χ^2/df	NFI	CFI	TLI	RMSEA
EMA, PS, RTP, BI	1.331	0.906	0.975	0.972	0.037
EMA,PS + RTP, BI	2.844	0.796	0.857	0.842	0.088
EMA + PS + RTP, BI	4.327	0.688	0.739	0.714	0.118
EMA + PS + RTP + BI	7.546	0.453	0.485	0.438	0.165

EMA, error management climate; PS, psychological security; TP, risk-taking propensity; BI, Bootleg innovation.

four-factor model had the best goodness of fit, $\chi^2/df = 1.331$, RMSEA = 0.037, NFI = 0.906, CFI = 0.975, and TLI = 0.972, providing support for the differentiation of the four variables involved in this study.

Common method bias refers to the artificial covariance between predictor and criterion variables due to the same data collection method (such as self-report and questionnaire) or other external factors (such as social expectations and personal tendencies) (Podsakoff et al., 2012). This bias can seriously affect the accuracy and reliability of the study results. To detect and assess the impact of common methodology bias, we used the Harman single-factor tests. As can be seen from Table 4, the first common factor explains 33.436% of the total variance, which is less than the critical value of 40% (Podsakoff et al., 2003). Therefore, there is no serious common methodology bias problem in this study.

Variance inflation factor (VIF) is a statistic that measures the severity of multicollinearity (Senaviratna and Cooray, 2019). In a multiple linear regression model, when there is a high linear correlation between two or more independent variables, it is called multicollinearity. Multicollinearity can cause the variance of regression coefficient estimators to increase, thus reducing the stability and reliability of the model. VIF value is an index used to detect this multicollinearity problem. Through collinearity diagnosis, we found that VIF values were all less than 10, indicating that there was no multicollinearity between variables (Table 5).

4.2 Correlation analysis

As shown in Table 6, there was a significant positive correlation between the main variables in this study, with error management climate being significantly positively correlated with psychological security ($r = 0.434$, $p < 0.01$) and bootleg innovation behavior ($r = 0.320$, $p < 0.01$), and psychological security being significantly correlated with bootleg innovation behavior ($r = 0.385$, $p < 0.01$).

4.3 Hypothesis testing analysis

Aggregation validity was analyzed using AVE (mean variance extraction) and CR (combined reliability). As can be seen from

TABLE 4 Harman’s single-factor test.

Component	Initial eigenvalues			Extraction sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	8.359	33.436	33.436	8.359	33.436	33.436
2	3.588	14.353	47.789	3.588	14.353	47.789
3	2.703	10.812	58.601	2.703	10.812	58.601
4	2.006	8.022	66.624	2.006	8.022	66.624
5	0.699	2.796	69.419			
6	0.624	2.495	71.915			
7	0.574	2.294	74.209			
8	0.555	2.220	76.430			
9	0.538	2.153	78.582			
10	0.504	2.017	80.599			
11	0.479	1.915	82.514			
12	0.461	1.842	84.356			
13	0.449	1.796	86.152			
14	0.410	1.642	87.794			
15	0.368	1.473	89.267			
16	0.347	1.390	90.657			
17	0.331	1.325	91.981			
18	0.321	1.286	93.267			
19	0.291	1.165	94.432			
20	0.275	1.098	95.530			
21	0.262	1.048	96.578			
22	0.248	0.990	97.569			
23	0.227	0.907	98.476			
24	0.199	0.798	99.273			
25	0.182	0.727	100.000			

TABLE 5 Collinearity diagnosis.

	Tolerance	VIF
EMA	0.752	1.329
PS	0.699	1.431
RTP	0.800	1.249
Gender	0.972	1.028
Age	0.735	1.361
Education	0.872	1.147
Length of service	0.590	1.695
Enterprise size	0.570	1.755

Table 7, the AVE of the seven common factors is greater than 0.5, the CR value is greater than 0.7, and the standardized load coefficient is greater than 0.6, indicating high polymerization validity, which indicates that the model has strong validity.

4.3.1 Main and mediating effects

Considering the main effect and mediating effect first, H1, H2, H3, and H4 were tested using hierarchical regression: (i) Control

variables (gender, age, education, length of service, and enterprise size) and independent variables (error management climate) were introduced into the regression equations, in turn, to analyze the effect of error management climate on employees’ bootleg innovation behavior. (ii) Control variables and independent variables (error management climate) are introduced sequentially to analyze the effect of error management climate on psychological security. (iii) Control variables and mediating variables (psychological security) are introduced sequentially to analyze the effect of psychological security on employees’ bootleg innovation behavior. (iv) Mediating effect, introducing control variables first, and then putting in independent variables and mediating variables to analyze the influence of error management climate and psychological security on employees’ bootleg innovation behavior. In statistics, the definition of “significant” is often associated with the level of significance and is used to determine the critical probability value for rejecting the null hypothesis in a hypothesis test. In general, the significance level is preset before the statistical test is performed, and commonly used significance level values are 0.05 or 0.01. When $p < 0.05$: The result is generally considered statistically significant; that is, there is sufficient evidence to reject the null hypothesis and believe that the difference between the sample data and the null hypothesis is not caused by

TABLE 6 Descriptive statistics.

		EMA	PS	BI	RTP	Gender	Age	Education	Length of service	Enterprise size
EMA	Pearson correlation	1	0.434**	0.320**	0.224**	−0.013	0.035	0.100	−0.031	0.055
	Sig.		0.000	0.000	0.000	0.841	0.587	0.120	0.637	0.393
PS	Pearson correlation	0.434**	1	0.385**	0.093	0.022	0.094	0.213**	0.017	0.111
	Sig.	0.000		0.000	0.151	0.733	0.145	0.001	0.788	0.086
BI	Pearson correlation	0.320**	0.385**	1	0.178**	0.000	0.000	0.082	−0.092	−0.005
	Sig.	0.000	0.000		0.005	0.998	0.998	0.207	0.154	0.935
RTP	Pearson correlation	0.224**	0.093	0.178**	1	−0.040	0.050	0.030	−0.071	0.029
	Sig.	0.000	0.151	0.005		0.536	0.443	0.639	0.274	0.653
Gender	Pearson correlation	−0.013	0.022	0.000	−0.040	1	0.039	−0.110	−0.030	0.029
	Sig.	0.841	0.733	0.998	0.536		0.542	0.087	0.646	0.658
Age	Pearson correlation	0.035	0.094	0.000	0.050	0.039	1	−0.007	0.432**	0.474**
	Sig.	0.587	0.145	0.998	0.443	0.542		0.908	0.000	0.000
Education	Pearson correlation	0.100	0.213**	0.082	0.030	−0.110	−0.007	1	−0.146*	0.107
	Sig.	0.120	0.001	0.207	0.639	0.087	0.908		0.023	0.098
Length	Pearson correlation	−0.031	0.017	−0.092	−0.071	−0.030	0.432**	−0.146*	1	0.575**
	Sig.	0.637	0.788	0.154	0.274	0.646	0.000	0.023		0.000
Size	Pearson correlation	0.055	0.111	−0.005	0.029	0.029	0.474**	0.107	0.575**	1
	Sig.	0.393	0.086	0.935	0.653	0.658	0.000	0.098	0.000	

**At level 0.01 (two-tailed), the correlation was significant.
*At level 0.05 (two-tailed), the correlation was significant.

TABLE 7 Differential validity analysis.

	EMA	PS	RTP	BI
EMA	0.785			
PS	0.434	0.773		
RTP	0.224	0.093	0.773	
BI	0.32	0.385	0.178	0.767

The blue section represents CR (construct reliability), which reflects the extent to which all items within each latent variable consistently explain the latent variable. A CR value greater than 0.70 indicates that the latent variable has good construct reliability.

random error. When $p < 0.01$: The result is considered more significant, which indicates that the difference between the sample data and the original hypothesis is more clear and the possibility of random error is lower. When $p < 0.001$, in some studies, a more stringent significance level, such as 0.001, is used, where a p -value less than 0.001 is considered to have a statistically significant difference. The results are shown in Table 8. The positive effect of error management climate on employees' bootleg innovation behavior is significant ($\beta = 0.444, p < 0.01$). Thus, H1 is validated. The positive effect of error management climate on psychological security was significant ($\beta = 0.297, p < 0.01$). Thus, H2 was validated. It indicated a significant positive effect of psychological security on employees' bootleg innovation behavior ($\beta = 0.275, p < 0.01$), and H3 was validated. Moreover, the positive effect of error management climate on employees' bootleg innovation behavior was still significant ($\beta = 0.133, p < 0.01$) after the addition of psychological security, but the coefficient was reduced. Thus, H4 is validated, i.e., psychological security plays a partially mediating role in error management climate

and employee bootleg innovation behavior. The test of mediating effect was conducted using PROCESS using the bootstrap method and by bias-correcting the non-parametric percentage bootstrap while utilizing the bias-corrected test method with repeated sampling 2000 times at a 95% confidence interval condition. According to the mediation effect judgment criteria, if the interval of the value of the variable at the 95% confidence interval does not include 0, it indicates that the mediation effect is significant. As shown in Table 9, the indirect effect of error management climate on employees' bootleg innovation behavior through psychological security has a higher effect value in the high-level group ($\beta = 0.177, 95\% \text{ CI} = [0.108, 0.255]$) than in the low-level group ($\beta = 0.072, 95\% \text{ CI} = [0.001, 0.146]$), and the difference in the average group is significant as well ($\beta = 0.072, 95\% \text{ CI} = [0.001, 0.146]; 95\% \text{ CI} = [0.071, 0.187]$), indicating that psychological security mediates the relationship between error management climate and bootleg innovation behavior.

4.3.2 Moderating effect of risk-taking traits

In order to explore the moderating effect of risk-taking traits on psychological security and employee piracy innovation, we designed a regression analysis study. In this study, we not only introduced control variables to ensure the accuracy of the results but also included independent variables, mediating variables, and moderating variables. Crucially, we add an interaction term between psychological security and risk-taking traits to the regression equation to examine their interaction.

The results of regression analysis showed that the interaction terms of psychological security and risk-taking traits had a significant positive effect on the employees' bootleg innovation behavior ($\beta = 0.122, p < 0.05$). This finding clearly points out the positive

TABLE 8 Hypothesis test results.

	Psychological security			Bootleg innovative behavior
Gender	0.006	−0.02	−0.013	0.09
Age	0.019	0.004	−0.009	0.056
Academic qualifications	0.036	−0.02	−0.011	0.208**
Length of service	−0.102	−0.11	−0.086	0.015
Enterprise size	0.023	0.011	0.012	0.045
Error management climate	0.297**	0.175**	0.444**	0.133*
Risk-taking traits profile			−0.25	
Psychological security			−0.179	0.275**
Psychological security* risk-taking traits				0.141**
R ²	0.112	0.186	0.217	0.228
△R ²	0.089	0.162	0.183	0.204
F-value	4.907**	7.615**	7.133**	11.490**

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

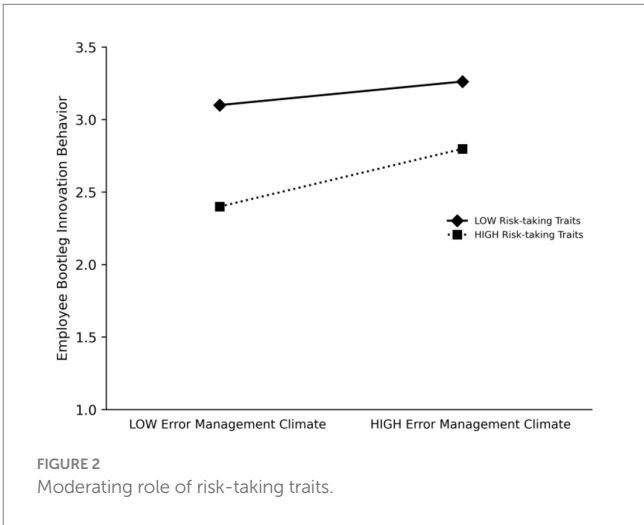
TABLE 9 Mediation effect test.

Intermediary variable	Adjustment level	Level value	Effect	BootSE	BootLLCI	BootULCI
Psychological security	Low level (−1SD)	2.792	0.072	0.035	0.01	0.146
	Average value	3.757	0.125	0.03	0.071	0.187
	High level (+1SD)	4.722	0.177	0.038	0.108	0.255

BootLLCI refers to the lower limit of the bootstrap sampling 95% interval and BootULCI refers to the upper limit of the bootstrap sampling 95% interval.

moderating effect of the risk-taking trait on the relationship between psychological security and bootleg innovation behavior: when the level of risk-taking trait is higher, the positive promoting effect of psychological security on bootleg innovation behavior is more significant. In contrast, when the level of risk-taking trait is low, the positive effect is relatively weakened. This result strongly supports our hypothesis H5.

In order to further visually demonstrate the moderating effect of risk-taking traits, we analyzed the moderating effect using the method of one standard deviation above the mean and one standard deviation below the mean and presented the results in Figure 2. The results showed that the moderating effect of psychological security on bootleg innovation was 0.3984 ($p < 0.01$) in the state of high-risk-taking trait and 0.1625 ($p < 0.01$) in the state of low risk-taking trait. This comparison clearly shows that psychological security has a stronger positive impact on bootleg innovation in situations with higher risk-taking traits.



5 Conclusion

5.1 Main findings and theoretical contributions

Taking the working employees of enterprise units as the research sample, this study constructed a relationship model of error management climate on employees' bootleg innovation behavior and explored the influence mechanism of error management climate on employees' bootleg innovation behavior, the mediating effect of psychological security, and the moderating effect of risk-taking traits.

Based on the empirical test results, the following conclusions are drawn:

First, in business organizations, error management climate has a significant positive impact on employees' bootleg innovation behavior. The more employees perceive an error management climate at work, the more their bootleg innovation behavior tends to increase accordingly. Previous research has focused on external reward and punishment systems (Abrams et al., 2018), and less on the effects of error management climate on employees' psychological states and subsequent behavior. In a management climate that encourages acceptance of mistakes and is learning oriented, employees are more

inclined to exhibit bootleg innovation behavior. This climate leads employees to believe that the organization encourages innovation and experimentation with new approaches, and therefore, they are more willing to actively explore new ideas, experiment with new methods, and take risks in order to improve work processes or product services. This study explores the results of the impact of error management climate with on-the-job employees in an enterprise unit as the research object, and the results support the theoretical view that establishing a strong error management climate can promote employees' bootleg innovation behaviors, validate the effectiveness of the error management climate in encouraging employees to adopt bootleg innovation behavior, and expand the content of the research on error management climate.

Second, psychological security played a key mediating role between error management climate and employee bootleg innovation behavior. This finding has important implications for theoretical research. First, while past studies have tended to focus on social interaction (Edmondson and Lei, 2014), team performance, and so on (Kim et al., 2020) in exploring the influencing role of psychological security, the present study explores the formation of psychological security from the perspective of error management climate. Second, past studies have often focused on the influence of factors such as leadership style (Lu et al., 2022) and individual traits (Tenzer and Yang, 2019) on employees' bootleg innovation behavior and seldom took employees' intrinsic psychological states into account. In this study, we introduced psychological security as a key variable by constructing the pathway of "error management climate—psychological security—employee bootleg innovation behavior" and emphasized its role in error management climate and employee bootleg innovation behavior. By constructing the path of "error management climate—psychological security—employee bootleg innovation behavior," this study introduces psychological security as a key variable and highlights its mediating role between error management climate and employee bootleg innovation behavior. This study not only expands the understanding of the relationship between error management climate and bootleg innovation behavior but also highlights the important role of psychological security in this process, enriching the research on the antecedent and outcome variables of psychological security.

Third, risk-taking traits positively moderated the relationship between psychological security and employees' bootleg innovation behavior, and the interaction of higher risk-taking traits and psychological security had a significant positive effect on employees' bootleg innovation behavior. This finding lends support to the previous hypothesis H5. Individuals high in risk-taking traits are more willing to try out new ideas and approaches, and having an environment with a high level of psychological security reduces their worries and fears, giving them more confidence and motivation to try out and implement novel and innovative ideas. This psychological security allows risk-takers to explore and take risks more freely, which promotes them to demonstrate bootleg innovation behavior more frequently, leading to more opportunities for innovation and development in the organization. The significance of this finding lies in the following: first, previous studies have mainly considered the moderating effect between psychological security and employees' bootleg innovation behavior in terms of organizational culture variables and have rarely explored the moderating effect from an individual trait perspective; second, previous studies on risk-taking

traits have mainly considered the antecedent and consequent variables of risk-taking traits and the mediating role of risk-taking traits among the relevant variables, neglecting the role of risk-taking traits on psychological security and innovation. The findings of this study not only examined the relationship between error management climate and employees' deviant and innovative behavior as a series of influences that positively feedback to satisfy individuals' psychological needs, and then stimulate intrinsic motivation and lead to behavior, but also deepened the research on the moderating effect of risk-taking traits on psychological security, which provides ideas for further research on psychological security in the future.

5.2 Practical implications

This study focuses on the relationship between error management climate and employees' bootleg innovation behavior, which broadens the research horizon and deepens managers' understanding of the value of error management climate. It is found that the error management climate can stimulate more employees' bootleg innovation behavior by enhancing psychological security and promote organizational innovation and development. For enterprises, this study puts forward the following recommendations:

First, managers should encourage employees to try new ideas, accept mistakes in the innovation process, and create an atmosphere of safe innovation. Use constructive and supportive communication to deal with staff mistakes and reduce their tension; build a team culture that encourages knowledge sharing, collaboration, and mutual support and enhance employees' confidence and motivation to innovate.

At the same time, managers should give priority to enhancing the psychological security of employees by providing support and resources, promoting teamwork, and demonstrating a leadership role with a positive innovative and experimental attitude to promote the psychological security of employees, thus encouraging piracy innovation.

In addition, managers should pay attention to the risk-taking traits of employees and provide them with appropriate challenges and opportunities to increase their self-confidence and willingness to take risks. Provide regular positive feedback and recognition for their efforts and innovative attempts to create an atmosphere that fosters risk-taking traits and promotes piracy innovation and positive risk-taking.

5.3 Limitations and future research

This study is devoted to exploring the mediating mechanism of psychological security between the error management climate and the employees' bootleg innovation behavior, and in the process, we found the moderating effect of risk-taking trait on this relationship. Although the research has achieved some results through theoretical derivation and empirical analysis, it still faces some significant limitations. Specifically, this study focused on a few cities in China, which limits the general applicability of the findings and makes it difficult to determine whether the findings are equally applicable to a broader international context. In addition, the use of electronic questionnaires to collect data may lead to bias in sample selection as it may not fully cover all potential study subjects, especially those with limited digital resources or who are less willing to participate in the survey online.

Therefore, in order to more comprehensively validate and extend the conclusions of this study, future studies need to span different geographic regions and combine multiple data collection methods to ensure the diversity and representativeness of the sample, thus improving the accuracy and reliability of the study. The study also overlooks critical methodological weaknesses like potential response bias in self-reported data and lack of longitudinal data to assess causality.

Data availability statement

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

Author contributions

QW: Investigation, Writing – original draft. XZ: Conceptualization, Writing – original draft. NZ: Methodology, Writing – original draft. JS: Conceptualization, Writing – original draft.

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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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Influence of digital transformation on employee innovative behavior: roles of challenging appraisal, organizational culture support, and transformational leadership style

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Introduction: This study investigates the relationships between digital transformation (DT), challenging appraisal (CA), organizational culture support (OCS), transformational leadership style (TLS), and employee innovative behavior (EINB) in Brazzaville's banking sector. Grounded in Social Cognitive Theory and Self-Determination Theory, the research aims to provide insights into how these factors interact to influence innovation within organizations undergoing digital change.

Methods: Data were collected from 280 employees working in the top five banks in Brazzaville. Structural Equation Modeling (SEM) was applied using SPSS 26 and SmartPLS to analyze the relationships among DT, CA, OCS, TLS, and EINB.

Results: The findings reveal significant positive relationships between DT and CA, DT and EINB, and CA and EINB. Moreover, CA and OCS partially mediate the relationship between DT and EINB. While CA has a significant effect on EINB, TLS moderates the DT-EINB relationship by weakening its positive impact. Hypotheses regarding these relationships were largely confirmed, except for the interaction effect of DT and TLS on EINB.

Discussion: These results highlight the crucial role of CA and OCS in facilitating the impact of digital transformation on employee innovation. Additionally, they suggest that higher levels of transformational leadership may not always strengthen innovation in digitally transforming organizations. The study provides valuable managerial implications for fostering an innovative workforce in the banking sector.

KEYWORDS

challenging appraisal, digital transformation, employee innovative behavior, organizational culture support, structural equation modelling, transformational leadership style

1 Introduction

In recent years, workplaces worldwide have experienced a profound evolution driven by the widespread adoption of digital technologies. This shift, known as ‘digital transformation,’ encompasses the integration of digital tools, processes, and strategies across organizational operations, with the aim of enhancing efficiency, competitiveness, and adaptability (Khin and Ho, 2019; Westerman et al., 2014). This phenomenon is particularly pertinent in Congo Brazzaville, where organizations are embracing digitalization to foster growth and development. Like many developing economies, Congo Brazzaville is undergoing a transformative phase in its technological journey (Pea-Assounga and Sibassaha, 2024), marked by initiatives to strengthen digital infrastructure, improve internet accessibility, and integrate digital solutions across sectors such as banking and government services (World Bank, 2021; Wu and Pea-Assounga, 2022). Despite challenges related to infrastructure and technology access disparities, the momentum toward digital transformation in Congo Brazzaville is palpable. As organizations in the country navigate this digital era, understanding the impact of technological advancements on employee behavior becomes essential. While prior research in Western contexts has hinted at a positive correlation between digital transformation initiatives and “employee innovative behavior” (Alieva and Powell, 2022; Bharadwaj et al., 2013), the specific dynamics of this relationship within the unique socio-cultural and organizational context of Congo Brazzaville remain largely unexplored.

Concurrently, the concept of ‘challenging appraisal’ has emerged prominently in organizational psychology literature as a mechanism for shaping employee innovative behavior. Challenging appraisal, defined as an evaluative process that not only assesses employee performance but also fosters a culture of continuous improvement by challenging individuals to exceed existing capabilities, warrants investigation within the realm of digital transformation (AlNuaimi et al., 2022; Hinings et al., 2018). Its potential mediating influence in the link between digital transformation and “employee innovative behavior” represents a critical area for exploration, particularly within the context of Congo Brazzaville. While existing studies have underscored the impact of digital transformation on organizational outcomes, such as increased efficiency, improved customer experiences, and enhanced competitive advantage (Bharadwaj et al., 2013; Westerman et al., 2014), the influence of digital transformation on employee behavior remains a critical area for exploration. For instance, research by Verhoef et al. (2021) demonstrated how digital transformation initiatives in the retail sector led to changes in employee roles and responsibilities, affecting job satisfaction and engagement. Similarly, a study by Selimović et al. (2021) highlighted how digital transformation in the financial industry influenced employee attitudes towards technology adoption and digital skill development, impacting overall organizational performance. This study aims to address this gap by investigating the influence of digital transformation initiatives on employee innovative behavior, while concurrently examining the mediating role of challenging appraisal practices and organizational culture support as well as the moderating effect of transformation leadership style within Congolese banks. The choice of Congolese banks as the focus of this study stems from several compelling reasons. Firstly, the banking sector in Congo Brazzaville represents a significant segment of the country’s economy,

playing a crucial role in driving economic growth, facilitating financial transactions, and fostering investment and development (Opoko Apendi et al., 2017; Pea-Assounga et al., 2017). Therefore, understanding how digital transformation initiatives impact employee innovative behavior within Congolese banks holds strategic importance for both the banking sector and the broader economy. Secondly, the banking and financial sectors are undergoing fast digital transformation globally, and this trend is also evident in Congo Brazzaville. Banks in Congo Brazzaville are progressively integrating digital technologies to streamline their operations, improve customer experiences, and maintain competitiveness in the era of digitalization (Pea-Assounga et al., 2024). By focusing on Congolese banks, this study can provide insights into the unique challenges and opportunities faced by organizations in the banking sector in embracing digital transformation and fostering innovation among employees. Moreover, studying digital transformation and employee innovative behavior within Congolese banks offers a specific and tangible context for research, allowing for a deeper understanding of the complexities and nuances involved. By examining real-world practices and experiences within Congolese banks, this study can generate practical implications and recommendations that are directly relevant to the challenges and opportunities faced by organizations in the banking sector in Congo Brazzaville. By shedding light on these interconnected dynamics, this research seeks to contribute empirical insights that can inform organizational strategies aimed at leveraging digitalization to drive employee innovation in Congo Brazzaville. In addition to challenging appraisal, organizational culture support represents another vital determinant of employee innovative behavior in the context of digital transformation. Organizational culture, defined as the shared values, beliefs, and norms that shape behavior within an organization, can either facilitate or impede innovation. In digitally transformed organizations, fostering a culture that values experimentation, risk-taking, and creativity is essential for driving innovation (Guinan et al., 2019). Therefore, this study also aims to explore how organizational culture support acts as an intermediary factor in the connection between digital transformation and employees’ innovative behavior. Furthermore, the study explores the moderating effect of transformational leadership style on the relationship between digital transformation and employee innovative behavior. Transformational leaders are characterized by their ability to inspire and motivate employees, encourage innovation, and drive organizational change. In the context of digital transformation, transformational leadership may serve to amplify the effects of digital initiatives on employee behavior by providing vision, direction, and support (Tagscherer and Carbon, 2023). Therefore, this study seeks to examine how transformational leadership style influences the strength and direction of the relationship between digital transformation and employee innovative behavior.

Digital transformation in Congo Brazzaville is a multifaceted process involving the usage of digital technologies to drive societal, economic, and governmental advancements. Despite challenges in access and technology investment, significant progress has been made across various sectors. Telecommunications have witnessed substantial growth, facilitating communication, information access, and e-commerce (Pea-Assounga and Yao, 2021; World Bank, 2018). E-Government initiatives aim to enhance efficiency and transparency, while education increasingly integrates technology to improve

learning outcomes (World Bank, 2018). The adoption of digital banking and fintech services is rising, promoting financial inclusion and facilitating transactions (Pea-Assounga and Wu, 2022; Wu and Pea-Assounga, 2022). Additionally, an emerging start-up ecosystem is fostering innovation and economic growth in sectors like fintech, healthcare, agriculture, and e-commerce (Pea-Assounga et al., 2024). Despite challenges such as limited internet connectivity and digital literacy, Congo Brazzaville is poised for further technological advancements with increasing investment and prioritization. The banking sector in Congo Brazzaville is experiencing a notable digital transformation, characterized by the introduction of online and mobile banking services, mobile money, and digital payment platforms (Pea-Assounga et al., 2024; World Bank, 2021). These initiatives aim to enhance accessibility, efficiency, and financial inclusion, albeit facing challenges like infrastructure limitations and cybersecurity concerns. Sustained investment, collaborations, and regulatory support are crucial for further catalyzing this transformation.

The main objective of this research is to evaluate the effect of digital transformation on employee innovative behavior and the mediating effect of challenging appraisal and organizational culture support as well as the moderating effect of Transformational Leadership Style. Specific objectives aim to: “Evaluate the effect of digital transformation on employee innovative behavior.” Examine the mediating effect of challenging appraisal and organizational culture support. Assess the moderating effect of transformational leadership style. Analyze the links between digital transformation, challenging appraisal, organizational culture support, and employee innovative behavior. The study addresses questions concerning the effect of digital transformation on employee innovative behavior (“What is the effect of digital transformation on employee behavior?”), the relationship between digital transformation and challenging appraisal (“What is the relationship between digital transformation and challenging appraisal?”), the influence of challenging appraisal on employee innovative behavior (How does challenging appraisal influence employee behavior?), and the potential mediation effects of challenging appraisal and organizational culture support (Do challenging appraisal and organizational culture support mediate the relationship between digital transformation and employee innovative behavior?).

Investigating the effect of digital transformation on employee innovative behavior, with a focus on the mediating role of challenging appraisal and organizational culture support, holds significant importance across several dimensions. Firstly, understanding how digital transformation influences employee behavior is crucial for organizational decision-making in a rapidly evolving digital landscape. Insights from this study can inform strategic decisions related to technology adoption and organizational culture, ultimately enhancing organizational effectiveness and competitiveness. Secondly, fostering a culture of innovation is vital for organizational growth, and this study offers practical implications for enhancing employee engagement and performance through effective challenging appraisal practices and Transformational Leadership Style. Thirdly, the study contributes to advancing theoretical frameworks in organizational behavior and innovation management, enriching existing perspectives and providing avenues for future research. This study innovatively bridges digital transformation and employee behavior domains by exploring how digital initiatives influence “employee innovative behavior.” By concentrating on the mediating effect of challenging appraisal, the study

offers insights into the mechanisms shaping employee responses to digital transformation. Furthermore, the study provides methodological innovation by employing “Structural Equation Modeling (SEM)” to analyze complex models comprehensively, contributing to a more holistic understanding of the relationships among constructs.

This research is structured as follows: Section 1 presents the research topic and objectives, Section 2 reviews the theoretical foundations and relevant literature, Section 3 outlines the methodology, Section 4 presents the research findings, Section 5 discusses the results, and Section 6 addresses limitations and suggests directions for further research.

2 The study theoretical foundation

Social Cognitive Theory (SCT), proposed by Bandura (1991) offers insights into how digital transformation influences challenging appraisal among employees. This theory underscores the significance of observational learning, self-efficacy, and motivation in shaping individual behavior. Observational learning suggests that employees observe and learn from others’ innovative behaviors, influencing their own. Additionally, the challenging appraisal can enhance employees’ self-efficacy beliefs, leading to greater motivation for innovative activities. Studies by Han and Xia (2020) and Trenerry et al. Yang et al. (2021) support these assertions, showing that observing innovative behaviors and having digital self-efficacy positively impact employees’ engagement in innovation initiatives. Furthermore, SCT highlights the reciprocal interaction between individuals and their environment, indicating that organizational climate and leadership practices, such as transformational leadership, significantly influence employees’ innovative behaviors. Research by Hoang et al. (2022) corroborates this, highlighting the role of transformational leadership in shaping employees’ perceptions of digital transformation efforts, thereby influencing their innovative behaviors. On the other hand, the “Self-Determination Theory (SDT)” proposed by Deci and Ryan (1985), offers insights into the link between challenging appraisal and employee innovative behavior. SDT posits that individuals are motivated by psychological needs for autonomy, competence, and relatedness. In this regard, challenging appraisal aligns with these needs by providing autonomy in problem-solving, fostering competence through overcoming challenges and promoting relatedness by encouraging collaboration. Empirical support from research by Van Den Broeck et al. (2016) and Deci et al. (2017) strengthens these claims, demonstrating that autonomy support and challenging tasks positively influence employees’ intrinsic motivation and innovative behavior. Moreover, SDT emphasizes the role of leaders and organizational practices in creating an environment that supports autonomy, competence, and relatedness, highlighting the importance of transformational leadership in fostering innovative behavior in digitally transformed workplaces. Additionally, a study by Nazir et al. (2019) found a significant positive relationship between employees’ perceived organizational culture support for innovation and their innovative behavior, suggesting that a supportive organizational culture fosters innovation among employees in digitally transformed environments. These findings further underscore the importance of organizational context in shaping employee behavior in the digital era.

2.1 Empirical literature review

In this section, the scholar compares theoretical reviews of literature with the results of other research works by analyzing the notions of other scholars in some manner in reference to the subject at hand.

Numerous investigations have delved into the correlation between digital transformation and employee innovation. For instance, a study conducted by [Westerman et al. \(2014\)](#) found that organizations undergoing digital transformation experienced higher levels of innovation, as employees were empowered to leverage digital tools and technologies to generate new ideas and solutions. Similarly, a study by [Hanelt et al. \(2021\)](#) demonstrated a positive linkage between digital capabilities and innovation outcomes in organizations. These findings suggest that digital transformation initiatives create an environment conducive to fostering employee innovation. Research by [Tarafdar and Tanriverdi \(2018\)](#) investigated the influence of “digital transformation” on employee creativity and innovation. The study found that organizations with advanced digital capabilities exhibited higher levels of employee creativity and innovation. Specifically, digital technologies provide employees with access to diverse information, collaboration tools, and creative platforms, enabling them to generate and implement innovative ideas more effectively. Moreover, research by [AlDhaheeri et al. \(2023\)](#) examined the “factors influencing employee innovation behavior in the context of digital transformation.” The findings revealed that organizational support, leadership encouragement, and access to digital resources were significant predictors of employee innovation. This suggests that organizational factors, including appraisal practices, play a crucial role in fostering employee innovation within digitally transformed environments.

The role of challenging appraisal in shaping employee behavior has also been investigated in empirical studies. For instance, [Harari et al. \(2018\)](#) conducted a meta-analysis of research on performance appraisal and employee creativity. The results revealed a positive link between challenging appraisal practices (e.g., setting ambitious goals, and providing constructive feedback) and employee creative performance. Employees who received challenging appraisals were more likely to engage in creative problem-solving and generate innovative solutions. Research by [Speer et al. \(2020\)](#) found that employees who received challenging performance appraisals were more likely to demonstrate higher degrees of engagement and motivation. Similarly, a study by [Zia et al. \(2022\)](#) showed that challenging feedback from supervisors positively influenced employee learning and development. These findings suggest that challenging appraisal practices can impact employee behavior and performance outcomes.

While empirical research specifically examining the mediating effect of challenging appraisal in the linkage between digital transformation and employee innovative behavior is limited, studies have explored related constructs. For example, a study by [Zhang X. et al. \(2023\)](#) investigated “the mediating effect of performance feedback on the relationship between digital transformation and employee performance.” The results indicated that performance feedback mediated the relationship, suggesting that appraisal processes may play a significant role in translating digital transformation efforts into employee outcomes. Similarly, research by [Liu and Su \(2022\)](#) found that organizational support mediated the link between digital

capabilities and employee innovative behavior. These findings underscore the importance of considering appraisal processes as potential mediators in the context of digital transformation and employee behavior. While not directly focused on digital transformation, research by [Yan et al. \(2022\)](#) explored the mediating role of challenging appraisal in the context of organizational change. The study found that challenging performance feedback mediated the linkage between change-related communication and employee attitudes toward change. Employees who received challenging feedback perceived organizational change initiatives more positively and were more likely to actively participate in the change process, suggesting that challenging appraisal practices can facilitate organizational change efforts.

Recent studies have highlighted the importance of integrating digital transformation initiatives with appraisal practices to enhance employee outcomes. For example, research by [Yang et al. \(2021\)](#) examined the effects of digital performance appraisal systems on employee motivation and job satisfaction. The findings indicated that digital appraisal systems positively influenced employee perceptions of fairness and transparency, leading to higher degrees of motivation and job satisfaction. This suggests that digital transformation initiatives in the realm of performance appraisal can contribute to fostering employee engagement and innovative behavior. In addition, research by [Weber et al. \(2022\)](#) investigated how digital transformation initiatives interact with challenging performance appraisal to influence employee job satisfaction and performance. The results indicated that the combination of digital capabilities and challenging appraisal practices had a synergistic effect on employee outcomes, leading to higher levels of job satisfaction and performance.

2.2 Conceptual framework and hypothesis development

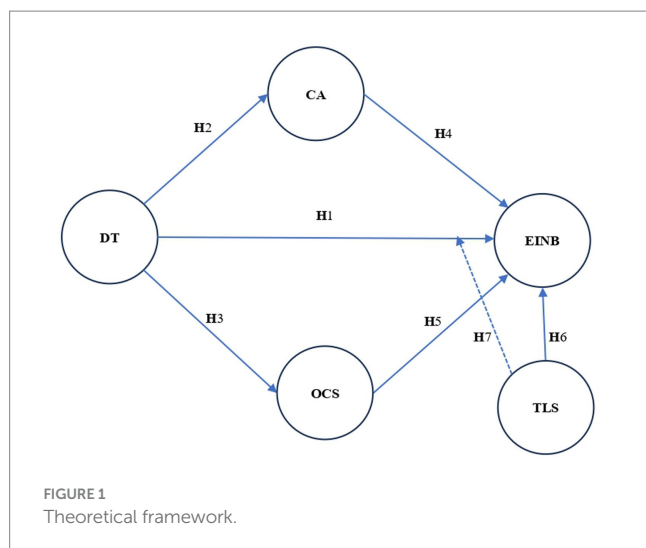
2.2.1 Theoretical model

The theoretical model outlined by [Shields and Rangarajan \(2013\)](#), visually illustrates the connection between dependent, mediating, and independent variables. In this research, the dependent construct is employee innovative behavior (EINB), while the mediators are challenging appraisal (CA), and organizational culture support (OCS). Finally, the external constructs are digital transformation (DT) and transformation leadership style (TLS). This work has utilized a theoretical framework, depicted in [Figure 1](#) to elucidate employee innovative behavior.

2.2.2 Hypothesis development

2.2.2.1 Digital transformation and employee innovative behavior

From the literature review, empirical studies have shown that digital transformation, by providing employees with improved access to data and information through advanced technological tools, positively correlates with increased innovative behavior ([Bharadwaj et al., 2013](#)). This increased access facilitates idea generation, problem-solving, and knowledge sharing among employees, fostering a culture of innovation within the organization. An investigation by [Iivari et al. \(2020\)](#) found a strong relationship between digital collaboration platforms and employee innovative behavior. These platforms, such as



online collaboration tools and project management software, enable real-time communication and idea sharing among teams, leading to enhanced innovation by leveraging collective intelligence. Other studies suggest that employees' adaptability to technological changes induced by digital transformation positively influences their innovative behavior (Galliers and Leidner, 2014). Employees who embrace and effectively utilize new digital tools and technologies are more likely to exhibit innovative behaviors in problem-solving and creative ideation. Research by Scuotto et al. (2023) emphasizes the importance of digital skill development programs in fostering employee innovation. Digital transformation initiatives that incorporate training and upskilling opportunities for employees to leverage technological tools tend to result in higher levels of innovative behavior. Organizational support for digital transformation initiatives significantly impacts employee innovative behavior. A study by Westerman et al. (2014) highlighted that organizational cultures that actively encourage and reward digital experimentation and innovation tend to see higher levels of innovative behavior among employees involved in such initiatives. Another study by Shin et al. (2023) found a positive link between employees' engagement in digital transformation projects and their innovative behavior. Actively involving employees in digital initiatives and decision-making processes fosters a sense of ownership and empowerment, leading to increased innovative contributions. Research conducted by Huu (2023) demonstrated a positive association between the use of digital technologies for problem-solving purposes and employee innovative behavior. Digital tools that aid in identifying, analyzing, and solving complex problems tend to stimulate creative thinking and innovation among employees. These empirical findings collectively support the notion that digital transformation initiatives within organizations significantly influence and contribute to the innovative behavior exhibited by employees across various domains, emphasizing the need to further explore this relationship in different contexts and industries.

H1. Digital Transformation has a positive effect on Employee Innovative Behavior.

2.2.2.2 Digital transformation and challenging appraisal

There is scarce empirical evidence elucidating the correlation between digital transformation and challenging appraisal practices.

Research by Saeed et al. (2023) indicates that digital transformation initiatives significantly impact organizational culture. Organizations undergoing digital transformation tend to exhibit a more open, flexible, and growth-oriented culture. This cultural shift often aligns with challenging appraisal practices, where performance evaluations focus on continuous improvement and development rather than just assessment. Studies by Mihai et al. (2022) highlight how digital transformation enables the implementation of real-time performance metrics and feedback mechanisms. These tools facilitate more dynamic and data-driven appraisal systems, allowing for more personalized and challenging feedback tailored to individual employee performance and growth areas. The investigation by Trenerry et al. (2021) explores the link between digital transformation and agile work methodologies. Agile frameworks often incorporate challenging appraisal as a core element, fostering an environment where frequent feedback, experimentation, and learning are valued. Digital transformation initiatives often align with these agile practices, reinforcing challenging appraisal processes. Studies suggest that digital tools, integrated as part of the digital transformation process, provide avenues for continuous learning and development (Braojos et al., 2024). These tools enable ongoing skill enhancement, performance tracking, and personalized development plans, contributing to a culture of challenging appraisal focused on growth and skill advancement. Research by Ye et al. (2024) demonstrates a positive linkage between employee engagement in digital transformation efforts and the effectiveness of challenging appraisal systems. Actively involving employees in the digitalization process fosters a culture of collaboration, learning, and receptiveness to challenging feedback. The usage of digital platforms for performance evaluation and feedback delivery has been shown to enhance challenging appraisal practices (Nudurupati et al., 2021). These platforms facilitate transparent, timely, and constructive feedback loops, crucial for fostering a culture of continuous improvement.

These empirical findings collectively suggest a strong relationship between digital transformation initiatives and the adoption or reinforcement of challenging appraisal practices within organizations. Digital tools and cultural shifts associated with digital transformation often facilitate or complement challenging appraisal processes, emphasizing continuous improvement, skill development, and growth-oriented performance evaluation.

H2. Digital Transformation may influence positively Challenging Appraisal.

2.2.2.3 Digital transformation and organizational culture support

Empirical research suggests a strong linkage between digital transformation (DT) and organizational culture support. The work by Kim et al. (2022) investigated the "impact of digital transformation on organizational culture in the context of South Korean companies." Their findings revealed that successful digital transformation initiatives were associated with a cultural shift towards agility, innovation, and customer-centricity. Organizations that effectively leveraged digital technologies to streamline processes and enhance customer experiences tended to develop a culture that embraced change and experimentation.

Similarly, research by Singh et al. (2021) explored "the relationship between digital transformation and organizational culture support in

Indian firms.” They found that organizations that prioritized digitalization efforts experienced significant improvements in their culture, characterized by enhanced communication, collaboration, and adaptability. Digital technologies played a pivotal role in facilitating this cultural transformation by empowering employees to work more efficiently and creatively. Additionally, [Ghafoori et al. \(2024\)](#) discuss the importance of organizational culture in supporting digital transformation, suggesting that a culture of agility, experimentation, and learning, fostered by challenging appraisal practices, can mediate the link between digital transformation and employee behaviors.

Furthermore, a study by [Zhang G. et al. \(2023\)](#) examined the influence of organizational culture on the success of digital transformation projects in Chinese companies. Their research revealed that organizations with a culture that values innovation, learning, and risk-taking were more likely to achieve positive outcomes from their digital initiatives. Cultivating a culture of openness and experimentation was identified as a critical factor in overcoming resistance to change and driving successful digital transformation. Moreover, research by [Zoppelletto et al. \(2023\)](#) investigated the relationship between digital transformation and organizational culture support in the context of “small and medium-sized enterprises (SMEs).” They found that SMEs that embraced digital technologies tended to develop a culture that prioritized collaboration, transparency, and employee empowerment. These cultural attributes were instrumental in fostering innovation and agility, enabling SMEs to adapt to rapidly changing market conditions.

Overall, recent empirical evidence reaffirms the significant link between digital transformation and organizational culture support. Organizations that effectively integrate digital technologies into their operations are more likely to cultivate a culture that promotes innovation, collaboration, and adaptability, ultimately driving success in today’s dynamic business environment.

H3. Digital Transformation may influence positively Organizational Culture Support.

2.2.2.4 Challenging appraisal and employee innovative behavior

Research by [Ashford et al. \(2016\)](#) suggests that high-quality feedback, which is a core component of challenging appraisal, positively influences employee innovative behavior. Constructive and specific feedback provided during challenging appraisal processes encourages employees to explore new ideas and take innovative initiatives. Studies by [Miao et al. \(2023\)](#) emphasize the link between a growth mindset encouraged by challenging appraisal and employee innovation. When employees perceive performance evaluations as opportunities for growth rather than mere assessments, they are more inclined to exhibit innovative behaviors and seek out new solutions. Research by [Liu et al. \(2022\)](#) found that setting challenging yet attainable goals during performance appraisals stimulates employee creativity. Challenging appraisal practices that involve setting ambitious but achievable objectives can motivate employees to think innovatively while striving to meet these goals. Studies by [Van Dyck et al. \(2005\)](#) suggest that an organizational culture emphasizing frequent and challenging feedback fosters a conducive environment for idea generation. Employees who receive consistent and challenging feedback are more likely to engage in creative problem-solving and

innovative thinking. Research by [Zhou et al. \(2014\)](#) highlights that challenging appraisal processes that recognize and reward calculated risk-taking behavior tend to stimulate employee innovation. Employees are more willing to take risks and experiment with novel ideas when such behavior is acknowledged and valued during performance evaluations. Studies by [Miron-Spektor et al. \(2011\)](#) suggest a positive relationship between employee engagement in challenging appraisal practices and their inclination toward innovative behaviors. Actively involving employees in challenging performance appraisal discussions and goal-setting processes fosters a sense of ownership and motivation to innovate. These empirical findings collectively indicate a robust relationship between challenging appraisal practices and employee innovative behavior. Challenging appraisal processes that emphasize high-quality feedback, growth-oriented mindsets, challenging goals, recognition of risk-taking, and employee engagement tend to stimulate and nurture a culture of innovation within organizations.

H4. Challenging Appraisal can have a positive effect on Employee Innovative Behavior.

2.2.2.5 Organizational culture support and employee innovative behavior

Recent empirical evidence continues to support the notion of a strong relationship between organizational culture support and employee innovative behavior. Research by [Nguyen et al. \(2019\)](#) conducted in Vietnam’s IT firms found that a supportive organizational culture characterized by openness, collaboration, and risk-taking positively influenced employees’ willingness to innovate. Similarly, a study by [Liu et al. \(2019\)](#) in the technology sector revealed that organizations with a culture emphasizing experimentation and learning experienced higher levels of employee creativity and innovation.

Furthermore, a cross-national study by [Lee \(2020\)](#) examined the impact of organizational culture on innovative behavior in South Korean and U.S. firms. They found that a supportive culture that values creativity and provides resources for innovation significantly predicted employees’ innovative behaviors in both contexts.

In another study, [Khan et al. \(2020\)](#) explored the role of leadership in shaping organizational culture and its impact on innovation. Their findings indicated that “transformational leadership behaviors,” such as inspirational motivation and intellectual stimulation, are positively associated with a culture of innovation, which, in turn, fostered employee innovative behavior. Moreover, research by [Tsui et al. \(2006\)](#) investigated the “influence of organizational culture dimensions, including adaptability and involvement, on employee innovation in Chinese manufacturing firms.” The results revealed a positive and significant relationship between these cultural dimensions and employee innovative behavior, highlighting the importance of fostering a culture that encourages experimentation and employee involvement in decision-making processes.

Overall, recent empirical studies provide robust evidence supporting the idea that organizational culture support has a significant role in stimulating and nurturing employee innovative behavior across various industries and cultural contexts.

H5. Organizational Culture Support influences positively Employee Innovative Behavior.

2.2.2.6 The direct and moderating effects of transformation leadership style on employee innovative behavior and the link between DT and EINB

Recent empirical research has shed light on both the direct and moderating impacts of transformational leadership style on employee innovative behavior, along with its function in the correlation between digital transformation and “employee innovative behavior.”

In a study by [Zhu et al. \(2022\)](#), conducted in a Chinese manufacturing context, transformational leadership is found to directly influence employee innovative behavior positively. The research highlighted that leaders who exhibit transformational qualities, such as inspiring vision, individualized consideration, intellectual stimulation, and supportive behavior, tend to foster a conducive environment for innovation among employees. This direct relationship underscores the importance of leadership in driving employee creativity and innovation within organizations. Furthermore, this study also explored the moderating effect of transformational leadership in the relationship between digital transformation and employee innovative behavior. Results indicated that transformational leadership strengthens the positive influence of digital transformation on “employee innovative behavior.” Leaders who effectively communicate the vision of digital transformation, provide support, and empower employees to embrace technological changes can enhance the innovation potential of their workforce ([Ertiö et al., 2024](#)). This moderating effect suggests that transformational leadership amplifies the benefits of digital transformation initiatives on employee innovation outcomes. Similarly, research by [Odugbesan et al. \(2023\)](#) investigated the linkage between transformational leadership, digital transformation, and employee innovative behavior in the context of information technology (IT) firms. The study revealed that transformational leadership influences positively both digital transformation efforts and employee innovative behavior. Moreover, “transformational leadership” significantly moderated the link between digital transformation and employee innovative behavior, indicating that strong leadership enhances the effectiveness of digital initiatives in driving innovation within IT firms.

These empirical findings underscore the critical role of transformational leadership in fostering employee innovative behavior and facilitating the success of digital transformation initiatives. Leaders who exhibit transformational qualities can motivate and inspire employees to embrace change, adapt to new technologies, and contribute creatively to organizational goals. Moreover, transformational leadership serves as a key driver in maximizing the influence of digital transformation on employee innovation, highlighting its significance in navigating organizational change and fostering a culture of continuous improvement and innovation.

H6. Transformational leadership Style positively influences Employee Innovative Behavior.

H7. Transformation Leadership Style moderates the link between Digital Transformation and Employee Innovative Behavior.

2.2.2.7 The “mediating effect” of CA on the linkage between DT and EINB

The investigations specifically concentrating on the mediating effect of challenging appraisal on the link between digital

transformation and employee innovative behavior are somewhat limited but emerging. While direct studies on the mediating role are limited, an investigation by [Westerman et al. \(2014\)](#) highlights that challenging appraisal practices play a crucial role in enabling employees to effectively leverage digital transformation initiatives. The study indicates that an organizational culture emphasizing continuous improvement and challenging appraisal aligns well with the requirements for successful digital transformation efforts. This alignment hints at the potential mediating role of challenging appraisal in facilitating the link between digital transformation and employee behavior. Studies by [Scuotto et al. \(2023\)](#) highlight that employee-centric feedback systems integrated into digital transformation initiatives are essential for fostering a culture of innovation. These feedback mechanisms, part of the challenging appraisal, allow for personalized feedback and developmental guidance, thereby influencing employee behaviors and potentially mediating the influence of digital transformation on innovation. [Ghafoori et al. \(2024\)](#) discuss the importance of organizational culture in supporting digital transformation. They suggest that a culture of agility, experimentation, and learning, fostered by challenging appraisal practices, can mediate the relationship between digital transformation and employee behaviors. Such a culture promotes the acceptance and the usage of “digital tools,” enhancing the likelihood of innovation among employees. A study by [Saeed et al. \(2023\)](#) expressed that digital transformation initiatives often coincide with skill development programs. Challenging appraisal practices aligned with digital skill enhancement may act as a mediator by fostering an environment where employees are motivated to apply newly acquired digital skills toward innovative activities. Another study by [AlNuaimi et al. \(2022\)](#) found that employee engagement in digital transformation initiatives positively influences the effectiveness of performance appraisal systems. Actively involving employees in digital initiatives and aligning challenging appraisal with these efforts might create a conducive environment for fostering innovative behaviors. While direct empirical evidence explicitly establishing challenging appraisal as a mediator between digital transformation and employee innovative behavior might be limited, these studies collectively hint at the potential mediating role of challenging appraisal practices in influencing employee behavior in the context of digital transformation initiatives. Further empirical research explicitly exploring this mediating relationship within the framework of digital transformation in various organizational contexts is warranted to solidify these associations.

H8. Challenging Appraisal may mediate the link between DT and EINB.

2.2.2.8 The mediating role of OCS on the link between DT and EINB

Recent empirical studies have shed light on the mediating role of organizational culture support in the relationship between digital transformation and employee innovative behavior. A study by [Kim et al. \(2022\)](#) assessed the “mediating effect of organizational culture support on the link between digital transformation initiatives and employee innovative behavior in South Korean firms.” Their findings revealed that a supportive organizational culture, characterized by openness to change, collaboration, and risk-taking, significantly mediated the relationship between digital transformation efforts and

employee innovation. Organizations that fostered a culture of experimentation, learning, and knowledge sharing were better equipped to harness the potential of digital technologies to drive innovation among their workforce. Moreover, research by Liang and Li (2023) investigated the mediating role of organizational culture support in the context of digital transformation in Chinese technology companies. They found that a culture that values agility, adaptability, and continuous improvement acted as a significant mediator in the link between digital transformation initiatives and employee innovative behavior. Organizations that prioritized cultural elements such as trust, autonomy, and recognition of employee contributions were able to create an environment conducive to innovation, enabling employees to embrace digital changes and leverage technology for creative problem-solving and idea generation. Furthermore, an investigation by Bagga et al. (2023) explored “the mediating role of organizational culture support on the relationship between digital transformation and employee innovative behavior in Indian multinational corporations (MNCs).” Their research highlighted the crucial role of a supportive organizational culture in facilitating the integration of digital innovation and technologies into everyday work practices and stimulating employee creativity and innovation. Organizations that cultivated a culture of experimentation, collaboration, and empowerment were more successful in driving innovative behaviors among their employees in the setting of digital transformation. Additionally, research by Chen et al. (2024), investigated the mediating role of organizational culture support in the Chinese manufacturing sector, specifically focusing on the influence of digital transformation on employee innovative behavior in Chinese firms. Their findings demonstrated that organizational culture support, characterized by a commitment to customer-centricity, agility, and continuous learning, mediated the link between digital transformation initiatives and employee innovation. Firms that fostered a culture of innovation and digital readiness were better able to capitalize on technological advancements to drive business innovation and enhance customer experiences (Sun et al., 2024).

H9. Organizational Culture Support may mediate the link between DT and EINB.

3 Methodology

3.1 Research design and context

This research uses a “quantitative research design” to empirically evaluate the relationships between digital transformation (DT), challenging appraisal (CA), organizational culture support (OCS), transformational leadership style (TLS), and employee innovative behavior (EINB). A cross-sectional survey was conducted to collect data from employees working in the top five (5) banks in Congo Brazzaville. These banks were strategically selected based on their market share dominance and their advanced implementation of digital transformation initiatives. The research setting is characterized by an evolving financial sector that has increasingly adopted digital technologies to enhance efficiency, customer experience, and competitive advantage. Employees from various functional departments (e.g., IT, customer service, operations, and management) were included to ensure a diverse and representative sample of

perspectives on digital transformation and its effects on employee innovative behavior.

3.2 Sampling strategy and data collection

A random sampling technique was used to ensure fairness in participant selection, minimizing biases and enhancing the generalizability of the findings. A total of 330 structured surveys were distributed to employees across different hierarchical levels within the five banks. Prior to distribution, ethical approval and support from the organization’s management and HR departments were obtained to facilitate participant engagement and ensure compliance with ethical research standards. To enhance the validity and reliability of the instrument, a pilot study involving 30 respondents was conducted. Response from the pilot phase informed adjustments to improve clarity, wording, and relevance of certain items. The final survey instrument was then administered, and responses were collected over a four-week period. Out of the 330 distributed surveys, all were returned, yielding a 100% initial response rate. However, following a rigorous data cleaning process, 50 incomplete surveys were excluded, resulting in 280 complete and valid responses for analysis, representing an effective response rate of 85%.

3.3 Constructs measurements and source

The measurements utilized in this work were derived from previous research and modified to suit the current investigation. The measurements of digital transformation were adopted from Khin and Ho (2019), while the items for challenging appraisal were derived from Cavanaugh et al. (2000). The indicators for organizational culture support and transformational leadership style are obtained from Upadhyay and Kumar (2020) and Afsar and Umrani (2019), respectively. Finally, the items of employee innovative behavior were taken from (Scott and Bruce, 1994). In this research, a “Likert scale” ranging from one (1) denoting “strongly disagree” to five (5) indicating “strongly agree” was utilized.

3.4 Data analysis and statistical techniques

Data analysis was conducted using SmartPLS 3 and SPSS 26, following a structured multi-step approach. Descriptive statistics were used to analyze the sample characteristics, including means, standard deviations, skewness, and kurtosis, ensuring data normality. Reliability and validity testing included content validity, ensured through expert reviews and pilot testing; construct reliability, evaluated using “Composite Reliability (CR)” and “Cronbach’s Alpha (α)” to ensure internal consistency; convergent validity, assessed using “Average Variance Extracted (AVE)” to confirm that the items measure their respective constructs; and discriminant validity, examined using the Fornell-Larcker criterion to confirm that constructs are conceptually distinct. “Exploratory Factor Analysis (EFA)” and “Confirmatory Factor Analysis (CFA)” were conducted to validate the measurement model and ensure construct validity. Multicollinearity assessment was performed by calculating the “Variance Inflation Factor (VIF)” to

detect potential collinearity issues among predictors. “Structural Equation Modeling (SEM)” was implemented in SmartPLS 3 to test the proposed hypotheses and assess direct, indirect, and moderating effects. Lastly, bootstrapping analysis was used to verify the significance of mediation and moderation effects with a 5,000 resampling approach.

The study adhered to “ethical research principles, including informed consent, confidentiality, and voluntary participation.” Participants were assured that their responses would remain anonymous and used solely for academic purposes. Furthermore, ethical approval was sought from relevant institutional review boards before data collection commenced. This methodological framework ensures the credibility, reliability, and validity of the study’s findings while providing a nuanced understanding of how digital transformation interacts with leadership, organizational support, and employee innovation in a rapidly evolving financial sector.

4 Findings

4.1 Demographic information

Table 1 presents the demographic information of the participants involved in the study. The table provides frequencies and percentages for various demographic variables. Regarding age

distribution, the majority of participants fall into the 30–35 age group (29.3%), followed by the 36–40 age group (26.4%). A considerable portion of participants are also in the 24–29 age group (23.2%). The distribution of participants across gender shows a slight majority of males (54.3%) compared to females (45.7%). Regarding “education level,” undergraduates or bachelor’s degree holders make up the largest proportion (45.7%), followed by graduates with a master’s or Ph.D. degree (30.7%). Other education levels represent 23.6% of participants. Regarding departmental affiliation, the majority of participants are from customer service (36.1%), followed by marketing (27.1%). Finance and human resources departments constitute smaller proportions at 21.1 and 15.7%, respectively. Regarding work experience, participants with 4–6 years of experience represent the largest group (40.4%), followed by those with 7–9 years of experience (30.0%). Participants with less than or equal to 3 years of experience account for 16.0%, while those with 10 years or more of experience constitute 13.6% of the sample. Overall, the table provides a comprehensive overview of the demographic characteristics of the study participants, facilitating insights into the composition of the sample.

4.2 Data analysis

4.2.1 Reliability and validity

Hair Jr et al. (2023) outlined the primary criteria for evaluating the estimation model, commonly recognized as an external model, to ensure the validity and reliability of the employed constructs. To assess the constructs’ reliability, both Cronbach’s Alpha and composite reliability values have been examined. The analysis indicated that “Cronbach’s Alpha” spanned from 0.709 to 0.859, exceeding the threshold standard of 0.70, indicating a high degree of reliability for the study’s instruments. Similarly, “composite reliability” varies between 0.816 and 0.895, also surpassing the benchmark of 0.70. These results are detailed in Table 2 and Figure 2.

In the following stage, estimation models’ validity was surveyed with a two-advance methodology, e.g., convergency and validity of discriminant. In evaluating “convergent validity,” this study investigated the “average variance extracted (AVEs).” The findings reveal that the “AVEs” range between 0.528 and 0.587, which is deemed satisfactory and exceeds the threshold of 0.5. The results of all “validity and reliability” assessments are presented in Table 2.

4.2.2 Discriminant validity

Additionally, “exploratory factor analysis (EFA)” was conducted on the study items, resulting in a solution for five factors. This solution accounted for 64.36% of the total variance, with a value of KMO equals to 0.908 and a statistically significant “Bartlett’s test” outcome (Approx. Chi-Square = 6462.633; $p = 0.000$). The scales regarding each factor exhibited strong associations within them, confirming the scales’ “convergent validity.” Moreover, the study evaluated the “Fornell-Larcker criterion” and “Heterotrait-Monotrait (HTMT)” to assess the “discriminant validity” of the models. According to the “Fornell-Larcker criterion,” the “square root of AVEs” must exceed other correlations within the variables in the same model (Hair Jr et al., 2023). The outcomes of this analysis meet this criterion, and the

TABLE 1 Demographic profile of participants.

	Frequency	%
Age (in years)		
24–29	65	23.2
30–35	82	29.3
36–40	74	26.4
41 & above	59	21.1
Gender		
Male	152	54.3
Female	128	45.7
Education level		
Undergraduates/Bachelors	128	45.7
Graduates (Master or Ph.D.)	86	30.7
Others	66	23.6
Department		
Finance	59	21.1
Marketing	76	27.1
Customer Service	101	36.1
Human Resource	44	15.7
Work experience (in years)		
≤3	45	16.0
4–6	113	40.4
7–9	84	30.0
10 & above	38	13.6

Number of Participants = 280.

TABLE 2 Constructs reliability and validity.

Construct	Cronbach's alpha	rho_A	Composite Reliability	AVE
CA	0.854	0.860	0.891	0.578
DT	0.824	0.840	0.870	0.530
EINB	0.859	0.871	0.895	0.587
OCS	0.758	0.776	0.846	0.580
TLS	0.709	0.770	0.816	0.528

AVE, average variance extracted.

full assessment of the “Fornell-Larcker criterion” is provided in Table 3.

Furthermore, an assessment using HTMT techniques as suggested by Henseler et al. (2015) has been carried out. As indicated in Table 3, all values are below the HTMT.85 threshold, indicating that the discriminant validity met the criteria (Kline, 2015).

4.2.3 Common methods bias test

Performing a “common method bias” assessment is crucial in this investigation due to the use of the same questionnaire set for collecting both dependent and external constructs’ data (Lowry and Gaskin, 2014). To evaluate the constructs of the study, “Harman’s single-factor” test has been utilized. The results indicated that the “single factor” explained around 42.45% of the “total variance.” This percentage is lower than 50%, suggesting that there is no presence of “common method bias” (Lowry and Gaskin, 2014).

4.2.4 Model fit

The “standardized root mean square residual (SRMR)” criteria are employed to ensure the absence of the model’s misspecification. SRMR assesses the disparities between the anticipated correlations and observed ones. As depicted in Table 4, the SRMR value is recorded at 0.076, falling below the threshold of 0.08, which suggests a strong model fit (Henseler et al., 2016).

4.2.5 “Predictive power” of the models

The “coefficient of determination (R^2)” for independent and mediating constructs (DT, CA, OCS, and TLS) effectively accounts for 79.4% of the overall variance in EINB. Additionally, DT moderately explains 50.5 and 60.5% of the total variance in CA and OCS, respectively. Table 5 indicates minimal disparities between “ R^2 and adjusted R^2 ” values.

4.2.6 Multicollinearity test

The “Variance Inflation Factor (VIF)” values in Table 6 vary from 1.000 to 2.952, all falling below the critical threshold of 5. This suggests that there is no “multicollinearity” issue within the models (Lowry and Gaskin, 2014; Ringle et al., 2015).

4.2.7 Correlation analysis

We performed the variables’ descriptive analysis, which involved determining “means (M) and standard deviations (Std. Deviation),” as well as assessing correlations among the constructs. As shown in Table 7, all correlation coefficients are below the threshold of 0.9. This indicates the absence of common method bias among the study variables (Lowry and Gaskin, 2014). This suggests that

multicollinearity is not a major issue and that the constructs in the study are statistically distinct. Table 7 provides descriptive statistics and a correlation matrix for the variables in the study namely Challenging Appraisal (CA), Digital Transformation (DT), Employee Innovative Behavior (EINB), Organizational Culture Support (OCS), and Transformational Leadership Style (TLS).

Regarding descriptive statistics, we considered Mean and Standard Deviation: These columns display the average score and variability of each variable, respectively, across all respondents. On the other hand, the correlation matrix reveals the correlation coefficients between each pair of variables. Notably, Challenging Appraisal (CA) shows a moderate positive association ($r = 0.677$, $p < 0.01$) with Digital Transformation (DT), suggesting that as CA increases, DT tends to increase as well. This suggests that organizations investing in digital transformation tend to implement more challenging appraisal mechanisms, potentially fostering a performance-driven culture. Similarly, CA exhibits a strong and positive association ($r = 0.722$, $p < 0.01$) with Employee Innovative Behavior (EINB), indicating that higher CA levels are associated with greater EINB. This highlights the role of CA in promoting innovation by setting high performance expectations and encouraging creative problem-solving. Additionally, DT demonstrates a strong and positive connection ($r = 0.733$, $p < 0.01$) with EINB, reflecting that organizations with advanced digital transformation initiatives tend to foster higher levels of employee innovation. This finding aligns with prior research suggesting that digital advancements provide employees with tools, data-driven insights, and automation capabilities that enhance their ability to generate novel ideas. Moreover, Organizational Culture Support (OCS) exhibits a strong and positive association ($r = 0.818$, $p < 0.01$) with EINB, suggesting that a supportive organizational culture promotes employee innovation. A culture that encourages risk-taking, knowledge-sharing, and collaborative learning appears to enhance employees’ willingness and capacity to engage in innovative behaviors. Lastly, Transformational Leadership Style (TLS) shows a strong positive and association ($r = 0.724$, $p < 0.01$) with EINB, indicating that leadership styles characterized by transformational traits are associated with increased employee innovative behavior. This reinforcing the view that leaders who inspire and challenge employees contribute significantly to innovation.

4.2.8 Research hypotheses

To investigate the study’s different hypotheses, we utilized “structural equation modeling (SEM)” via the statistical tool, SmartPLS (Ringle et al., 2015). The results of the distinct hypotheses evaluated and associated estimates are presented in Table 8. Specifically, the initial analysis focused on exploring the link between digital transformation (DT) and employee innovative behavior (EINB). The result reveals that DT positively influences EINB ($DT \rightarrow EINB$, $\beta = 0.130$, $t = 2.321$, $p < 0.05$). This suggests that for every incremental increase in digital transformation, there is a corresponding 13% increase in EINB, with all other variables held constant. Consequently, hypothesis 1 (H1) is validated. While digital transformation is positively associated with innovation, other underlying mechanisms may be at play, such as employee autonomy, digital literacy, or external market pressures. Future studies could examine whether digital transformation’s impact on innovation varies across industries with differing levels of technological maturity.

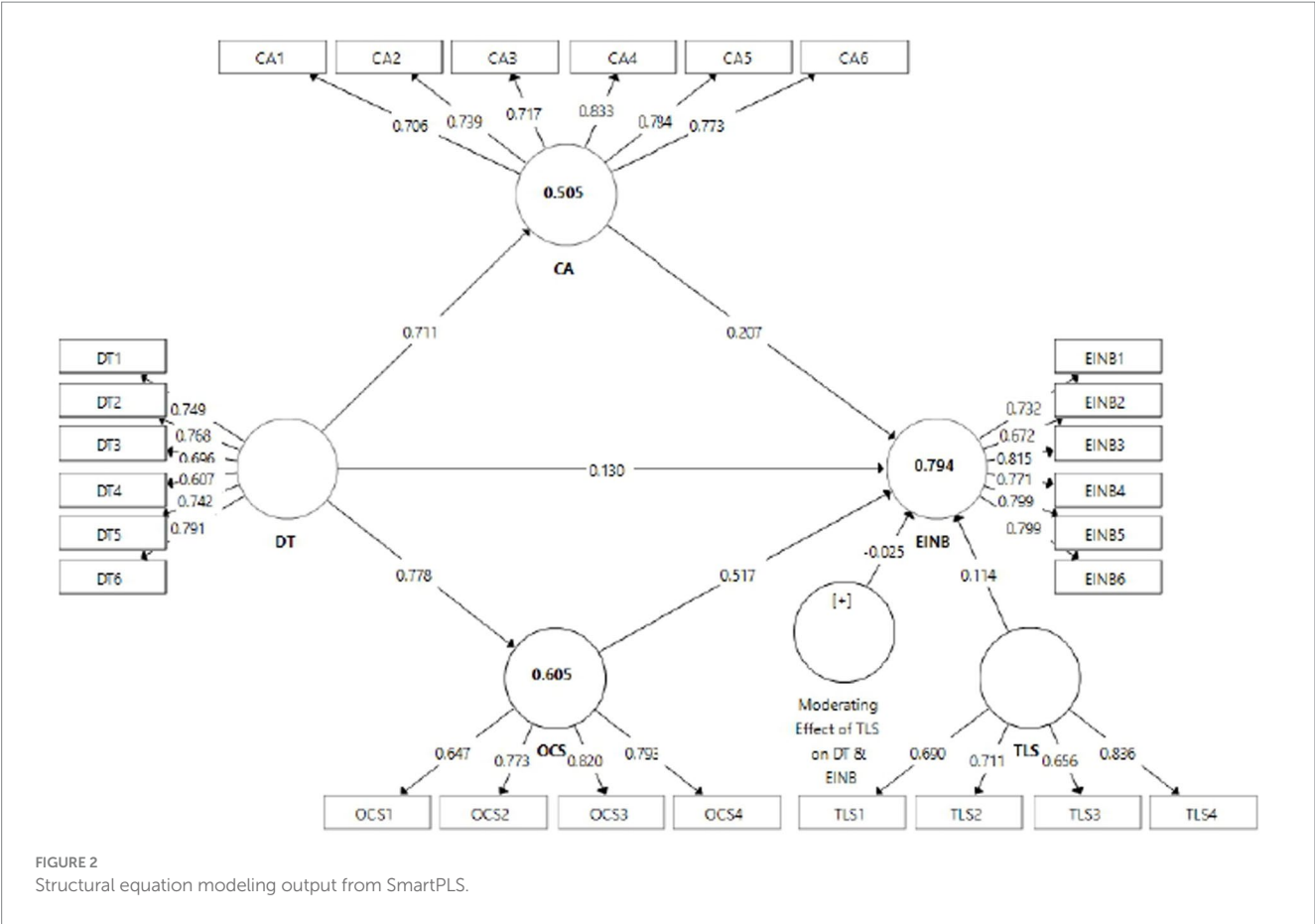


TABLE 3 Discriminant validity.

	CA	DT	EINB	OCS	TLS
Fornell-Larcker Criterion					
CA	0.760				
DT	0.711	0.778			
EINB	0.749	0.759	0.863		
OCS	0.711	0.728	0.766	0.786	
TLS	0.668	0.663	0.753	0.661	0.726
Heterotrait-Monotrait (HTMT) criterion					
CA					
DT	0.816				
EINB	0.812	0.825			
OCS	0.815	0.738	0.627		
TLS	0.802	0.827	0.810	0.519	

Bold and underlined Values are the square root of AVE; Heterotrait—Monotrait (HTMT) Ratio, at (HTMT < 0.85).

In relation to the second hypothesis, the examination indicates a significant and positive linkage between digital transformation and CA ($DT \rightarrow CA, \beta = 0.711, t = 21.838, p < 0.05$). This suggests that a one-unit increased in digital transformation while controlling for other factors, leads to a 71.1% increase in CA. Consequently, hypothesis 2 (H2) is affirmed. This suggests that as organizations

TABLE 4 Model fits.

	Saturated Model	Estimated Model
SRMR	0.076	0.076
d_ULS	0.979	0.979
d_G	0.307	0.307
Chi-Square	468.071	468.071
NFI	0.952	0.952

TABLE 5 R square, and R square adjusted.

	R square	R square adjusted
CA	0.505	0.503
EINB	0.794	0.790
OCS	0.605	0.604

integrate digital tools, they can also implement more sophisticated performance appraisal systems, potentially using AI-driven analytics to track and evaluate employee performance dynamically. Similarly, hypothesis 3 linked DT and OCS, and the results reveal that digital transformation influences positively organizational culture support ($DT \rightarrow OCS, \beta = 0.778, t = 42.883, p < 0.05$). This outcome supports hypothesis 3 (H3). This further implies that digital transformation may foster a more adaptive and resilient organizational culture,

TABLE 6 VIF values.

Items	Outer VIF values	Inner VIF values		
		EINB	CA	OCS
Employee Innovative Behavior (EINB)				
EINB1	1.686			
EINB2	1.612			
EINB3	2.130			
EINB4	1.828			
EINB5	1.948			
EINB6	1.839			
Challenging Appraisal (CA)		2.435		
CA1	1.457			
CA2	2.065			
CA3	1.992			
CA4	2.184			
CA5	1.978			
CA6	1.866			
Digital Transformation (DT)		2.952	1.000	1.000
DT1	1.544			
DT2	1.632			
DT3	1.524			
DT4	1.427			
DT5	1.669			
DT6	1.814			
Organizational Culture Support (OCS)		2.072		
OCS1	1.293			
OCS2	1.485			
OCS3	1.665			
OCS4	1.525			
Transformation Leadership Style (TLS)		2.820		
TLS1	1.316			
TLS2	1.358			
TLS3	1.271			
TLS4	1.400			

characterized by knowledge-sharing, flexibility, and a data-driven decision-making approach. Another result indicates a significant and positive impact of challenging appraisal (CA) on EINB ($CA \rightarrow EINB$, $\beta = 0.207$, $t = 4.730$, $p < 0.05$). This demonstrates that for each unit increase in challenging appraisal, there is a 20.7% increase in EINB. As a result, hypothesis 4 (H4) is supported. This highlights that performance assessments that set ambitious goals and encourage problem-solving can drive employees to adopt more innovative approaches in their work. In addition, Hypotheses 5 ($OCS \rightarrow EINB$, $\beta = 0.517$, $t = 7.926$, $p < 0.05$), and 6 ($TLS \rightarrow EINB$, $\beta = 0.114$, $t = 1.92$, $p < 0.05$) are also supported, indicating that Organizational Culture Support and “Transformational Leadership Style” have significant positive effects on Employee Innovative Behavior. The stronger effect of OCS ($\beta = 0.517$) compared to TLS ($\beta = 0.114$) suggests that a supportive culture may be more influential than

leadership alone in driving innovation. On the other hand, hypothesis 7 tests the interaction effect between Digital Transformation and Transformational Leadership Style ($DT \times TLS$) on Employee Innovative Behavior. However, the result is not significant ($p > 0.05$), indicating that the interaction between DT and TLS does not have a significant effect on EINB. The non-significant interaction between DT and TLS suggests that leadership alone may not amplify digital transformation’s effect on employee innovation. It is possible that employees require additional factors such as training, incentives, or psychological safety to fully harness the benefits of digital tools.

Finally, the mediating effects of challenging appraisal and organizational culture support are further assessed on the link between DT and EINB. Hypotheses 8 and 9 examine the mediated relationships between variables. Both Hypothesis 8 ($DT \rightarrow CA \rightarrow EINB$, $\beta = 0.147$,

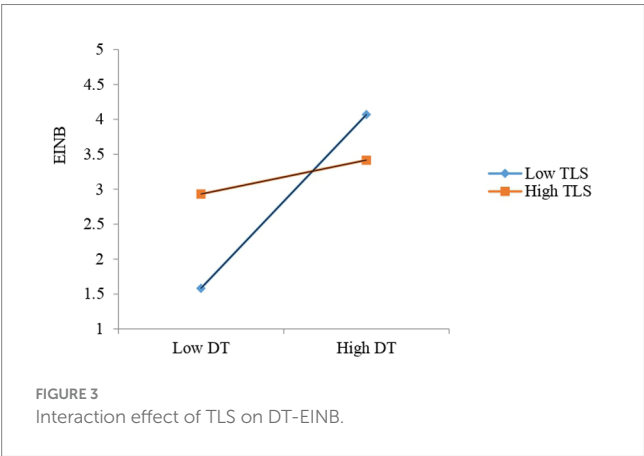
TABLE 7 Descriptives statistics and correlation matrix.

	Mean	Std. Deviation	CA	DT	EINB	OCS	TLS
CA	28.88	7.483	1.000				
DT	24.74	6.710	0.677**	1.000			
EINB	29.04	6.806	0.722**	0.733**	1.000		
OCS	15.16	3.821	0.683**	0.732**	0.818**	1.000	
TLS	18.94	3.983	0.636**	0.625**	0.687**	0.724**	1.000

**Correlation is significant at the 0.01 level (2-tailed).

TABLE 8 Hypothesis test.

Hypothesis	Path	Coef.	St. Error	t-stat	p-value	Decision
H1	DT → EINB	0.130	0.056	2.321	0.021	Confirmed
H2	DT → CA	0.711	0.033	21.838	0.000	Confirmed
H3	DT → OCS	0.778	0.018	42.883	0.000	Confirmed
H4	CA → EINB	0.207	0.044	4.730	0.000	Confirmed
H5	OCS → EINB	0.517	0.065	7.926	0.000	Confirmed
H6	TLS → EINB	0.114	0.058	1.920	0.036	Confirmed
H7	DT*TLS → EINB	−0.025	0.068	0.375	0.708	Not confirmed
H8	DT → CA → EINB	0.147	0.030	4.890	0.000	Confirmed
H9	DT → OCS → EINB	0.403	0.052	7.788	0.000	Confirmed



$t = 4.890, p < 0.05$) and Hypothesis 9 ($DT \rightarrow OCS \rightarrow EINB, \beta = 0.403, t = 7.788, p < 0.05$) are supported, indicating that Challenging Appraisal and Organizational Culture Support positively and significantly mediate the link between Digital Transformation and Employee Innovative Behavior. This suggests that digital transformation alone may not be enough to drive innovation unless accompanied by appraisal mechanisms that challenge employees to exceed expectations. This finding reinforces the importance of fostering a work environment that embraces change, experimentation, and knowledge-sharing to maximize the benefits of digital transformation on innovation. All bootstrapping outcomes are depicted in Table 8.

It is important to notice that TLS dampens the positive relationship between DT and EINB (see Figure 3). This implies that the higher the transformation leadership style (TLS), the weaker the link between digital transformation (DT) and employee innovative behavior (EINB). In other words, the lower

the TLS, the greater the interaction effect and the stronger the link between DT and EINB.

Based the findings, the following direct implications are highlighted. First, businesses aiming to enhance innovation through digital transformation should simultaneously focus on strengthening their appraisal systems and fostering a culture of support. Digital tools should be integrated with clear performance expectations and feedback mechanisms to maximize innovation potential. Second, transformational leadership, while important, may need to be complemented with specific skill development and autonomy-enhancing policies to empower employees to leverage digital transformation effectively. Finally, organizations undergoing digital transformation should consider policies that promote a balance between technological advancements and human-centered workplace strategies. Investment in digital literacy and change management programs could be key to ensuring successful innovation outcomes.

Overall, the study findings reinforce the notion that digital transformation serves as a critical enabler of employee innovation, particularly when supported by challenging appraisal systems and a strong organizational culture. While transformational leadership is beneficial, its role in amplifying digital transformation's effect on innovation remains unclear. Future research should explore industry-specific variations and additional mediating factors such as psychological safety, digital literacy, and job autonomy to provide a more comprehensive understanding of these dynamics.

5 Discussion

The findings of the study, analyzed through structural equation modeling (SEM) utilizing SmartPLS, shed light on the

complex interplay between digital transformation (DT), challenging appraisal (CA), organizational culture support (OCS), transformational leadership style (TLS), and employee innovative behavior (EINB).

Firstly, the analysis demonstrated a significant positive linkage between digital transformation and employee innovative behavior (H1). The findings suggest that organizations undergoing digital transformation experience higher levels of innovative behavior among employees, indicating that the adoption of digital technologies positively influences the generation of new ideas and solutions within the organizational context. Empirical evidence supporting the positive link between digital transformation and EINB is abundant. Studies by [Bharadwaj et al. \(2013\)](#) and [Ivari et al. \(2020\)](#) have demonstrated that digital transformation initiatives equip employees with enhanced access to data and information, fostering idea generation, problem-solving, and knowledge-sharing, thereby cultivating a culture of innovation. Similarly, research by [Galliers and Leidner \(2014\)](#) and [Scuotto et al. \(2023\)](#) underscores the role of employees' adaptability to technological changes induced by digital transformation in promoting innovative behaviors. Moreover, [Huu \(2023\)](#) highlighted the positive association between the use of digital technologies for problem-solving purposes and employee innovative behavior. Our study's confirmation of Hypothesis 1 further strengthens this body of evidence, indicating that digital transformation indeed positively influences employee innovative behavior.

Secondly, the study found that digital transformation significantly predicts challenging appraisal practices (H2). This indicates that as organizations embrace digital transformation initiatives, they are more likely to adopt challenging appraisal processes that focus on continuous improvement, feedback, and development rather than mere assessment. Regarding the relationship between digital transformation and challenging appraisal, empirical studies have provided insights into how digital transformation initiatives impact organizational culture and appraisal practices. Research by [Saeed et al. \(2023\)](#) and [Trenerry et al. \(2021\)](#) suggests that digital transformation fosters a culture of agility, experimentation, and continuous improvement, aligning well with challenging appraisal practices. [Mihai et al. \(2022\)](#) also highlighted how digital transformation enables the implementation of real-time performance metrics and feedback mechanisms, contributing to more dynamic and personalized appraisal systems. The findings of our study, confirming Hypothesis 2, further support these assertions, indicating that organizations undergoing digital transformation are more likely to adopt challenging appraisal practices.

Similarly, the analysis confirms the positive influence of digital transformation on organizational culture support (H3). This suggests that organizations undergoing digital transformation are likely to foster supportive organizational cultures. This finding aligns with studies by [Nazir et al. \(2019\)](#), which highlighted the role of digital transformation initiatives in shaping supportive organizational cultures. Nonetheless, [Ghafoori et al. \(2024\)](#) introduce nuances to this relationship, suggesting that contextual factors may moderate the impact of digital transformation on organizational culture support.

Moreover, the analysis demonstrated a significant positive influence of challenging appraisal on employee innovative behavior (H4). Employees who receive constructive feedback, set challenging yet achievable goals, and engage in ongoing skill development are more likely to exhibit innovative behaviors, contributing to a culture of creativity and problem-solving within the organization.

Furthermore, empirical evidence has consistently demonstrated the positive influence of challenging appraisal on employee innovative behavior. Studies by [Ashford et al. \(2016\)](#), [Miao et al. \(2023\)](#), and [Zhou et al. \(2014\)](#) emphasize how high-quality feedback, growth-oriented mindsets, and recognition of risk-taking behavior inherent in challenging appraisal processes stimulate employee creativity and innovation. [Van Dyck et al. \(2005\)](#) also suggested that an organizational culture emphasizing frequent and challenging feedback fosters an environment conducive to idea generation. Our study's confirmation of Hypothesis 4 adds to this body of literature, reaffirming that challenging appraisal indeed plays a vital role in fostering employee innovative behavior.

Both organizational culture support and transformational leadership style are shown to have significant positive effects on employee innovative behavior. This suggests that supportive organizational cultures and transformational leadership styles contribute to fostering innovation among employees. This finding aligns with studies by [Jiang and Chen \(2018\)](#), which emphasized the importance of supportive organizational cultures and transformational leadership styles in promoting innovation. Yet, [Saeed et al. \(2023\)](#) suggest that the direct impact of these factors on innovative behavior may vary depending on contextual factors.

The interaction effect between digital transformation and transformational leadership style on employee innovative behavior is found to be non-significant. This implies that the linkage between digital transformation and employee innovative behavior is not significantly influenced by transformational leadership style. While not directly conflicting, [Trenerry et al. \(2021\)](#) suggest that the interaction effect between digital transformation and transformational leadership style may be contingent on organizational contexts and employee perceptions.

Lastly, this study also tests the mediating effects of challenging appraisal and organizational culture support in the linkage between digital transformation and employee innovative behavior, finding significant mediation effects. This indicates that challenging appraisal and organizational culture support play important intermediary roles in translating digital transformation efforts into employee outcomes (H8 and H9). This suggests that challenging appraisal and organizational culture support play a crucial role in translating the impact of digital transformation initiatives into tangible improvements in innovative behavior among employees. These results are in line with studies by [Zhang G. et al. \(2023\)](#) and [Liu and Su \(2022\)](#) which demonstrated the mediating effects of challenging appraisal and organizational culture support in facilitating the link between digital transformation and employee innovative behavior. However, [Chen et al. \(2024\)](#) introduce complexities to this relationship, suggesting that mediating effects may be influenced by contextual factors. Moreover, emerging research by [Westerman et al. \(2014\)](#), [Scuotto et al., \(2023\)](#), and [AlNuaimi et al. \(2022\)](#) hints at the potential mediating effect of challenging appraisal practices. These studies suggest that challenging appraisal practices complement digital transformation initiatives by fostering a culture of agility, learning, and experimentation, thereby influencing employee behaviors and potentially mediating the influence of digital transformation on innovation.

The findings of this study align with existing empirical evidence highlighting the importance of digital transformation and challenging appraisal practices in fostering employee innovative behavior within organizations. The results underscore the need for organizations to not only invest in digital technologies but also cultivate a supportive culture

that encourages continuous learning, feedback, and experimentation to drive innovation. In conclusion, our investigation contributes to the growing body of literature on the interplay between digital transformation, challenging appraisal, and employee innovative behavior. By integrating empirical evidence from existing studies, we provide a comprehensive understanding of how these factors influence organizational innovation dynamics. However, further research is warranted to explore additional contextual factors and mechanisms that may influence these relationships, thereby enhancing our understanding of organizational innovation processes in the digital age.

5.1 Conclusion

This study investigated the influence of digital transformation on employee innovative behavior, with a focus on the mediating roles of challenging appraisal and organizational culture support, as well as the moderating effect of transformational leadership style. The survey data collected from employees of the top five banks in Congo Brazzaville provided valuable insights into these relationships' complex dynamics. By drawing upon Social Cognitive Theory and Self-determination Theory, the study elucidated the mechanisms through which digital transformation initiatives shape employee behavior and organizational outcomes.

The findings of the study, analyzed using Structural Equation Modeling (SEM) via SmartPLS, revealed several important insights. Firstly, digital transformation was found to have a significant positive influence on employee innovative behavior, highlighting the importance of organizations embracing technological advancements to foster innovation among their workforce. Secondly, challenging appraisal and organizational culture support were identified as key mediating factors in translating digital transformation efforts into tangible outcomes, emphasizing the role of organizational practices in shaping employee responses to change. Thirdly, transformational leadership style was found to have a significant positive effect on employee innovative behavior, although its interaction with digital transformation did not yield significant results, suggesting the need for further exploration of contextual factors. These results carry significant implications for both theoretical understanding and practical application. From a theoretical perspective, the study contributes to our understanding of the mechanisms through which digital transformation initiatives influence employee behavior, providing empirical support for the theories of Social Cognitive and Self-determination. By integrating these theoretical frameworks, the study offers a comprehensive perspective on the interplay between individual, organizational, and environmental factors in shaping employee responses to digital transformation. The study also contributes to the broader digital transformation literature by offering a nuanced perspective on the roles of appraisal and cultural support in fostering innovation within banking institutions.

From a practical standpoint, the findings underscore the importance of organizational practices in fostering innovation in the digital age. Particularly, the findings provide several actionable insights for organizations aiming to maximize the benefits of digital transformation. First, banks and financial institutions should invest in digital upskilling programs to ensure that employees possess the necessary technical and cognitive skills to innovate effectively in a digitally driven workplace. Second, organizations should implement performance management systems that incorporate challenging appraisal mechanisms, as they encourage employees to develop

problem-solving skills, embrace new technologies, and proactively contribute to digital initiatives. Third, fostering a supportive organizational culture that encourages collaboration, risk-taking, and openness to change is critical in sustaining digital transformation efforts. Leaders and managers must prioritize cultural transformation alongside technological advancements to ensure employees feel engaged and empowered to contribute to digital innovation. Furthermore, the study highlights the need for targeted leadership development programs to strengthen transformational leadership skills, as such leadership plays a vital role in motivating employees, fostering a vision for digital change, and reducing resistance to new technologies. Organizations should integrate leadership strategies that emphasize continuous learning, adaptive management, and inclusive decision-making to enhance the effectiveness of digital transformation initiatives. In addition to organizational implications, the findings also hold broader societal relevance. By successfully integrating digital transformation strategies, banks can enhance financial inclusion, streamline service delivery, and improve overall customer experiences. This, in turn, fosters economic growth by expanding access to financial services, supporting entrepreneurship, and driving technological adoption within the broader economy. Policymakers and industry regulators should develop supportive policies that incentivize banks to invest in employee digital training and innovation-friendly work environments, ensuring that digital transformation benefits both employees and society at large.

Overall, this work contributes to the growing body of literature on digital transformation and employee behavior by providing empirical evidence of the mechanisms underlying these relationships. By leveraging insights from Social Cognitive and Self-determination Theory, the study highlights the significance of digital transformation and challenging appraisal practices in fostering employee innovative behavior, offering valuable implications for organizational management and strategic decision-making in the era of digitalization.

5.2 Implications of the study

This study provides significant implications for both the banking sector and society by demonstrating how digital transformation fosters employee innovative behavior, ultimately driving efficiency, competitiveness, and long-term sustainability. In an era where digitalization is reshaping financial services, banks must actively invest in advanced digital tools, automation, and artificial intelligence to streamline operations, enhance decision-making, and improve customer experiences. Equally important is the need for comprehensive training programs that equip employees with the necessary digital skills to adapt to evolving technologies and leverage them for innovation. Additionally, organizations should implement challenging appraisal systems that encourage continuous learning, problem-solving, and creativity among employees, ensuring that performance evaluation frameworks are designed to stimulate rather than hinder innovation. Moreover, fostering a supportive organizational culture that values collaboration, openness to new ideas, and risk-taking is essential for sustaining digital transformation efforts. Leadership plays a pivotal role in this process, as transformational leaders can inspire and guide employees through technological transitions by providing vision, motivation, and mentorship. Organizations should develop leadership programs that

enhance transformational leadership skills, enabling leaders to support their teams effectively and create an environment conducive to innovation. Beyond the organizational level, digital transformation in banking has broader societal implications. By increasing operational efficiency and improving service delivery, banks can expand financial inclusion, particularly in underserved areas, bridging the gap between traditional banking systems and digital financial services. This, in turn, contributes to economic growth by fostering financial stability, increasing access to credit, and supporting entrepreneurship. Additionally, workforce development is strengthened as employees gain digital competencies that enhance their employability and adaptability in an increasingly technology-driven job market.

From a policy perspective, governments and regulatory bodies should create supportive frameworks that encourage digital adoption while ensuring job security and employee well-being. Policies should promote incentives for digital upskilling, encourage banks to invest in employee development, and introduce regulations that balance technological advancement with ethical considerations. Furthermore, leadership development programs should be integrated into organizational strategies to cultivate an innovation-driven workplace where employees feel empowered to experiment, take initiative, and contribute to organizational success.

All in all, integrating these insights can help banks, industry leaders, and policymakers develop a holistic and sustainable approach to digital transformation, maximizing its benefits while mitigating potential challenges. By embracing digitalization strategically, organizations can enhance both employee innovative behavior and overall performance, ultimately contributing to a more resilient and dynamic financial sector that positively impacts society.

6 Limitations and further research directions

While offering valuable insights, this study has limitations that merit consideration. Firstly, its quantitative approach may not fully capture the intricate relationships between digital transformation, challenging appraisal, organizational culture support, transformational leadership style, and employee innovative behavior. Future research could employ qualitative methods like interviews or focus groups for a deeper understanding. Secondly, while the sample size of 280 respondents was randomly selected, it may not fully represent all employees in Congolese banks. Selection bias may be present if respondents who are more engaged with digital transformation initiatives were more likely to participate, potentially skewing results. Future studies should aim for larger and more diverse sample sizes to enhance generalizability and reduce selection bias. Expanding the study to include a more representative mix of employees across different hierarchical levels, departments, and banking institutions would provide a more holistic view of digital transformation's impact. Moreover, focusing solely on Congolese banks limits the findings' applicability to other industries or regions. The banking sector has unique regulatory, technological, and operational characteristics that may not be directly comparable to other sectors. Additionally, cultural and economic differences across countries may influence how digital transformation and leadership styles interact with employee behavior. Future research should explore these dynamics in diverse organizational and national contexts, particularly in industries with varying levels of technological integration. A comparative analysis

across multiple industries and countries would provide valuable cross-sectoral and cross-cultural insights. Future studies should explore these dynamics in diverse contexts. Furthermore, reliance on self-reported questionnaire data may introduce response biases. Using objective measures or behavioral observations could provide more accurate assessments. Moreover, the study identifies significant relationships, but their directionality remains unclear, as digital transformation may both influence and be influenced by employee innovative behavior. Future longitudinal studies tracking changes over time would offer stronger evidence of causality and allow researchers to assess the long-term impact of digital transformation on employee innovation and organizational performance.

Moving forward, research should examine contextual factors' moderating effects, such as organizational culture and leadership style, on digital transformation and challenging appraisal. Understanding how individual differences influence responses to these practices is crucial, as is exploring cultural variations across different regions. Moreover, future studies should incorporate additional mediators and moderators to deepen understanding. Finally, longitudinal research on the long-term effects of digital transformation and challenging appraisal on organizational performance outcomes would offer strategic insights into their sustainability and impact. Investigating whether sustained digital transformation efforts lead to long-term cultural shifts within organizations or if their effects diminish over time would be particularly valuable for both academic research and managerial practice. By addressing these limitations and expanding research directions, future studies can build on the findings of this study to enhance theoretical and practical understanding of digital transformation in the evolving workplace.

Data availability statement

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

Author contributions

JB: Conceptualization, Investigation, Methodology, Visualization, Writing – review & editing. JP-A: Conceptualization, Formal analysis, Software, Validation, Writing – original draft. PB: Data curation, Investigation, Software, Validation, Writing – review & editing.

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Supplementary material

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Inclusive leadership and subordinates' career calling: roles of belongingness and organization-based self-esteem

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Introduction: While the concept of career calling has garnered attention for its role in inspiring employees' sense of purpose and engagement, the literature on its developmental aspects, especially the influence of leadership styles, has not been fully paid attention to. Furthermore, the association between leadership styles and career calling still needs further exploration. Therefore, this study narrows this gap through testing the mediating role of belongingness in the relationship between inclusive leadership and career calling and its variation across different levels of organization-based self-esteem. Drawing upon the Need-to-Belong Theory, we propose a moderated mediation framework to elucidate the relationship and its variations between inclusive leadership and career calling among employees.

Methods: Data was collected from 337 employees across various industries in Guangdong, Zhejiang, and Beijing, China, using a two-wave lagged questionnaire. We used Inclusive Leadership-9, Belongingness-12, Organization-Based Self-Esteem-10 and Career Calling-12 measurement variables. Later, we used SPSS and PROCESS to verify five hypotheses.

Results: Statistical testing revealed that (1) there is a positive relationship between inclusive leadership and career calling. (2) Belongingness plays a mediating role in the relationship between inclusive leadership and career calling. (3) Organization-based self-esteem moderates the association between inclusive leadership and career calling, both directly and indirectly through belongingness.

Conclusion: This study provides insights into the conversation about inclusive leadership and career calling, revealing a deeper understanding of the associations between leadership styles and employees' vocational fulfillment, and suggesting practical implications for encouraging an inclusive work environment that supports career development.

KEYWORDS

inclusive leadership, career calling, belongingness, organization-based self-esteem, need-to-belong theory

1 Introduction

More and more individuals are working to pursue work meaningfulness, and find and achieve a career calling (Berg et al., 2010). Coincidentally with this reality, there has been a wave of research career calling in the field of management (DiRenzo et al., 2022; Dobrow et al., 2023; Ran et al., 2023; Thompson and Bunderson, 2019). Defined as strong enthusiasm and meaningful passion toward work perceived by individuals (Dobrow and Tosti-Kharas, 2011), career calling has attracted scholars' attention and been verified as a predictor of individual and organizational aspects (Zhang and Jin, 2019), such as job crafting (Chang et al., 2021), task performance (Vianello et al., 2022), and job satisfaction (Huang et al., 2022). Given the positive role of career calling in managing employees and organizational development, scholars have devoted themselves to inspecting influential factors of career calling, including leadership (Zhang and Jin, 2019), personality (Wen et al., 2022), and organizational context (Chen et al., 2018). Despite the acknowledged importance of career calling in enhancing employee engagement and organizational growth, the exploration of factors influencing career calling (Dobrow et al., 2023; Thompson and Bunderson, 2019), particularly the association with leadership, remains limited.

As employees' actions and attitudes will be deeply influenced by leaders (Choi et al., 2015), exploring the relationship between leadership and subordinates' career calling is necessary. Past literature has tried to explore the effects of different types of leadership on career calling, such as empowering leadership (Zhang and Jin, 2019), spiritual leadership (Wu and Lee, 2020), and ethical leadership (Zhang and Jiang, 2020). Nevertheless, among different types of leadership, the relationship and the mechanism through which inclusive leadership is linked with career calling have not been addressed in the conversation. At present, many corporate tasks are completed in the form of teams, and employees from different departments form temporary teams. They not only have belongingness to the temporary teams, but also maintain their individual uniqueness. While a number of existing positive leadership methods have been identified as able to facilitate the completion of work tasks in temporary teams, none of them adequately address these basic needs of group members, namely the value of belongingness and uniqueness (Randel et al., 2018; Korkmaz et al., 2022). Inclusive leadership has the potential to be effective for both different work groups and the same work group (Brewer, 1991; Shore et al., 2011). Inclusive leadership is distinct from other leadership paradigms due to its emphasis on fostering an environment that values and embraces all group members, no matter what their backgrounds are or what perspectives they stand for (Hollander, 2009). Unlike other leadership styles that may focus primarily on performance outcomes or individual leader characteristics, inclusive leadership is characterized by behaviors that promote diversity, accessibility, and open-mindedness, enabling a wide range of ideas and contributions (Carmeli et al., 2010). This unique focus on inclusivity is especially relevant in today's diverse work environments, where leveraging a wide range of talents and perspectives is key to innovation and problem-solving (Nembhard and Edmondson, 2006). Inclusive leadership requires leaders to conduct supportive, open-minded and flexible actions in workplaces, which may inspire employees' meaning in work (Zhang et al., 2012). However, the specific role and mechanisms of inclusive leadership in the context of career calling have received scant attention. Therefore, this study aims to investigate

the association between inclusive leadership and career calling. The research on the relationship between inclusive leadership and career calling not only helps enrich the impact of positive leadership on employees' sense of meaning, but also makes up for the research gap in the relationship between inclusive leadership and career calling.

The need-to-belong theory posits that individuals have intrinsic motivations to form meaningful connections with others (Baumeister and Leary, 1995). This study will explore how inclusive leadership, which focuses on the connection between individuals and organizational environments, positively relates to individuals' belongingness and their career calling at work. By integrating these theoretical perspectives, the study aims to provide a comprehensive understanding of the dynamics between inclusive leadership and career calling, offering valuable insights for both academic research and practical leadership development (Baumeister and Leary, 1995). According to Randel et al. (2018), inclusive leadership aims to motivate people to more comprehensively engage in work and offer a chance for all organizational members to release potential abilities. This will encourage employees to have a sense of initiative in establishing high-quality relationships with leaders, in order to view individuals as members of the organization. Therefore, inclusive leadership, characterized by openness, accessibility, and supportiveness, closely relates to a workplace environment that satisfies employees' need for belongingness. This satisfaction is associated with a stronger sense of identity and integration within the organizational context, with employees also reporting a deeper sense of meaning and purpose in their work, which is related to an enhanced career calling (Xu et al., 2023). This conceptualization aligns with Baumeister and Leary's (1995) assertion that fulfilling the need for belongingness can significantly influence individuals' emotional, cognitive, and behavioral orientations towards their roles, thus instigating a more profound engagement with their careers as a calling.

One way to improve the career calling of subordinates with belongingness is to have them perceive their own personal values and abilities within the organization. Studies have found that organization-based self-esteem helps to improve employees' belongingness (Dhir et al., 2024). Influenced by organization-based self-esteem, subordinates with belongingness will achieve results consistent with self-evaluation through improving career calling. Organization-based self-esteem, defined as individuals' self-perceived value and competence within their organizational role, plays a pivotal role in shaping career calling by influencing how employees perceive their contributions and significance within the workplace (Pierce et al., 1989). High organization-based self-esteem is associated with a positive self-concept in relation to one's work (Bowling et al., 2010), and this type of employee sees himself as valuable, trustworthy, and contributing to the organization (Pierce et al., 1989). Individuals develop their attitudes in a way that is consistent with their own level of self-esteem (Lee, 2003), so individuals with high organization-based self-esteem may be more likely to report a career calling. This connection is critical for understanding the "black box" of how inclusive leadership is associated with career calling, as it suggests that feeling valued and competent in the organization can lead employees to view their work as a personal calling, beyond mere job satisfaction or role fulfillment. To further elucidate this relationship, it's essential to explore how inclusive leadership practices that affirm individual contribution and value diversity relate to belongingness based on organization-based self-esteem. This may be associated with employees' sense of purpose and calling in their careers, as they perceive their work as meaningful and integral to their self-identity.

In general, this study will provide some important contributions to the literature on positive leadership and career calling. First, previous research has mainly discussed the outcome variables of career calling, while relatively few studies have been done to discuss which factors relate to career calling. This study expands the scope of influencing factors of career calling via investigating the role of inclusive leadership. Second, this study attempts to use belongingness as a mediator to unlock the “black box” of the two variables. This study fills a critical gap in the literature by exploring how inclusive leadership positively relates to career calling, considering the potential mediating role of belongingness and the moderating role of organization-based self-esteem. While previous research has examined the impact of leadership styles on various outcomes, the specific associations through which inclusive leadership affects career calling have been underexplored (Randel et al., 2018). Third, this study further investigates how the relationship between inclusive leadership and career calling fluctuates under what conditions. Taking organization-based self-esteem as the moderator is conducive to explaining under what conditions the relationship between inclusive leadership and belongingness will be strengthened, and the change of the relationship between inclusive leadership and career calling through belongingness. Empirical evidence supports the notion that inclusive leadership practices—such as demonstrating openness, facilitating accessibility, or being available to others—significantly enhance employees’ belongingness, which in turn positively affects their career calling (Mitchell et al., 2015). Moreover, organization-based self-esteem has been identified as a crucial factor that can amplify the positive effects of inclusive leadership on employees’ belongingness and career calling (Pierce et al., 1989). By addressing these specific relationships, this study enriches the understanding of the relationship between inclusive leadership and career calling, further proposing practical suggestions for organizations seeking to cultivate an inclusive and motivating work environment (Figure 1).

2 Theory and hypotheses

2.1 The need-to-belong theory

Baumeister and Leary (1995) defined the need for belonging as the basic incentive for people to establish and sustain minimum, long-term lasting, positive and meaningful social connections. Ryan

and Deci (2000) extended Baumeister and Leary's (1995) statement and defined the need for belonging as an individual's need to connect with others, be accepted, respected, and concerned by others, and bring values to others. Accordingly, to meet a person's need for belonging, one of the most important and basic social motivations of human beings, he/she should experience frequent and pleasant interactions with other people on occasions when people are concerned about each other (Baumeister and Leary, 1995). Furthermore, meeting people's basic needs may inspire people's self-determined behaviors (Ryan and Deci, 2000). The positive outcomes of belongingness have been reported by researchers, such as perception of life (Lambert et al., 2013), extra-role behavior (Zhao et al., 2012) and intention to complete goals (Mallet-García and García-Bedolla, 2021). Besides, past literature has also been investigating factors inspiring people's belongingness and the outcomes. For example, Liu et al. (2022) pointed out that organizational support could increase teleworkers' belongingness. Furthermore, other social capital factors (e.g., perceived similarity, trust, familiarity) have been verified as predictors of belongingness (Zhao et al., 2012).

This study applies the need-to-belong theory as a theoretical base to investigate the mechanism between inclusive leadership and career calling. Proposed as a kind of supportive leadership, inclusive leadership may inspire employees' self-determined behaviors by meeting their needs for belongingness. Inclusive leadership can construct a respectful, humane and open climate, which can give living space to different views and beliefs and allow them to be part of organizations. On this occasion, employees' need for stable and high-quality connections with others may be satisfied (i.e., belongingness). As employees' basic needs are satisfied, they may recognize organizations and perceive themselves as part of organizations. According to the need-to-belong theory, employees whose needs for belongingness are met may hold positive attitudes toward work. Furthermore, as self-esteem reflects the perceived quality of interpersonal relationships (Baumeister, 2012), it may shape people's feelings of belongingness and responses to the external environment. Summing up, this study proposes that inclusive leadership can promote satisfaction of people's belongingness and lead to changes in work attitudes, while being influenced by individuals' perceived organization-based self-esteem.

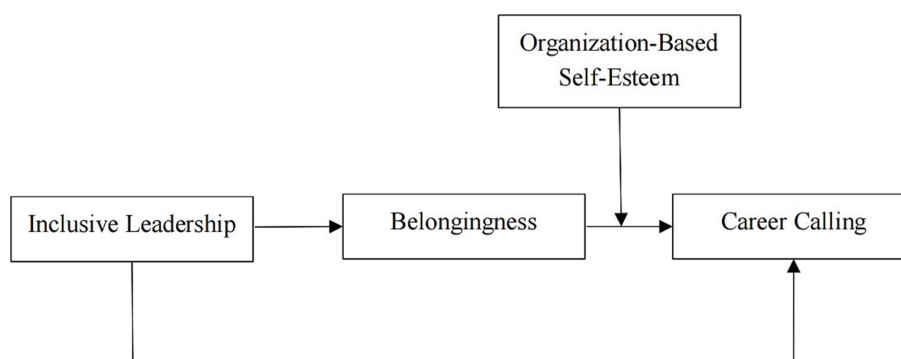


FIGURE 1
The research model of this paper.

2.2 Inclusive leadership and career calling

Conceptualized as a broad term for relationship-oriented leadership styles (Korkmaz et al., 2022), inclusive leadership requires leaders to be open, accessible and available in organizational interactions (Carmeli et al., 2010). These requirements shape leaders to conduct altruistic and supportive actions toward subordinates (Černe et al., 2013), such as establishing respectful, responsible and recognizable relations between supervisors and subordinates (Hollander, 2009), listening and concerning subordinates' needs and expectations (Carmeli et al., 2010), and respecting diversity and divergence in groups (Nembhard and Edmondson, 2006). Past literature has confirmed the essential role of inclusive leadership in predicting performance. In terms of individual level, inclusive leadership has been verified to contribute to positive subordinates' outcomes, such as motivation (Zhang and Jin, 2019), working performance (Khan et al., 2020), extra-role behavior (Jiang et al., 2020), and in-role behavior (Chen et al., 2020). Furthermore, the positive effects of inclusive leadership can be found at team and organizational levels in various aspects, including performance (Qi and Liu, 2017), climate (Li and Peng, 2022) and team-level identity (Mitchell et al., 2015). Although organizations believe that inclusive leadership may ensure micro and meso-level performance, the high turnover rate among young employees in organizations due to the pandemic and financial crises break their assumptions (Deal et al., 2010; Ng et al., 2010). Employees have turnover intention due to a lack of sense of work meaning.

Defined as strong enthusiasm and meaningful passion toward work perceived by individuals (Dobrow and Tosti-Kharas, 2011), career calling consists of three dimensions, including prosocial orientation, transcendent summons and purposeful work dimensions (Dik et al., 2012). Past literature has reported various benefits of career calling to organizations, such as career commitment (Lv et al., 2021), meaning in life (Peng et al., 2020) and low burnout (Zhao et al., 2022). Given the positive effects of career calling in organizations and the potential contribution of leadership to shaping employees' cognitions and motivations (Gupta, 2020), scholars in leadership conversation have started to devote themselves to it. For instance, Zhang and Jiang (2020) found that ethical leadership could inspire Chinese employees' career calling. However, the research about inclusive leadership and career calling is scarce.

As a kind of relation-focused leadership, inclusive leadership emphasizes the interactions between supervisors and subordinates (Randel et al., 2018). Inclusive leaders interact with employees and influence their career calling through openness, accessibility and availability (Carmeli et al., 2010). First, open and accessible inclusive leaders have flexibility and curiosity. They respect each subordinate, accept employees' different new views and ideas, and encourage employees to participate in decision-making (Darvishmotevali, 2019). This way of being recognized by leaders will enhance employees' sense of ownership and responsibility, improve employees' perception of the meaning of their work (Brown and Mitchell, 2010), and inspire employees' career calling. The support of inclusive leadership is conducive to the improvement of personal ability (Carmeli et al., 2010), and the higher the matching degree between personal ability and job requirements, the stronger the career calling (Thompson and Bunderson, 2019). Finally, accessible and inclusive leaders usually pay attention to the needs and expectations of subordinates and provide

help to subordinates in a timely manner. When employees are respected and authorized by leaders (Hollander, 2009), they can freely and equally express their suggestions and ideas in the process of participating in enterprise decision-making (Nishii, 2013). The positive attitudes and expectations toward the job may make them achieve beyond themselves and realize the meaning of work. Based on the above narration, the study posits that:

H1: The relationship between inclusive leadership and subordinates' career calling is positive.

2.3 Inclusive leadership and belongingness

Inclusive leadership promotes employees' belongingness in three ways: supporting team members, ensuring fairness in experience for each member, and allowing participation in shared decision-making toward organizations' issues (Randel et al., 2018). First, during the interactions among colleagues, inclusive leaders value the concern, care toward subordinates in the daily work, patiently listen to communications, free expression, and respect and support for subordinates' needs (Hollander, 2009). In this case, subordinates may have a sense of being accepted, recognized and respected by the organizations (Won et al., 2018) and perceive the fairness during the interactions. These good senses and perceptions toward interactions will make subordinates regard themselves as part of organizations and satisfy subordinates' need of belongingness (Baumeister and Leary, 1995). Second, inclusive leaders demonstrate to group members that they are a respected part of the group by treating them in a fair and just manner (Sabharwal, 2014; Shore et al., 2011). Third, inclusive leadership shares decision-making power with subordinates by inviting employees to participate and make decisions together, expands decision-making consultation, and helps subordinates decide how to work. This promotes the belongingness of subordinates (Nembhard and Edmondson, 2006).

H2: The relationship between inclusive leadership and subordinates' belongingness is positive.

2.4 Belongingness as a mediator

In light of the need-to-belong theory, this study posits that the establishment and maintenance of interpersonal relationships are not just fundamental to human activity but are also pivotal in shaping one's career calling (Pickett et al., 2004). Belongingness, conceptualized as the desire and fulfillment of being an integral part of a group or organization, emerges as a critical psychological state that mediates the relationship between inclusive leadership and career calling. Inclusive leadership, characterized by its emphasis on fostering a supportive, open, and respectful environment, enhances employees' belongingness by making them feel valued, respected, and an essential part of the organizational fabric (Randel et al., 2018). Furthermore, people's behaviors may be motivated by the extent of being recognized as part of groups and taken care of by others (Ryan and Deci, 2000). For example, Hoogervorst et al. (2012) and Dysvik et al. (2013) found that the more leaders and followers perceived belongingness, the more they might conduct altruistic behaviors. Besides, scholars have

confirmed the positive effect of belongingness on employees' psychology. Shakespeare-Finch and Daley (2017) revealed that workplace belongingness could control distress and inspire resilience. Although scholars have found different benefits of belongingness in organizations, they still need more work on the fostering factors. Responding to Randel et al.'s (2018) appeal to introducing leaders to inspiring belongingness, Kyei-Poku and Yang (2020) found that authentic leadership could indirectly inspire followers' organizational citizen behaviors via belongingness.

This amplified belongingness, in turn, has profound implications for employees' career calling. It deepens their connection with their work, instilling it with heightened meaning, passion, and a transcendental quality. This transcends the conventional parameters of job satisfaction or engagement, positioning career calling as a profound alignment with one's professional role, reflective of personal values and purpose. This study, therefore, posits that belongingness mediates the relationship between inclusive leadership and career calling, translating inclusive practices into a more pronounced career calling among employees. Kyei-Poku (2014) further underscores this relationship by illustrating how perceived belongingness can inspire altruistic behaviors and a stronger commitment to organizational goals, aspects closely related to the concept of career calling. The sense of security and identity derived from belongingness motivate employees to contribute meaningfully to their organizations, enhancing their sense of purpose and fulfillment from their work. This study hypothesizes:

H3: Belongingness positively mediates the relationship between inclusive leadership and career calling.

2.5 Moderating effects of organization-based self-esteem

Defined as the perceived value of individuals as organizational members in the organizational environment (Pierce et al., 1989), self-esteem was one of the main factors inspiring individuals' psychological well-being and meaning in life (Lee and Peccei, 2007). Later, Pierce and his/her colleagues proposed the concept of organizational self-esteem and clarified its definition as the degree to which individuals perceive their own competence, importance, value, respect, and match with the organization rather than as individuals' perceptions of their own value in the organizations and the extent to which they are capable of participating in organizational actions to the degree to which individuals perceive their own competence, importance, value, respect, and match with the organization (Pierce et al., 1989; Pierce and Gardner, 2004). Past literature has revealed the effect of organization-based self-esteem in shaping individuals' behaviors. According to Brockner (1988), people with low levels of organization-based self-esteem will have comparatively pessimistic attitudes and be sensitive to negative stimulations. Pierce and Gardner (2004) also argued that researchers might consider the moderating effect of organization-based self-esteem in the working environment and individuals' behaviors.

Need-to-belong theory reflects that human's basic need for belongingness has a strong impact on emotions, cognitions and behaviors (Baumeister and Leary, 1995). In this study, subordinates with high-level organization-based self-esteem are sensitive to

external positive stimulations (Brockner, 1988) and believe that individuals are valuable, trustworthy and contributive to the organization (Gardner and Pierce, 1998). When these subordinates keenly notice the feeling of being part of the organizations, they may feel confident, which can make employees with a high belongingness believe that individuals have good interpersonal relationships in the organization. They will actively explore the meaning and value of work, give full play to their potential, and generate a high career calling through strong internal motivation (Dumulescu et al., 2015). At the same time, subordinates with high organization-based self-esteem may have positive attitudes toward organizations because they easily feel support from groups (Korman, 1976). In this case, they believe that individuals in the groups are important to them, which motivates these subordinates to altruistically help others. Accordingly, this study proposes that:

H4: Organization-based self-esteem moderates the relationship between belongingness and career calling, such that this relationship is stronger when the organization-based self-esteem is high than when it is low.

2.6 Moderated mediating effect

In a similar way, the mediating effect of belongingness is also influenced by organization-based self-esteem. When subordinates have high-level organization-based self-esteem, they may believe that individuals can contribute to the organizations and participate in organizations' work and activities, which is essential and meaningful for organizational development (Kim and Beehr, 2018). In an inclusive leadership context, subordinates may perceive the leaders' recognition, encouragement and support better, which may be accompanied by their belongingness. On this occasion, subordinates may be more passionate about their work, brave enough to accept challenges, diligent enough to achieve purposes, and willing to help other members because they may believe that the organizations are vital and their work is valuable. On the contrary, subordinates with low-level organization-based self-esteem will have lower perceptions of self-competence, hardly perceive support from organizations, and hold skeptical attitudes toward whether they are accepted by the organizations or not, which may lead them to feel a sense of incapability and not easy to experience the work passion and sense of meaning. In accordance with the above, the study posits that:

H5: Organization-based self-esteem positively moderates the indirect relationship between inclusive leadership and career calling via belongingness, such that this indirect relationship is stronger when the organization-based self-esteem is high than when it is low.

3 Research methods

3.1 Research subjects and collection procedures

This study regarded Chinese employees as the population and recruited participants from different firms in various industries in Guangdong, Zhejiang, and Beijing provinces, China. This study

applied a snowball sampling to contact 11 managers in the human resources management departments of 11 companies to ask for support in accessing employees and collecting data. After gaining permission from companies, researchers adopted a convenient sampling approach to recruit 500 potential participants. To control common method bias, we applied a time-lagging approach to collect data over two periods (Podsakoff et al., 2003). The interval between the two collections is 2 months. Before the data collection, the study sent consent forms, participation information sheets, and hard-copied questionnaires to participants and ensured that their participation was voluntary and confidential. In wave 1, 500 surveys were distributed to participants to respond to questions about inclusive leadership and belongingness. Furthermore, researchers asked participants to report their personal information (e.g., gender, age, phone numbers and email address). In wave 1, the study received 420 responses and numbered these surveys. Two months later, the study invited participants who were matched to respond to questions related to organization-based self-esteem and career calling. In wave 2, the study gained 407 surveys. Finally, the study received 337 surveys after deleting the invalid ones (those failing to answer all questions), accounting for 67.4% of the initial number of participants. Table 1 described the demographic characteristics of the participants. Of these, a third of participants are from other industries, namely technology, medical and transportation.

3.2 Ethics approval and consent to participate

All participants in this paper have provided written informed consent in order to collect information and publish the data generated by the article study and its results. This project adopts questionnaires to collect data and is approved by the Institutional Review Committee of Yiwu Industrial and Commercial College. Sign and submit to the “Ethical Issues Form” provided by Yiwu Industrial and Commercial College to ensure the authenticity of this paper and conform to academic ethics. In addition, the study was conducted in accordance with the Declaration of Helsinki.

3.3 Measuring tools

Following Brislin’s (1980) suggestions, this study adopted several 5-point Likert scales from the existing literature (1 refers to strongly disagree attitude, 5 refers to strongly agree attitude) and translated the scales into Chinese versions. The study firstly invited two overseas researchers with human resources management backgrounds to translate the English versions into Chinese versions. Then, the research team invited two professors in related fields to translate the Chinese versions back to English versions and assisted the research team in modifying the Chinese versions based on the cultural context into final versions.

3.3.1 Inclusive leadership

Participants completed a nine-item scale developed by Carmeli et al. (2010) to measure inclusive leadership. The scale included three dimensions, including 3 items about openness (e.g., The manager is open to hearing new ideas), 2 items about accessibility (e.g., The

TABLE 1 Descriptive characteristics of the sample.

Characteristic	Percent (Number)
Gender	
Male	48.1% (162)
Female	51.9% (175)
Age (years)	
<20	26.1% (88)
21–30	36.2% (122)
31–40	27.3% (92)
41–50	9.2% (31)
>50	1.2% (4)
Marital status	
Non-married	53.4% (180)
Married	42.7% (144)
Divorced	3.9% (13)
Education level	
Doctor’s degrees	4.2% (14)
Master’s degrees	7.1% (24)
Bachelor’s degrees holders	51.3% (173)
Junior college diplomas	19% (64)
Technical secondary school, High school or below	18.4% (62)
Tenure (years)	
<10	94.7% (319)
> = 10	5.3% (16)
Time working with a fixed leader (years)	
<10	98.5% (332)
> = 10	1.5% (5)
Industry	
Educational	36.2% (122)
Financial	3.3% (11)
Service	23.1% (78)
Construction	3.9% (13)
Other (Technology, Medical, Transportation)	33.5% (113)

manager encourages me to access him/her on emerging issues) and 4 items about availability (e.g., The manager is available for consultation on problems). The Cronbach’s alpha reaches a satisfying level (0.947).

3.3.2 Belongingness

A 12-item scale developed by Malone et al. (2012) was used to ask participants to report their attitudes toward belongingness. Among the 12 items, items 3, 4, 6, 7, 9 and 12 were reverse-scored (e.g., I feel isolated from the rest of the world). The Cronbach’s alpha reaches a satisfying level (0.921).

3.3.3 Organization-based self-esteem

This study applied a widely adopted scale developed by Pierce et al. (1989) to measure organization-based self-esteem. The scale had 10

items and showed satisfying reliability in this study. An example item was “I am trusted.” The Cronbach’s alpha reaches a satisfying level (0.945).

3.3.4 Career calling

The study applied the 12-item scale developed by Dobrow and Tosti-Kharas (2011) to measure career calling. The example item was “I am passionate about being an employee in the company.” The Cronbach’s alpha reaches a satisfying level (0.959).

3.3.5 Control variables

Based on previous studies, gender, age, and tenure have been found to influence individual career calling (Chen et al., 2018; Creed et al., 2016; Wu and Lee, 2020). To more accurately validate the model, gender (male = 0, female = 1), age (year), and tenure (year) were measured as control variables.

3.4 Methods for data analysis

Data analyses can be divided into several steps. First, we test the validity of the measurement model through confirmatory factor analysis by applying AMOS. We calculated overall scores for all items on all dimensions of each variable (inclusive leadership, occupational calling, belonging, organization-based self-esteem). Then, we computed the mean score for each variable by averaging these overall scores. We carried out descriptive statistics and correlation analysis to conduct preliminary data analysis. Later, we used SPSS and PROCESS to test the hypotheses (Edwards and Lambert, 2007; Hayes, 2017; Preacher and Hayes, 2004). The data analysis for this study was conducted in a series of steps to rigorously test the hypotheses and explore the relationships between inclusive leadership, belongingness, organization-based self-esteem, career calling, and control variables (i.e., age, gender, and tenure in this study).

We tested our hypothesis through multiple linear regression analysis in SPSS and Process macro. Multiple regression analysis is widely used to test models in management (Montani et al., 2020; Pan et al., 2018). To examine the mediating role of belongingness (BE) between inclusive leadership (IL) and career calling, we utilized the PROCESS macro in SPSS, following Preacher and Hayes’s (2004) bootstrapping method. In examining the moderating effect, since regression analyses involve the interaction between belongingness and organization-based self-esteem (OBSE), we referred to Aiken and West (1991) and centralized values of belongingness and organization-based self-esteem to avoid exaggerating in multicollinearity, seeking a better interpretation.

4 Research results

4.1 Common method bias test

As the data was self-reported by participants, there might exist common method bias. Thus, this study applied two ways to test the common method bias. The study applied a Harman’s single-factor test to diagnose the common method bias. The result showed that common method bias was not a serious issue, as a single factor accounted for 39.233% of the variance (Podsakoff et al., 2003).

4.2 Confirmatory factor analysis

To test the validity of scales from existing literature, we used confirmatory factor analysis to test the measurement model via AMOS software (Table 2). Compared with other alternative models, the four-factor model satisfyingly fitted the data. According to Medsker et al. (1994), all the results of indexes met the cut-point of criteria ($\chi^2 = 1620.140$, $df = 854$, $RMSEA = 0.052$, $SRMR = 0.056$, $CFI = 0.933$, $TLI = 0.929$, $IFI = 0.933$). Thus, the validity of the measurement model was ensured. According to the approach (ULMC) suggested by Bagozzi and Yi (1988) of testing common method variance ($CFI = 0.950$, $TLI = 0.947$, $RMSEA = 0.045$, $SRMR = 0.048$), there is no serious common method variance ($\Delta CFI = 0.017$, $\Delta TLI = 0.018$, $\Delta RMSEA = 0.007$, $\Delta SRMR = 0.008$).

4.3 Correlation analysis

Before testing the hypotheses, this study conducted descriptive statistics and correlation analyses to draw a simple picture of the data. Table 3 shows descriptive statistics (means and standard deviations) and correlation coefficient among variables. The descriptive statistics showed that the participants’ attitudes toward variables were generally high as their mean scores of variables were located in more than 3.6. Furthermore, though the standard deviation of belongingness was larger than that of other variables, the dispersion degrees of variables were generally similar. Besides, given that the Kolmogorov–Smirnov normality test showed that all the data were non-normally distributed (p -value < 0.5), Spearman’s correlation analysis was applied to investigate the variables’ relationships. Table 2 showed that inclusive leadership was positively correlated with belongingness ($r = 0.447$, $p < 0.01$) and career calling ($r = 0.573$, $p < 0.01$), respectively. Subsequently, belongingness ($r = 0.488$, $p < 0.01$) and

TABLE 2 Results of confirmatory factor analysis ($N = 337$).

Models	χ^2	df	RMSEA	SRMR	CFI	TLI
Four-factor model (hypothesis)	1620.140	854	0.052	0.056	0.933	0.929
Three-factor model (A + B)	2936.302	857	0.085	0.094	0.818	0.808
Three-factor model (A + C)	3179.278	857	0.090	0.099	0.796	0.785
Three-factor model (A + D)	3200.472	857	0.090	0.093	0.794	0.783
Two-factor model (A + B, C + D)	5320.227	859	0.124	0.164	0.608	0.588
One-factor model (A + B + C + D)	6258.182	860	0.137	0.145	0.526	0.503

A (Inclusive leadership), B (Belongingness), C (Career calling), D (Organization-based self-esteem).

TABLE 3 Descriptive statistics (means and standard deviations) and correlation analyses among variables ($N = 337$).

Variables	Mean	SD	1	2	3	4	5	6
1.Gender	–	–						
2.Age	28.85	8.539	–0.349**					
3.Tenure	–	–	–0.230**	0.387**				
4.IL	4.144	0.777	–0.039	0.088	–0.019			
5.CC	3.983	0.756	0.035	–0.132*	–0.097	0.589**		
6. BE	3.652	0.829	0.008	–0.171**	–0.069	0.454**	0.516**	
7.OBSE	4.003	0.737	0.020	0.066	0.089	0.548**	0.293**	0.342**

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$; IL (Inclusive Leadership), BE (Belongingness), CC (Career Calling), OBSE (Organization-Based Self-Esteem).

organization-based self-esteem ($r = 0.313$, $p < 0.01$) were positively correlated with career calling, respectively.

4.4 Hypotheses testing

4.4.1 Main effect test

The hypothesis testing in this study was methodically structured and executed through a series of analytical steps using SPSS 23 and the PROCESS macro, as recommended by Preacher and Hayes (2004). First, we use SPSS software to assess the main effect of inclusive leadership on career calling (Hypothesis 1). As shown in Model 1 in Table 4, the results show a positive correlation ($b = 0.59$, $p < 0.001$), thus supporting H1.

4.4.2 Test for the mediating effect

Subsequently, we examined the mediating impact of belongingness in the main path by using SPSS software for regression analysis (Hypothesis 2). In Model 4 and Model 6, as shown in Table 5, the data results show that the direct effect of inclusive leadership on career calling decreases from $b = 0.59$ ($p < 0.001$) to $b = 0.46$ ($p < 0.001$) when belongingness is taken as the mediating variable. There was a strong positive correlation between belongingness and career calling ($b = 0.26$, $p < 0.001$). Although the direct relationship between inclusive leadership and career calling was reduced, it also remained significant. This indicates that belongingness partially mediates the relationship between inclusive leadership and career calling. In addition, in order to further examine the mediating role of belongingness, this study combined with the Process program. The data results are shown in Table 5 (Effect = 0.13, $se = 0.03$, 95%CI = [0.07, 0.19]), which also proves Hypothesis 2.

4.4.3 Testing belongingness as a moderator

For the moderating effect analysis (Hypothesis 3), the interaction term was calculated by multiplying belongingness with organization-based self-esteem. We used centralized belongingness and organization-based self-esteem to control multicollinearity and seek a better interpretation (Aiken and West, 1991). As shown in Model 7 in Table 4, based on the Model 5, the centralized belongingness, organization-based self-esteem and their interaction terms are added as independent variables. The analysis revealed that both belongingness ($b = 0.38$, $p < 0.001$) and organization-based self-esteem ($b = 0.19$, $p < 0.01$) were positively associated with career calling, and with the interaction term also showing a significant positive effect ($b = 0.14$,

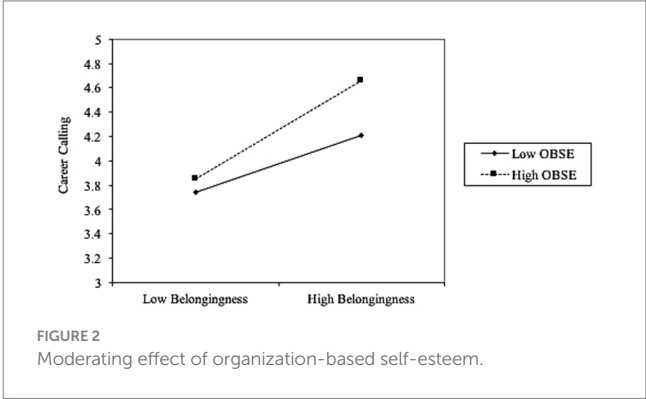


FIGURE 2 Moderating effect of organization-based self-esteem.

$p < 0.05$). Hypothesis 3 was proved. Figure 2 more intuitively shows the moderating effects of organization-based self-esteem. We also used the method suggested by McCabe et al. (2018) to enhance the visualization of the adjustment renderings through the J-N diagram. Since the interval shown on the graph does not contain 0, the moderated effect is valid (Figure 3). Hypothesis 3 is supported.

4.4.4 Moderated mediating effect test

We applied multiple steps to validate Hypothesis 4. We first used SPSS software for regression analysis. Based on Model 6, Model 8 in Table 4 added centralized organization-based self-esteem, interaction terms of organization-based self-esteem and belongingness as independent variables to regression the career calling. The data results showed that (Model 8 in Table 4), inclusive leadership ($b = 0.49$, $p < 0.001$), belongingness ($b = 0.24$, $p < 0.001$), and the interaction coefficient ($b = 0.14$, $p < 0.01$) were significant. In order to further test the moderating effect of organization-based self-esteem, model 14 of PROCESS was adopted. Table 5 exhibits that this effect was stronger at a higher level of organization-based self-esteem (Boot indirect effect = 0.17, Boot SE = 0.035, 95%CI = [0.10, 0.23]), supporting Hypothesis 4.

5 Discussions

In this study, we explored the relationship between inclusive leadership and career calling, particularly focusing on the mediating role of belongingness and the moderating role of organization-based self-esteem. Our findings not only corroborate existing research on

TABLE 4 Results of regression analysis.

variable	BE		CC					
	Model1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Gender	−0.100 (−0.061, 0.096, −1.046)	−0.087 (−0.053, 0.084, −1.038)	−0.028 (−0.019, 0.008, −0.323)	−0.013 (−0.009, 0.070, −0.193)	0.018 (0.012, 0.076, 0.239)	0.009 (0.006, 0.067, 0.134)	0.009 (0.006, 0.075, 0.114)	0.025 (0.016, 0.066, 0.376)
Age	−0.018** (−0.188, 0.006, −3.083)	−0.023*** (−0.239, 0.005, −4.436)	−0.010 (−0.117, 0.005, −1.898)	−0.016*** (−0.182, 0.004, −3.696)	−0.002 (−0.021, 0.005, 0.386)	−0.010* (−0.114, 0.004, −2.374)	−0.004 (−0.049, 0.005, −0.923)	−0.011* (−0.122, 0.004, −2.555)
Tenure	−0.002 (−0.010, 0.013, −0.175)	0.004 (0.020, 0.011, 0.395)	−0.011 (−0.057, 0.012, −0.957)	−0.003 (−0.017, 0.009, −0.37)	−0.010 (−0.051, 0.010, −1.005)	−0.005 (−0.023, 0.009, −0.516)	−0.012 (−0.059, 0.010, −1.168)	−0.002 (−0.010, 0.009, −0.219)
IL		0.505*** (0.474, 0.051, 9.94)		0.588*** (0.064, 0.042, 13.909)		0.458*** (0.471, 0.046, 5.901)		0.493*** (0.507, 0.045, 9.636)
BE					0.464*** (0.509, 0.043, 10.686)	0.257*** (0.281, 0.043, 9.991)	0.384*** (0.420, 0.384, 8.059)	0.236*** (0.258, 0.045, 5.257)
OBSE							0.191** (0.187, 0.054, 3.564)	−0.038 (−0.037, 0.053, −0.711)
IL*OBSE							0.143* (0.123, 0.058, 2.485)	0.137** (0.117, 0.051, 2.688)
R ²	0.032	0.254	0.020	381	0.271	0.440	0.302	0.456
ΔR ²		0.222***		0.361***	0.251***	0.059***	0.031**	0.016**
df1/df2	3/333	1/332	3/333	1/332	1/332	5/331	2/330	2/329
F(p)	3.725 (0.012)	28.314 (0.000)	2.295 (0.078)	51.081 (0.000)	30.851 (0.000)	51.993 (0.000)	23.821 (0.000)	39.366 (0.000)

IL (Inclusive Leadership), BE (Belongingness), CC (Career Calling), OBSE (Organization-Based Self-Esteem). b (β, standard error, t): unstandardized coefficients (b), standardized coefficients (β), t-test(t). N = 337, *p < 0.05, **p < 0.01, ***p < 0.001.

TABLE 5 Mediation effect and moderated mediation effect.

	Indirect effect	SE	95%CI
Simple mediation effect			
	0.130	0.029	[0.073, 0.185]
Moderated mediation effect			
High moderator (OBSE)	0.170	0.035	[0.102, 0.234]
Mean (OBSE)	0.119	0.025	[0.071, 0.167]
Low moderator (OBSE)	0.068	0.029	[0.008, 0.124]

Bootstrap sample size $N = 5,000$; OBSE (Organization-Based Self-Esteem).

the positive associations between inclusive leadership and various employee outcomes but also extend the literature by elucidating the psychological mechanisms underpinning these relationships. The results suggest that inclusive leadership is associated with higher levels of employees' career calling. Subsequently, belongingness mediates the relationship between inclusive leadership and career calling. Furthermore, organization-based self-esteem not only positively moderates the relationship between belongingness and career calling but also moderates the indirect path between inclusive leadership and career calling via belongingness.

5.1 Theoretical implications

This study has some theoretical contributions. First, this study contributes to career calling literature by extending the positive relationship between inclusive leadership and career calling. Consistent with past research, positive leadership styles are beneficial for improving employees' career calling, for example, meaningful leadership (Ahmad and Fatima, 2023), authentic leadership (Liu and Wong, 2023), caring leadership (Zhang et al., 2024) and empowering leadership (Zhang and Jin, 2019). However, limited scholars have focused on the relationship between inclusive leadership and employees' career calling. This study tests this relationship, enriching the research on the factors that influence career calling.

Second, this study reveals the relationship mechanism between inclusive leadership and career calling by introducing a mediating variable (belongingness). It responds to the call for more evidence on the belongingness in workplaces (Cockshaw et al., 2013) and the nature of belongingness in inclusive leadership (Randel et al., 2018). Inclusive leadership as a positive style of leadership is consistent with past research that positive leadership improves employees' belongingness to the organization and team, for example, appreciation leadership (Saleh et al., 2024) and charismatic leadership (Den Hartog et al., 2007). By recognizing the applicability of the need for belonging theory in inclusive leadership, this study extends the conclusion of Katsaros (2022) by revealing inclusive leadership can satisfy employees' need for belongingness and directly inspire employees' positive attitudes and behaviours (i.e., career calling in this study) via providing supportive and fair treatment and climates in Eastern context.

Third, this study contributes to the study of boundary conditions of the relationship between inclusive leadership and belongingness. The results of this study also confirm the moderating role of organization-based self-esteem (Rank et al., 2009; Zhao and Liu,

2022) and the positive impact of organization-based self-esteem on belongingness (Carnevale et al., 2018; Dhir et al., 2024; Ferris et al., 2009). Based on past research, filling the gap in neglecting the moderating effect of organization-based self-esteem in the effectiveness of inclusive leadership literature, this study indicated that positive associations between inclusive leadership and employees' belongingness, as well as between inclusive leadership and career calling, varied among employees with different levels of organization-based self-esteem. These findings indirectly supported the idea that self-esteem reflected the quality of relationships in belongingness theory. Besides, the verification of the moderating effect of organization-based self-esteem extends the role of organization-based self-esteem from shaping individual actions (Su et al., 2021) or varying individuals' cognitions (Kuo and Wu, 2022) to results of interactions between external environmental factors (e.g., leadership) and individual perception (e.g., belongingness), which can encourage researcher's further exploration of the scope of organization-based self-esteem.

5.2 Practical implications

We underscore the significant role of inclusive leadership in cultivating an environment that is closely linked with employees' career calling. Inclusive leadership, characterized by openness, accessibility, and affirmation, has been empirically linked to enhanced employee engagement and satisfaction (Mitchell et al., 2015). Managers should, therefore, prioritize creating an inclusive atmosphere where diverse perspectives are valued and mistakes are seen as learning opportunities. Instead of imposing harsh penalties for errors, a more constructive approach involves providing constructive feedback and support to help employees learn and grow from their experiences. This way of managing people resonates with the principles of inclusive leadership but also promotes a culture of continuous improvement and resilience (Liu et al., 2022).

Further, the mediating role of belongingness in the relationship between inclusive leadership and career calling suggests that fostering a strong sense of community within the organization is pivotal. Empirical studies have shown that team-building activities, such as regular team dinners and informal gatherings, can significantly link to employees' sense of belongingness (Hoogervorst et al., 2012). These activities provide informal platforms for employees to connect, share experiences, and reinforce their commitment to the organization's goals, which may be linked with their belongingness. Regarding organization-based self-esteem, the study highlights its

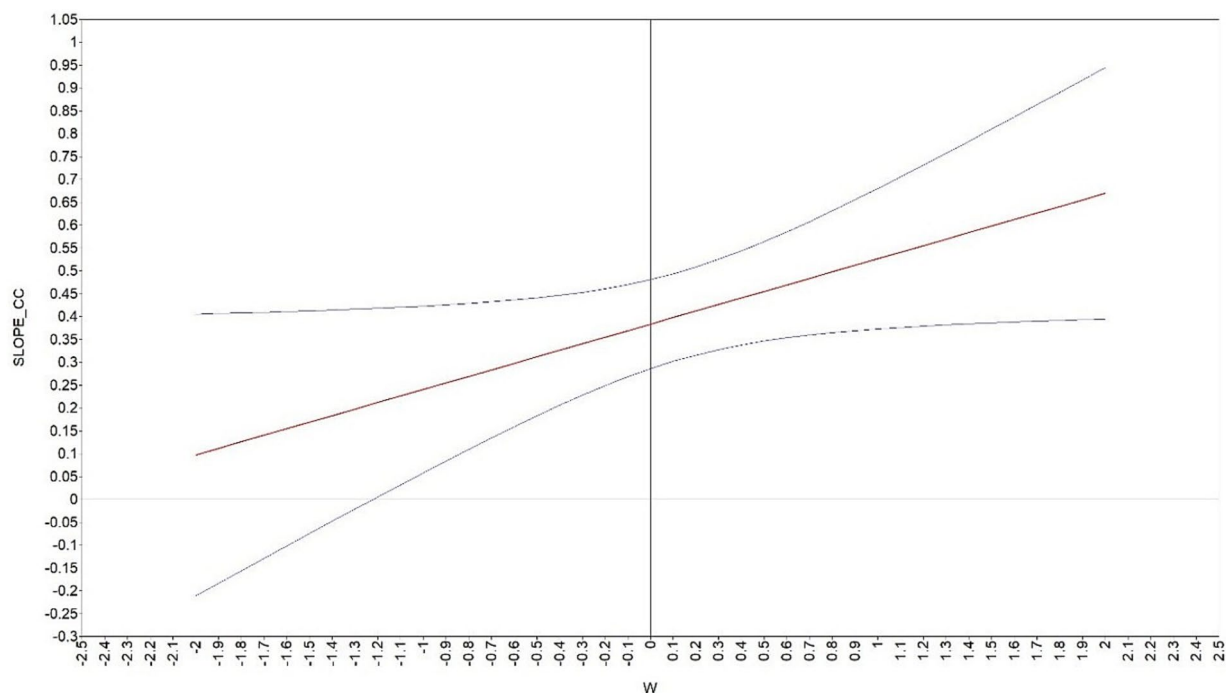


FIGURE 3
Organization-based self-esteem (J-N) as a moderator.

moderating role when career calling appears in the inclusive leadership context. Systematic and frequent training programs aimed at skill development and personal growth have been shown to enhance employees' self-esteem and perceived competence within the organization (Ryan and Deci, 2000). By investing in employees' development, organizations can not only improve self-esteem but also foster a culture of empowerment and autonomy, leading to more effective leadership and improved organizational outcomes.

In conclusion, the practical implications of this study suggest that inclusive leadership practices, coupled with targeted activities to enhance belongingness and organization-based self-esteem, can significantly relate to a supportive work environment that is closely linked to career calling. By implementing these strategies, organizations can retain talented employees, maintain their enthusiasm, and enhance their overall productivity and satisfaction.

5.3 Limitations and future research directions

Although this study makes contributions to the literature to some extent, some limitations need to be addressed for future research. First, given the cross-sectional research design, the findings cannot deduce causal inference. To predict the effectiveness of leadership and the dynamic changes in people's attitudes and beliefs, researchers may conduct longitudinal studies or experiments to test the conclusion proposed in this study.

Second, the data in this study are from Chinese employees, which cannot represent all people's beliefs and attitudes in China and the

world. To generalize the conclusions from the study, other researchers may try to collect data from samples from different nations or areas to retest the model.

Third, the study collects data only from employees, which makes data biased because single source data (i.e., self-report survey) cannot reflect all aspects of leadership or career calling phenomena and thoughts of participants. Thus, researchers in the same conversation may try to test the hypothesis with multi-source data (e.g., online comments, peer assessment, superior assessment) to understand related phenomena and investigate their relationships.

Finally, the mechanism existing in the inclusive leadership-career calling link is complex. Hence, more studies may try to investigate the roles of organization-level and team-level factors in the link or the combined effects of different types of factors in shaping the relationship between inclusive leadership and career calling.

6 Conclusion

Although scholars have focused on investigating the employees' career calling in the leadership context, further research is needed on the potential pathways through which inclusive leadership may be related to career calling. Based on the Need-to-belong theory, we collect data from Chinese employees through self-reported surveys and verify belongingness as a mediator and organization-based self-esteem as a moderator in the inclusive leadership-career calling path, which contributes to the career calling literature. Besides, the study proposes several implications for practitioners in the Chinese business context and research avenues for 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 humans were approved by Yiwu Industrial and Commercial College. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

GM: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Supervision, Writing – original draft. LW: Investigation, Data curation, Resources, Writing – review & editing. SS: Validation, Writing – review & editing, Project administration, Writing – original draft. LL: Supervision, Writing – original draft, Conceptualization, Visualization, Formal analysis, Methodology.

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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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Research on the relationship between executive cognition and innovation performance of SRDI SMEs

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Purpose: This study aimed to explore the relationship between executive cognition and the innovation performance of specialized, refined, distinctive, and innovative small and medium sized enterprises (SRDI SMEs) in China, establish a theoretical framework of the influence mechanism of executive cognition on innovation performance of SRDI SMEs, and give some management implications for SRDI SMEs to improve innovation performance.

Design, methodology, and approach: Through theoretical derivation, 409 valid questionnaires from 98 SRDI SMEs in China and statistical analysis techniques, this paper studied the effect of executive cognition of SRDI SMEs on innovation performance and its mechanism.

Findings: This study found that executive cognition has a significant positive impact on innovation performance, compositional capability plays an intermediary role between executive cognition and innovation performance, and organization routine updating enhances the positive relationship between executive cognition and compositional capability.

Originality and value: This study was among the first to investigate the relationship between executive cognition and innovation performance of SRDI SMEs.

KEYWORDS

executive cognition, compositional capability, innovation performance, organization routine updating, SRDI SMEs

1 Introduction

Specialized, Refined, Distinctive, and Innovative Small and Medium-sized Enterprises (SRDI SMEs) represent the most dynamic segment within the SME sector. These enterprises are the core driving force behind technological breakthroughs, green transformations, global supply chain stabilization, and the low-carbon transition of the global economy (Lian, 2024). However, SRDI SMEs currently face significant developmental barriers, including capital constraints, financing difficulties, supply chain disruptions, and heightened uncertainties in the business environment (Lian, 2024). Innovation is the essence of SRDI SMEs and a vital pathway for overcoming these challenges and achieving sustainable growth (Yang and Xu, 2024). By leveraging innovation, SRDI SMEs can achieve technological differentiation and establish competitive advantages in niche markets. Concurrently, innovation can facilitate intellectual property financing, accelerate digital transformation, and enhance global strategic

deployment, thereby strengthening the core competitiveness of these enterprises (Yang and Xu, 2024). Therefore, effectively enhancing innovation performance in a dynamic environment is an urgent issue that SRDI SMEs must address.

Senior leaders are key decision-makers and drivers of organizational innovation initiatives. Their cognitive abilities inevitably exert a significant influence on overall corporate innovation performance (Malhotra and Harrison, 2022; Zhou and Ding, 2024). Existing studies grounded in the Upper Echelons Theory have explored the relationship between executive cognition and innovation performance, demonstrating that enhancing executive cognition can significantly improve corporate innovation performance (Malhotra and Harrison, 2022; Zhou and Ding, 2024). For instance, Bajaba et al. (2022) proposed that executive cognition can significantly enhance innovation quality. Maitlis and Sonenshein (2010) demonstrated that during financial crises, Top Management Teams (TMTs) could drive strategic innovation by adjusting cognitive frameworks through sense-making processes. Empirical evidence also shows that executive cognition significantly enhances technological innovation in high-tech industries (McEvily and Zaheer, 1999; Barker and Mueller, 2002; Arena et al., 2018). Additionally, Wang et al. (2022) validated that internationalized cognition among executives drives exploratory innovation. However, the connection between executive cognition and innovation performance, as well as the underlying mechanisms in SRDI SMEs, has not received adequate attention. According to the Upper Echelons Theory, executive cognition plays a critical role in decision-making, strategic selection, and implementation in the corporate innovation process (Hambrick and Mason, 1984; Adner and Helfat, 2003). Particularly for SRDI SMEs, only high executive cognition can support them in making correct decisions in a harsh business environment (Shi and Wu, 2022). The essence of innovative activities can be conceived as an ongoing process of creating novel outcomes through the integration of resources (Drucker, 2002), where the resource integration approach hinges upon the decisions of senior leaders. Thus, this study posits a positive relationship between executive cognition and innovation performance in SRDI SMEs.

SRDI SMEs often adopt a Focus Strategy to pursue professional development due to their relative shortage of resources (Chen et al., 2023). Due to their deep cultivation of market segments, SRDI SMEs are often constrained by “bottleneck” issues in the process of sustainable development (Shi and Wu, 2022). At the same time, their small scale makes it more challenging for them to obtain heterogeneous resources, necessitating the need to maximize resource utility through effective integration of common resources (Shan et al., 2021). Lu and Sun (2013), influenced by Chinese philosophical concepts such as “harmony,” “symbiosis,” and “moderation,” proposed the Composition-based View, arguing that for enterprises lacking heterogeneous resources, innovation performance can be improved through the creative compound utilization of existing internal and external resources. They then introduced the concept of compositional capability, defined as the unique ability of an enterprise to synergistically integrate existing tangible or intangible resources from internal and external sources. Additionally, the Upper Echelons Theory suggests that higher levels of executive cognition can help enterprises enhance their compositional capability (Lu and Sun, 2013). Therefore, based on the Upper Echelons Theory and the Composition-based View, this study argues that for resource-constrained SRDI SMEs, the innovative integration of internal and

external common resources through the construction of compositional capability is an important pathway to improving their innovation performance. Thus, this study introduces compositional capability to explore its mediating role in the relationship between executive cognition and innovation performance in SRDI SMEs in China.

Furthermore, the Dynamic Capability Theory posits that the timely updating of organizational routines can provide a conducive internal environment for the formation and enhancement of enterprises’ dynamic capabilities (Liu et al., 2024; Salvato and Rerup, 2018). Compositional capability is a special dynamic capability particularly suitable for SMEs with limited resources and capabilities (Lu and Sun, 2013). Limited by changes in the execution environment of organizational routines, organizations primarily rely on “variation,” “selection,” and “retention” to achieve routine updates, thereby adapting to new environments, enhancing organizational efficiency, and enabling senior managers’ executive cognition to play a better role in improving the enterprise’s compositional capability (Liu and Yu, 2019). Therefore, this study attempts to explore the moderating effect of organizational routine updating on the relationship between senior managers’ executive cognition and the compositional capability of SRDI SMEs.

In summary, this study makes the following contributions: Theoretically, based on the Composition-based View and Upper Echelons Theory, this paper discusses the influence path of executive cognition on the innovation performance of SRDI SMEs by improving compositional capability. Based on Dynamic Capability Theory, this paper also attempts to study the boundary conditions of executive cognition on innovation performance by analyzing the process of executive cognition enhancing compositional capability under the condition of timely updating of organizational routines, thereby promoting the innovation performance of SRDI SMEs. In practice, this paper provides a development direction for SRDI SMEs to overcome their dilemmas and offers practical guidance and management insights for SRDI SMEs to improve innovation performance.

2 Theory and hypothesis

2.1 Executive cognition and innovation performance

Executive cognition refers to the process by which senior managers recognize, process, and respond to external environmental information through their cognitive activities (Mitchell et al., 2000; Zhou and Ding, 2024). Uncertainty and instability have become the norm for SRDI SMEs. Executive cognition can guide senior managers to steer the development direction of enterprises in a dynamic environment. Existing research indicates that executive cognition comprises three structural dimensions: willingness cognition, configuration cognition, and ability cognition (Mitchell et al., 2000). Willingness cognition of senior managers in SRDI SMEs refers to their commitment to the SRDI development of the enterprise and the knowledge structure that ensures the realization of this commitment (Yang and Yu, 2016). There are three main types of willingness cognition: innovation opportunity capture, long-term development commitment, and innovation opportunity weighing (Krueger and Brazeal, 1994; Sexton and Bowman-Upton, 1985). Configuration

cognition of senior managers in SRDI SMEs refers to the unique individual knowledge structure that supports the SRDI development of enterprises, which can be categorized into four types: patent idea protection, access to external resources, digital network construction, and exclusive skills that are difficult to imitate (Busenitz and Barney, 1997; Macmillan, 1983; Mitchell et al., 2002). Ability cognition of senior managers in SRDI SMEs refers to the knowledge structure that enables them to mobilize skills, knowledge, values, and attitudes to support the SRDI development of enterprises. There are three main types of ability cognition: diagnostic ability, situational knowledge that is not easily imitated, and competence-opportunity matching (Krueger and Carsrud, 1993; Stuart and Abetti, 1990).

Innovation is the core driver of high-quality development for SRDI SMEs (Yang and Xu, 2024; Dong and Li, 2019). In recent years, some scholars have shifted from traditional research on the content and form of innovation to a focus on the returns or outcomes of innovation, thereby strengthening the study of innovation performance. Existing research indicates that a firm's innovation strategy, innovation resources and capabilities, and innovation knowledge and skills are the key factors affecting innovation performance (Liu et al., 2024).

According to the Upper Echelons Theory, the level of executive cognition affects corporate performance by influencing senior managers' decisions and behaviors (Hambrick and Mason, 1984; Yang and Xu, 2024). Executive cognition acts as a "lifesaver" for SRDI SMEs in crisis situations. This is because if senior managers possess the ability to quickly identify and absorb effective information and respond keenly, they can make correct decisions swiftly, helping enterprises recover and rebound from crises by improving innovation performance (Zhang et al., 2021; Shan et al., 2021). Specifically: Firstly, the willingness cognition level of senior managers in SRDI SMEs affects the innovation strategy of enterprises. The volatility of the market environment has become the norm, and the high ability to capture innovation opportunities enables senior managers of SRDI SMEs to identify changes in market segment demands more acutely, explore innovation opportunities to meet these needs, take the lead in generating innovation strategies, improve products or services, and make products more specialized and distinctive. As a result, they can serve specific customer groups more precisely (Helfat and Peteraf, 2015). Through opportunity weighing, senior managers can more easily predict potential problems in the implementation of innovation activities in crisis situations, thereby improving the entrepreneurial strategy, enhancing professional technical capabilities and market segmentation abilities more effectively, and avoiding risks in the implementation of innovation activities. The long-term development commitment of senior managers ensures the long-term implementation of the enterprise's SRDI development strategy, thereby promoting the stable improvement of innovation performance.

Secondly, the innovation and development of SRDI SMEs are more likely to be limited by their own resources and capabilities (Yang and Xu, 2024; Dong and Li, 2019). However, the configuration cognition of senior managers provides resource and capability guarantees for improving enterprise innovation performance. The high protection of patent ideas and exclusive skills by senior managers enables them to distinguish enterprises from competitors by creating novel and distinctive products and services that are difficult to imitate, thereby meeting the needs of customers in market segments and enhancing market segmentation capabilities (Dong and Li, 2019; Shan

et al., 2021). The configuration cognition of senior managers helps enterprises obtain the required external resources through resource acquisition and provides subsequent resource acquisition channels for enterprise innovation through network construction, thereby compensating for the disadvantages SRDI SMEs face in obtaining external resources due to scale discrimination, optimizing resource allocation, and accelerating enterprise innovation output (Ma et al., 2022).

Lastly, the high ability cognition of senior managers in SRDI SMEs can provide relevant knowledge and skills to promote professional capabilities. The unique situational knowledge of senior managers can help enterprises diagnose promising market segments, provide knowledge reserves and experience references for market segment development, enhance market segmentation capabilities, and accelerate the speed, frequency, and level of enterprise innovation (Zahra and George, 2002). Innovation is often accompanied by significant uncertainty. The diagnostic ability of senior managers can help enterprises screen out innovation plans that are unsuitable for their professional development, increasing the success probability of feasible plans and enabling the innovation activities of SRDI SMEs to achieve twice the result with half the effort. The competence-opportunity matching function in ability cognition can recombine enterprise personnel, raw materials, or products to make resource allocation more orderly and efficient, thereby producing professional, sophisticated, and unique new products and enhancing professional technical capabilities and system operation capabilities (Guo et al., 2024; Xie and Liu, 2015).

In summary, the willingness cognition, configuration cognition, and ability cognition of executive cognition provide innovation strategies, resources and capabilities, as well as innovation-related knowledge and skills for enterprise innovation, thereby improving the innovation performance of SRDI SMEs. Accordingly, this paper proposes the following hypothesis:

Hypothesis 1: Executive cognition has a significantly positive impact on the innovation performance of SRDI SMEs.

2.2 Mediating role of compositional capability

Lu and Sun (2013) defined compositional capability as the unique ability of an enterprise to integrate existing internal and external tangible or intangible resources. Under the framework of compositional capabilities, the object of resource integration for SRDI SMEs is primarily common resources rather than heterogeneous resources, and the resource integration process can be divided into two stages: resource acquisition and resource allocation. Resource acquisition is an externally oriented behavior of enterprises, including the identification and acquisition of resources, while resource allocation is an internal behavior of enterprises involving the combination and utilization of resources (Ma et al., 2011).

The Upper Echelons Theory posits that a higher cognitive level of senior managers will help enterprises achieve better resource integration (Hambrick and Mason, 1984). The operating environment of SRDI SMEs is highly uncertain, but such an uncertain environment often conceals opportunities (Yang and Xu, 2024; Liu et al., 2019). A high level of willingness cognition among senior managers can help

enterprises capture and weigh opportunities in a timely manner. For SRDI SMEs, it is often difficult to win opportunities relying solely on internal resources. A high level of willingness cognition can help senior managers identify the external resources needed. Commitment limits encourage senior managers to obtain the external resources required for SRDI development. The strong configuration cognition of senior managers can provide a channel for the acquisition of external resources by SRDI SMEs. On one hand, senior managers can use the relationship networks they have built to obtain resources; on the other hand, idea protection and exclusive skills can increase the discourse power and competitiveness of SRDI SMEs in key core areas, thereby expanding their existing relationship networks and increasing access to external resources. When senior managers possess a high level of ability cognition, it means they have rich situational knowledge and diagnostic ability, which helps them allocate resources more reasonably, apply the new resource combination to the business that aligns with their actual market segments through the matching of opportunity and ability, focus on the SRDI development of the main business, and improve the utilization efficiency of enterprise resources. Accordingly, this paper proposes the following hypothesis:

Hypothesis 2: Executive cognition has a significantly positive impact on compositional capability of SRDI SMEs.

The lack of resources is the bottleneck of innovation and development for SRDI SMEs (Lian, 2024; Chen et al., 2023). The entire process of producing specialized, refined, and unique products or services requires the support of core resources such as core technology and high-tech talents. The unpredictability of the external environment and the risk of internal production chain disruptions increase the cost and difficulty of cultivating and acquiring core resources, necessitating an effective response through resource integration (Lian, 2024). According to the Composition-based View, for SRDI SMEs that lack heterogeneous resources, they can achieve improved innovation performance through the innovative integration of internal and external common resources (Jian and Kuang, 2020). Specifically, innovation activities require a substantial amount of resource input, which is difficult for SRDI SMEs to meet due to limited internal resources (Chen et al., 2018). SRDI SMEs with compositional capabilities provide resource guarantees for enterprise innovation through the identification and acquisition of external resources. The ability of an SRDI SME to allocate internal and external resources cannot be copied or imitated by its competitors and is also the driving force for the enterprise to improve its performance (Barney, 1991). The innovative and rational allocation of common resources can yield extraordinary benefits and efficiency (Ma et al., 2011). The process of enterprises utilizing resources is also a process in which the value of resources is realized and transformed into enterprise innovation performance (Hitt et al., 2001). Therefore, for SRDI SMEs, their compositional capabilities can significantly enhance their innovation performance. Accordingly, this paper proposes the following hypothesis:

Hypothesis 3: Compositional capability has a significantly positive impact on innovation performance of SRDI SMEs.

In summary, based on the Composition-based View, SRDI SMEs can enhance their innovation performance by building compositional

capabilities, that is, through the innovative integration of internal and external resources. At the same time, the Upper Echelons Theory suggests that higher cognitive levels among senior managers will help enterprises achieve better resource integration. Therefore, for SRDI SMEs that increasingly struggle to cultivate and acquire core resources, senior managers with high cognitive levels can build compositional capabilities through collaborative integration of internal and external resources, serve specific market segments, improve enterprise operational efficiency, and achieve better innovation performance. Accordingly, this paper proposes the following hypothesis:

Hypothesis 4: Compositional capability plays a mediating role between executive cognition and innovation performance of SRDI SMEs.

2.3 Moderating effect of organizational routine updating

Organizational routine updating refers to the process in which organizational routines actively “search” when the execution environment of organizational routines changes, thereby adapting organizational routines to the new environment and enhancing the effectiveness of organizational routines (Wang et al., 2012; Salvato and Rerup, 2018). Wang et al. (2012) divided the organizational routine updating into two mechanisms: updating and innovation. The updating mechanism emphasizes the adaptation of internal routines to the environment, which is an optimization process of self-sublation through inheritance and correction. The innovation mechanism refers to the formation of new organizational routines through trial and error in the process of search and selection.

According to the Dynamic Capability Theory, the timely updating of organizational routines can provide a conducive internal environment for the formation and improvement of enterprises’ dynamic capabilities (Salvato and Rerup, 2018). Compositional capability is a special dynamic capability that is particularly suitable for SRDI SMEs that lack resources (Lu and Sun, 2014). In SRDI SMEs, changes in the external environment significantly interfere with and damage the internal rules and regulations of the organization. To adapt to these changes, organizations need to update routines to buffer the negative impact of crises (Liu et al., 2024) and promote the role of senior managers’ cognition in improving the compositional capability of SRDI SMEs (Lu and Sun, 2013; Parmigiani and Jennifer, 2011). Specifically, when the willingness cognition of senior managers acts on the compositional capability of enterprises, organizational routine updating can help enterprises cope with the changing external environment. At this time, the increased awareness of crisis among senior managers will prompt them to question and reflect on the issues in enterprise development, thereby promoting their willingness cognition to recognize and obtain the resources lacking in enterprise development. This lays a resource foundation for the construction of compositional capability in SRDI SMEs. When the configuration cognition of senior managers acts on the compositional capability of SRDI SMEs, organizational routines can provide a conducive organizational environment for senior managers’ allocation cognition to take effect through the updating and innovation mechanisms, thereby attracting partners and helping enterprises obtain external resources. When the ability cognition of senior managers acts on the

compositional capability of enterprises, the innovation mechanism of organizational routine updating enables senior managers to break the routine, accept new ideas, and propose novel solutions to problems. This helps enterprises generate more innovative and valuable resource allocation methods, increase resource utilization efficiency, and thus enhance the compositional capability of SRDI SMEs. In other words, when the level of organizational routine updating is low, organizational routines are stable, and fixed standard consensus and behavior patterns are evident, which can easily lead to myopia among senior managers and rigidity in the organization. As a result, enterprises will struggle to withstand various internal and external shocks (Salvato and Rerup, 2018; Zhou and Wu, 2010). At this time, even high executive cognition among senior managers in SRDI SMEs will find it difficult to lead the enterprises to form the compositional capabilities of innovatively integrating internal and external resources. Accordingly, this paper proposes the following hypothesis:

Hypothesis 5: Organizational routine updating positively moderates the relationship between executive cognition and compositional capability in SRDI SMEs. When the level of organizational routine updating is higher, the relationship between executive cognition and compositional capability is stronger; The reverse is weaker.

The theoretical model of this study is shown in Figure 1.

3 Research design

3.1 Research object and investigation process

The sample enterprises in this study are SRDI SMEs identified by the provincial departments of Industry and Information Technology in China, primarily focusing on information transmission, software and information technology services, and manufacturing industries. According to statistical data from the Ministry of Industry and Information Technology of China, as of July 2024, there were 140,000 SRDI SMEs nationwide. Shandong, Jiangsu, and Zhejiang—three economically developed provinces in China—collectively accounted for 31.3% of the national total of such enterprises. Considering the social network connections of the research team, 98 SRDI SMEs from these three provinces were selected as research subjects, with 4–5 senior executives from each enterprise chosen as study participants. Starting from May 2023, questionnaires were distributed offline, through WeChat, and via

email. In the first stage, variables such as executive cognition, compositional capability, and organizational routine updating were investigated. Three months later, the second stage of the survey was carried out, mainly distributing questionnaires related to the dependent variable, innovation performance. A total of 482 questionnaires were distributed, and 409 valid sample questionnaires from 98 enterprises were finally obtained after eliminating those with obvious errors and incomplete filling, with an effective recovery rate of 84.8%. The analysis results of sample characteristics are shown in Tables 1, 2.

3.2 Variable measurement

Based on the reference of mature scales at home and abroad, the measurement items of this study are adjusted and modified according to expert opinions, the business scenarios of Chinese enterprises and the pre-survey results. Except for the control variables, the five-point Likert scale is used for measurement. The specific variables are described as follows.

The executive cognition, the scale was developed by Smith et al. (2010). First, the researcher translated the scale into Chinese according to the language expression habits of Chinese and solicited expert opinions, and then another researcher translated it into English. After repeated comparison and correction, the final Chinese questionnaire was determined, and then the pre-survey was conducted. According to the pre-survey data processing results, the items with factor loading <0.6 are deleted, and the executive cognition scale with 15 items is finally determined. Specific items include “We have the ability to obtain a variety of capital sources for the development and expansion of the enterprise” and so on. In this study, the Cronbach’s α coefficient of the scale is 0.952.

Compositional capability, it refers to the measurement of compositional capability by Lu and Sun (2014) and is modified according to the predictive quantity feedback, including four items. According to the feedback of the respondents, the language expression of some items is not concise and clear. According to the feedback, the item “The enterprise is good at adding externally obtained resources into the ever-changing portfolio of existing resources” was modified to “The enterprise is good at innovatively integrating externally obtained resources with existing resources,” and the item “Your company is good at replacing original resources with cost-effective resources. Improve efficiency and reduce costs” was adjusted to “The enterprise is good at reducing costs and improving profits through the integration of internal and external resources.” In this study, the Cronbach’s α coefficient of the scale is 0.942.

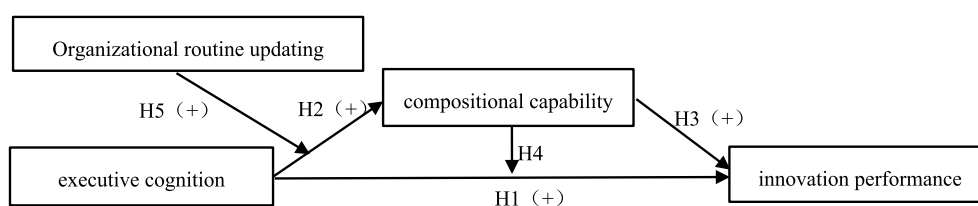


FIGURE 1
Research model.

TABLE 1 Overview of the surveyed senior managers.

Variables		Proportion of variables (%)
Gender	Male	54.8
	Female	45.2
Education level	Junior college and below	20.3
	Undergraduate	65.8
	Master and above	13.9

Innovation performance draws on the scale of Zhang and Li (2010) and Yu and Cai (2013). According to the pre-survey data processing results, we deleted the items with a lower factor loading of 0.6, which contains 4 items in total. In this study, the Cronbach's α coefficient of the scale is 0.930.

Organizational routine updating, it was developed by Wang et al. (2012). According to the pre-survey results, the items with factor loading <0.6 are removed, and five measurement items are finally determined. Specific items include "The enterprise encourages employees to participate in the revision process of organizational norms" and so on. In this study, the Cronbach's α coefficient of the scale is 0.945.

Control variables, based on existing research on innovation performance, firm size (measured by the number of employees: 1 means "199 or less," 2 means "200–399," 3 means "400–599," 4 means "600–799," 5 means "800 or more"), company age (1 means "<15 years," 2 means "16–19 years," 3 means "20–24 years," 4 represents "25 years or more") and the proportion of R&D investment in sales revenue (1 represents "<3–6% (excluding 6%)," 2 represents "6–10% (excluding 10%)," and 3 represents "10% or more") are set as the control variables of this study.

3.3 Statistical analysis

In this study, SPSS 26.0 and MPLUS 7.4 were used for statistical analysis of the data. The specific statistical analysis process is as follows: First, SPSS 26.0 and MPLUS 7.4 were used to conduct confirmatory factor analysis on the four variables involved in the study. Secondly, SPSS 26.0 was used for descriptive statistical analysis and correlation analysis. Finally, hierarchical regression analysis was used to test the hypotheses.

4 Research results

4.1 Common method bias test

Although this study conducted a questionnaire survey on the research variables in two stages, and filled in the questionnaire anonymously, the common method bias cannot be completely avoided because all the variables of the same sample were filled in by the same respondent. Therefore, this paper adopts two methods to test. First, through confirmatory factor analysis, we test whether most of the differences in the data can be explained by a single factor. The results show that the fitting index is very unsatisfactory: $\chi^2 = 1637.534$, $df = 351$, $\chi^2/df = 4.665$, $RMAEA = 0.119$, $CFI = 0.688$,

$TLI = 0.662$, $SRMR = 0.096$, and it can be inferred that there is no serious common method bias in this study. Secondly, the correlation coefficient between the variables is tested. Table 3 shows that the correlation coefficient between variables is <0.9 , which again indicates that there is no serious common method bias in the sample data.

4.2 Reliability and validity test

In this study, the software SPSS26.0 and MPLUS7.4 are used to conduct confirmatory factor analysis to test the reliability and validity of the research variable scale. In the first step, the reliability of the scale is tested by combining reliability and internal consistency coefficients (CR value and Cronbach's α coefficient). As shown in Table 4, the CR value and Cronbach's α coefficient of each variable all exceed 0.8, indicating that the reliability of each variable scale is good.

The second step is to test the validity of the scale by comparing the AVE value of each variable and the correlation coefficient between the square root of the AVE of each variable and other variables. As can be seen from Table 4, the AVE of each variable is higher than 0.5, indicating that the variables all have good convergent validity. Moreover, as shown in Table 3, the square roots of the AVE (Average Variance Extracted) for all variables are greater than their correlation coefficients with other variables. And compared to other factor models, the four-factor model demonstrates the best fit ($\chi^2 = 659.833$, $df = 344$, $\chi^2/df = 1.918$, $RMSEA = 0.062$, $CFI = 0.918$, $TLI = 0.908$, $SRMR = 0.065$), meeting the recommended model fit criteria. These results collectively indicate that the variables exhibit significant discriminant validity.

4.3 Aggregate analysis

Since the survey data providers are individual senior managers in enterprises, in order to effectively avoid the deviation of model parameter estimates caused by the interaction between individuals and accurately measure variables, it is necessary to test the intra-group consistency and inter-group heterogeneity of variables. The results are shown in Table 5, ICC1 of each variable is >0.1 , ICC2 is >0.5 , and Rwg is >0.7 . Therefore, the sample data can be aggregated to the enterprise level, and 98 enterprises are taken as samples, and the average of the survey results of senior managers in each enterprise is used as the observation quantity of each variable.

4.4 Descriptive statistical analysis and correlation analysis

The results of the descriptive statistical analysis of this study are shown in Table 3. It can be seen from Table 3 that executive cognition is significantly positively correlated with compositional capability ($r = 0.765$, $p < 0.01$) and innovation performance ($r = 0.789$, $p < 0.01$). At the same time, the compositional capability is also significantly positively correlated with the innovation performance ($r = 0.880$, $p < 0.01$). These results provide a preliminary basis for the hypothesis tests that follow.

TABLE 2 Overview of the surveyed SRDI SMEs.

Enterprise characteristics	Percentage	Enterprise characteristics	Percentage
	(%)		(%)
Enterprise size (operating revenue in 2023)		Number of employees	
Less than RMB60 million (excluding RMB60 million)	4.9	199 or less	24.9
60–80 million yuan (excluding 80 million yuan)	18.6	200–399 people	37.9
80–100 million yuan (excluding 100 million yuan)	20.1	400–599 people	21.8
100–30,000 yuan (excluding 300 million yuan)	39.6	600–799 people	14.4
More than 300 million yuan	16.8	800 and above	1.0
Time of establishment		R&D investment as a percentage of sales revenue	
Less than 15 years (excluding 15 years)	24.2	3–6% (excluding 6%)	16.3
15–19 years	60.1	6–10% (excluding 10%)	68.4
20–24 years	12.8	10% and above	15.3
25 years and above	2.9		

TABLE 3 Descriptive statistics and correlation analysis.

Variables	1	2	3	4	5	6	7
1. Enterprise age	–						
2. Enterprise scale	0.200*	–					
3. Proportion of R&D investment	0.047	–0.057	–				
4. Executive cognition	–0.176	–0.424**	0.010	0.915			
5. Compositional capability	–0.201*	–0.486**	0.035	0.765**	0.898		
6. Innovation performance	–0.304**	–0.432**	0.055	0.789**	0.880**	0.882	
7. Organizational routine updating	–0.133	–0.511**	0.109	0.811**	0.814**	0.811**	0.881
Average value	1.950	2.311	1.658	4.100	3.974	4.091	4.159
Standard deviation	0.404	0.641	0.366	0.332	0.444	0.477	0.425

*represents the significance level of $P < 0.05$, and **represents the significance level of $P < 0.01$, the same below; values in diagonal brackets are the square root of AVE.

TABLE 4 Reliability and validity test results of the scales.

Variables	Cronbach's a coefficient	CR	AVE
Executive cognition	0.952	0.939	0.838
Compositional capability	0.942	0.943	0.806
Innovation performance	0.930	0.875	0.778
Organizational routine updating	0.945	0.946	0.777

TABLE 5 Index values of the aggregate analysis of each variable.

Variables	Rwg	ICC ₁	ICC ₂
Executive cognition	0.871	0.218	0.538
Compositional capability	0.901	0.243	0.572
Innovation performance	0.852	0.243	0.573
Organizational routine updating	0.907	0.282	0.621

4.5 Hypothesis test results

This study employs linear regression analysis to test the hypotheses, along with the Bootstrap method for robustness checks. During the regression analysis, multicollinearity issues were simultaneously examined. As shown in Tables 6, 7, the variance inflation factor (VIF) values for all variables are significantly <10 , indicating the absence of severe multicollinearity problems.

4.5.1 Main effect test

This study primarily tests Hypothesis 1, Hypothesis 2, and Hypothesis 3 using hierarchical regression analysis conducted with

SPSS 26.0: (1) The control variables (enterprise age, enterprise scale, proportion of R&D investment) and independent variables (executive cognition) are introduced into the regression equation successively to analyze the impact of executive cognition on innovation performance. (2) Control variables and independent variables (executive cognition) are introduced in turn to analyze the impact of executive cognition on compositional capability. (3) Control variables and mediating variables (compositional capability) are introduced in turn to analyze the impact of compositional capability on innovation performance. The results are shown in Table 6. According to Model 6, executive cognition can significantly promote the improvement of enterprise innovation performance ($\beta = 0.742$, $p < 0.001$), so Hypothesis 1 is verified. In Model 2, executive cognition has a significant effect on

improving the compositional capability ($\beta = 0.702, p < 0.001$), so Hypothesis 2 is verified. Model 7 shows that the compositional capability has a significant positive impact on innovation performance ($\beta = 0.807, p < 0.001$), so Hypothesis 3 is verified.

In addition, Bootstrap testing was conducted using Mplus 7.4 with 5,000 random samples. The impact coefficient of executive cognition on innovation performance is 0.272, with a 95% confidence interval of [0.102, 0.443], which does not include zero, indicating a significant direct effect. The impact coefficient of executive cognition on compositional capability is 0.522, with a 95% confidence interval of [0.282, 0.762], which does not include zero, indicating a significant direct effect. The impact coefficient of compositional capability on innovation performance is 0.481, with a 95% confidence interval of [0.297, 0.664], which does not include zero, indicating a significant direct effect. Therefore, Hypothesis 1, Hypothesis 2, and Hypothesis 3 are further supported.

4.5.2 Mediating effect test

This study primarily tests Hypothesis 4 using hierarchical regression analysis conducted with SPSS 26.0. Control variables (enterprise age, enterprise scale, proportion of R&D investment), the independent variable (executive cognition), and the mediating variable (compositional capability) were sequentially introduced into the regression equation. The results are shown in Table 7. By comparing Model 6 and Model 8, it is evident that after including both executive cognition and compositional capability in the regression equation, compositional capability still significantly and positively influences innovation performance (Model 8, $\beta = 0.556, p < 0.001$), and executive cognition continues to significantly affect innovation performance (Model 8, $\beta = 0.351, p < 0.001$). However, the regression coefficient for executive cognition significantly decreases, indicating that compositional capability partially mediates the relationship between executive cognition and innovation performance. Thus, Hypothesis 4 is preliminarily supported.

Additionally, this study employs Bootstrap testing in Mplus 7.4 to examine the mediating effect of compositional capability between

executive cognition and firm innovation performance. The number of random samples was set to 5,000, and the bias-corrected method was used to estimate the upper and lower bounds of the effect interval, with a 95% confidence interval. If the confidence interval does not include zero, the mediating effect is considered significant. With innovation performance as the dependent variable, executive cognition as the independent variable, and compositional capability as the mediating variable, the indirect effect is 0.251, with a Bootstrap confidence interval of [0.126, 0.372], which does not include zero. Therefore, Hypothesis 4 is further validated.

4.5.3 Moderating effect test

In order to verify the interaction between executive cognition and organizational routine updating, on the basis of setting compositional capability as the dependent variable, the control variable, independent variable (executive cognition) and moderating variable (organizational routine updating) are introduced into the regression equation, and finally the standardized interaction term between independent variable and moderating variable is put in. The results are shown in Table 7. According to Model 4, the interaction between executive cognition and organizational routine updating has a significant positive impact on compositional capability ($\beta = 0.148, p < 0.05$), which indicates that organizational routine updating can positively regulate the relationship between executive cognition and compositional capability. When the level of organizational routine updating is high, the positive impact of executive cognition on compositional capability is greater. When the level of organizational routine updating decreases, the positive impact of executive cognition on compositional capability will be weakened. Therefore, Hypothesis 5 is verified.

Furthermore, Mplus 7.4 was used to further validate the moderating effect of organizational routine updating. Organizational routine updating was divided into a high-score group (mean + standard deviation) and a low-score group (mean - standard deviation) to examine the differences in the moderating effects between the two groups. In the high-score group of organizational

TABLE 6 Regression results of main effect.

Variables	Compositional capability				Innovation performance					
	M1		M2		M5		M6		M7	
	β	VIF	β	VIF	β	VIF	β	VIF	β	VIF
Control variables										
Enterprise age	−0.127	1.043	−0.053	1.056	−0.250*	1.043	−0.172**	1.056	−0.147**	1.063
Enterprise scale	−0.379***	1.044	−0.119	1.208	−0.307**	1.044	−0.032	1.208	−0.001	1.219
Proportion of R&D investment	0.033	1.005	−0.005	1.008	0.14	1.005	0.1	1.008	0.113*	1.006
Independent variable										
Executive cognition			0.702***	1.195			0.742***	1.195		
Compositional capability									0.807***	1.217
R^2	0.178		0.590		0.198		0.659		0.734	
adjusted R^2	0.152		0.573		0.173		0.644		0.723	
ΔR^2	0.178		0.412		0.198		0.461		0.075	
F	6.791***		33.509***		7.752***		44.882***		64.160***	

***represents the significance level of $P < 0.001$.

TABLE 7 Regression analysis of mediating and moderating effects.

Variables	Compositional capability				Innovation performance	
	M3		M4		M8	
	β	VIF	β	VIF	β	VIF
Control variables						
Enterprise age	−0.073	1.06	−0.054	1.08	−0.142**	1.063
Enterprise scale	−0.033	1.282	−0.01	1.311	0.034	1.243
Proportion of R&D investment	−0.006	1.008	0.008	1.019	0.103*	1.008
Independent variable						
Executive cognition	0.247*	3.299	0.329**	3.657	0.351***	2.398
Compositional capability					0.556***	2.441
Moderator variable						
Organizational routine updating	0.583***	3.451	0.543***	3.537		
Executive cognition × Organizational routine updating			0.148*	1.173		
R ²	0.689		0.707		0.785	
adjusted R ²	0.672		0.688		0.774	
ΔR ²	0.129		0.018		0.051	
F	40.728***		36.679***		67.378***	

*represents the significance level of $p < 0.05$, **represents the significance level of $p < 0.01$, ***represents the significance level of $p < 0.001$.

routine updating, the impact coefficient of executive cognition on compositional capability is 0.622, with a 95% confidence interval of [0.487, 0.758], which does not include zero, indicating a significant positive effect. In the low-score group of organizational routine updating, the impact coefficient of executive cognition on compositional capability is 0.306, which, although still significant, is much smaller than that of the high-score group. More importantly, the between-group difference coefficient is 0.316, with a 95% confidence interval of [0.164, 0.468], which does not include zero, indicating a significant difference. Therefore, Hypothesis H5 is further supported. At the same time, in order to more intuitively show the interaction effect, one standard deviation higher than and lower than the mean value is used as the benchmark to describe the influence of executive cognition on compositional capability under different levels of organizational routine updating. As shown in Figure 2, the positive impact of the interaction effect at high levels of organizational routine updating is evident.

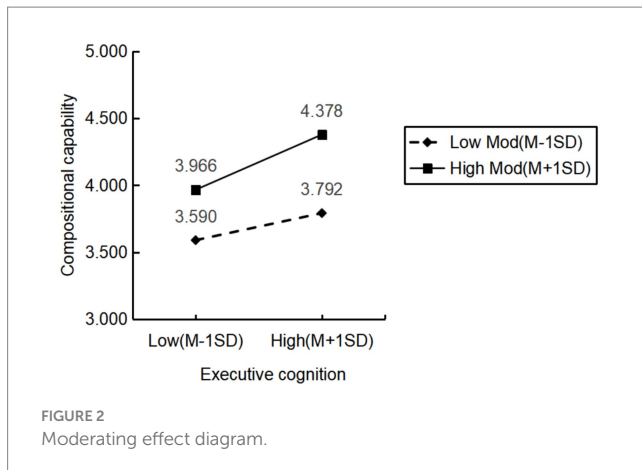
5 Discussion

Based on Upper Echelon Theory and Composition-based View, this paper constructs the research framework of executive cognition on innovation performance in SRDI SMEs, and draws the following conclusions: (1) Executive cognition has a significant role in improving enterprise innovation performance. (2) Compositional capability plays a mediating role in the relationship between executive cognition and enterprise innovation performance. (3) The organizational routines updating positively moderates the effect of executive cognition on compositional capability. That is, when the level of organizational routine updating is high, the positive effect of executive cognition on compositional capability is strengthened. On the

contrary, the positive effect of executive cognition on compositional capability is weakened.

5.1 Theoretical significance

1. The research reveals the black box of the influence mechanism of executive cognition on the innovation performance of SRDI SMEs, and enriches the relevant theoretical research of SRDI SMEs. Previous literature has shown that executive cognition has an important impact on innovation performance, but few studies have explored whether the previous research conclusions are applicable to SRDI SMEs and the influence mechanism. This study confirms that SRDI SMEs urgently need senior managers with high cognitive level to guide the development direction of the enterprise in the dynamic environment and improve the innovation performance of the enterprise. In this process, SRDI SMEs have limited resources and capabilities, It is necessary for senior managers to build compositional capability through their executive cognition to creatively integrate internal and external resources to achieve better innovation performance.
2. The research verifies the important value of the compositional capability in the process of improving the innovation performance of SRDI SMEs, and further enriches and improves the Composition-based View. It has been argued that Composition-based View can guide enterprises that lack core resources to fully integrate and coordinate internal and external common resources by building compositional capability, so as to improve their innovation performance. However, it has not yet answered what scale and type of enterprises the Composition-based View is specifically applicable to, and how



senior managers can help enterprises build and improve the compositional capability. This paper finds that due to the lack of resources and the characteristics of SRDI SMEs, their development is easily constrained by the “bottleneck” technology, and they need to innovate and integrate common resources by building compositional capabilities. Therefore, the Composition-based View is especially suitable for guiding the innovation development of SRDI SMEs.

3. The research significantly broadens the application scope and boundary conditions of the Upper Echelons Theory. By applying this theory to the context of innovation performance in SRDI SMEs, we explore how executive cognition influences innovation performance through compositional capability. Moreover, we investigate the interaction between organizational routines updating and executive cognition on compositional capability. Our findings reveal that timely updates to organizational routines can significantly amplify the positive impact of executive cognition on compositional capability. In this way, this study not only extends the theoretical applicability of the Upper Echelons Theory but also clarifies its boundary conditions in the context of SRDI SMEs.

5.2 Management implications

1. **Enhancing Executive Cognition in SRDI SMEs.** The current complex external environment presents significant challenges to the SRDI SMEs. However, crises often coexist with opportunities, revealing innovative prospects in new business models, operational paradigms, and emerging technologies. In this context, senior executives of SRDI SMEs must establish an innovation-centric cognitive system. By engaging in continuous learning, accumulating practical experience, and enriching their knowledge base, they can develop and refine a structured knowledge framework. This will enhance their cognitive capabilities, enabling them to translate strategic insights into actionable innovation roadmaps in a timely manner. As a result, enterprises can seize emerging opportunities, persist in innovation-driven activities, and prioritize the improvement of innovation performance.
2. **Emphasize the Development of Compositional Capability.** Senior managers of SRDI SMEs should prioritize cultivating

compositional capability as a key driver for enterprise growth. To achieve this, they must leverage social networks and continuously break through organizational boundaries to identify and acquire essential resources for development. Additionally, they should enhance the ability to creatively combine both internal and external resources. Firstly, a resource coordination network can be established to strengthen industry-university-research cooperation. By tapping into regional industrial clusters, enterprises can access shared technical service platforms, thereby reducing the costs associated with resource integration. Secondly, optimizing the organizational mechanism is crucial. A flexible management structure should be built, and cross-departmental project teams should be implemented to improve the efficiency of resource allocation. Thirdly, digital transformation can be harnessed to connect with industrial Internet platforms. This will enable the integration of production and supply chain data, facilitate equipment networking and operational visualization, and transform ordinary data into valuable resources for management decision-making.

3. **Conduct Timely Organizational Routine Updating.** SRDI SMEs should proactively update their organizational routines to keep pace with the ever-changing business environment. This is essential for ensuring that executive cognition can effectively drive the development of the enterprise’s compositional capabilities. To achieve this, enterprises must adopt a dual focus: externally, they should prioritize the “search” and “selection” of advanced external routines, actively identifying and integrating best practices from the broader industry. Internally, they should encourage improvisational behaviors among organizational members, fostering a culture of agility and innovation. By discarding outdated elements of old routines while retaining their core strengths, enterprises can enhance the flexibility and adaptability of their organizational processes. This dual approach not only maximizes the impact of executive cognition but also strengthens the enterprise’s ability to absorb and integrate resources, ultimately contributing to sustainable growth and competitive advantage.

5.3 Deficiencies and prospects

Despite its contributions, this study has several limitations that warrant consideration. First, the SRDI SMEs examined in this study primarily belong to industries such as information transmission, software and information technology services, and manufacturing, and are limited to enterprises in East China. This narrow focus means that the influence of industry-specific factors and regional cultural differences cannot be fully excluded. Future research could extend the scope to other industries and regions to enhance the generalizability of the findings. Second, this study relies on cross-sectional data to empirically analyze how executive cognition influences innovation performance in SRDI SMEs. While valuable, cross-sectional data inherently limit our ability to capture dynamic relationships and establish robust causal inferences. Future research could employ grounded theory approaches, case study methodologies, or longitudinal dynamic data to conduct time-series analyses of SRDI SMEs. Such

methods would allow for a deeper and more comprehensive exploration of the relationship between executive cognition and innovation performance, ultimately providing more actionable recommendations for enhancing innovation outcomes in these enterprises. Third, this study focuses solely on executive cognition, a senior manager trait, and does not account for the potential impact of other characteristics of top managers on innovation performance. Future research could incorporate additional top-manager traits as control variables in the research model, thereby distinguish the unique role of executive cognition in driving innovation performance in SRDI SMEs.

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 authors.

Author contributions

YC: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Writing – original draft, Writing – review & editing. HD: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Validation, Writing – original draft, Writing – review & editing. DW: Conceptualization, Data curation, Formal analysis, Investigation, Methodology,

Project administration, Validation, Writing – original draft, Writing – review & editing.

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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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The subtle balance of trust: how employees' expected and perceived trust influence impression management

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Introduction: This study examines how employees expected and perceived trust influence impression management strategies, focusing on their interplay in shaping pro-social and self-oriented behaviors. Trust is pivotal in organizations, yet research has overlooked the impact of trust mismatches on impression management. Addressing this gap, we analyze the effects of trust congruence and explore behavioral variations under different trust combinations.

Methods: Using a quantitative approach, we analyze survey data from employees across various enterprises. To test the hypotheses, we first conducted polynomial regression analysis, followed by response surface analysis. The primary polynomial regression aims to test the hypotheses of ascendant ridge, consistency, and asymmetry, further revealing the complex relationships between the variables.

Results: Trust congruence fosters pro-social impression management and curtails self-oriented behaviors. Higher trust levels correlate positively with pro-social behaviors. Notably, trust incongruence has asymmetric effects: employees with high expected but low perceived trust resort to self-oriented strategies, while those with low expected but high perceived trust exhibit stronger pro-social tendencies.

Discussion: These findings highlight the need to promote trust congruence in management. Addressing trust misalignment through tailored strategies, such as enhancing communication and support, can foster constructive behaviors. Future research should explore trust dynamics and moderating organizational factors like leadership and culture. This study advances understanding of workplace trust and offers practical insights for management.

KEYWORDS

expected trust, perceived trust, pro-social impression management, pro-self impression management, cubic response surface analysis

1 Introduction

In recent years, as work models have increasingly shifted towards flexibility and remote arrangements, traditional mechanisms of leader control have gradually weakened, leading to a significant rise in the need for leaders to trust their employees (Wohlers and Hertel, 2017). Simultaneously, the growing complexity of work makes it difficult for leaders to possess sufficient expertise in all areas, further heightening their reliance on employees' professional capabilities (Humphrey et al., 2007). As a result, trust has become particularly crucial in

leader-subordinate relationships (Dirks and de Jong, 2022). Trust is commonly defined as a willingness to be vulnerable in the presence of others (Mayer et al., 1995; Rousseau et al., 1998), and it is a core element of effective leadership. This is especially true in modern work environments, where leaders must depend on the judgment and skills of their employees.

Moreover, trust is not merely an attitude that leaders hold toward their employees; it also exerts influence through employees' perceptions. When employees perceive trust from their leaders, the "feeling of being trusted" emerges (Lau et al., 2007). This represents a vital social and emotional resource, signaling to employees that they are valued and positively regarded within the organization (Lau et al., 2014). In turn, this feeling can stimulate their work motivation and sense of responsibility. Research has shown that perceived leader trust enhances job satisfaction (Goris et al., 2003; Colquitt et al., 2007; Ugwu et al., 2016; Legood et al., 2021), task performance (Lau et al., 2014), and proactive work behaviors (Lester and Brower, 2003), while also contributing to the development of high-performing teams (Lau et al., 2007; Salamon and Robinson, 2008).

Although existing research on the effects of perceived leader trust is relatively well-developed, in practice, leader trust in employees often manifests as specific behaviors, such as relying on their judgment and abilities or depending on their assistance in critical matters (Spreitzer and Mishra, 1999; Brower et al., 2000). Therefore, while being trusted can bring benefits, it also places high demands on employees' time and energy (Baer et al., 2015, 2021). These conflicting conclusions regarding the effects of perceived leader trust not only pose challenges for academic research but also create dilemmas for managers in practical application. Consequently, further exploration of the effectiveness and underlying mechanisms of perceived leader trust is of significant importance for both theoretical advancement and managerial practice.

According to person-environment fit theory, employees' perceptions and responses are shaped not only by their individual characteristics but also closely linked to their organizational environment (Edwards, 1996). When employees' needs align with perceived organizational factors, such as leadership style or organizational support, they tend to exhibit more positive attitudes and behaviors. Conversely, a misalignment between their needs and perceptions may lead to negative emotions, stress, or dissatisfaction. Future research should therefore further investigate the alignment between employees' needs and their perceived leader trust and its effects on employee behavior and attitudes. To address this research gap, Baer et al. (2021), drawing on fairness theory, examined the alignment between employees' expected trust (trust expectations) and the actual trust they receive (trust perceived) and its effects on employees' fairness perceptions and job performance (Baer et al., 2021). These studies have revealed that when employees' trust expectations align with the trust they actually receive, they perceive greater fairness and demonstrate improved job performance. However, this fairness-based perspective primarily focuses on the alignment between trust supply and demand, yet is limited in explaining the relationship between employees' role positioning within the organization, role expectations, and behavior. Within the framework of role theory, employees not only have expectations of their own but also play specific roles shaped by the organization's and leaders' expectations. Role theory suggests that employees' behaviors are influenced by the roles they assume and leaders'

expectations of these roles (Katz and Kahn, 1978). Thus, employees may not only respond to discrepancies in trust based on fairness perceptions but also be influenced by their role perception, leaders' definition of their roles, and their understanding of these role expectations. In other words, the alignment between trust expectations and trust perceived may affect not only fairness perceptions but also employees' understanding of their roles within the organization, thereby influencing their behaviors and performance.

Secondly, this study primarily focuses on employees' resources and characteristics, without adequately considering relational factors between leaders and employees. While prior research has examined the top-down effects of leaders' trust behaviors on employees (Song et al., 2023), it has overlooked the bottom-up influence that employees exert on leaders. Trust, as a critical component of leader-employee relationships, is not built instantaneously but is gradually established and strengthened through mutual interaction (Nienaber et al., 2023; Yang and Tsai, 2023). Through everyday communication, collaboration, and interdependence, trust accumulates over time. In this process, leaders convey trust to employees by assigning responsibilities, empowering them with autonomous decision-making, and providing support and feedback. In response, employees reciprocate by fulfilling their roles, demonstrating professional competence, and maintaining reliability, thereby reinforcing mutual trust. Furthermore, research has shown that employees can influence leaders' trust behaviors through impression management strategies, a mechanism that warrants further exploration in future studies.

In organizational environments, employees face pressures to gain leaders' trust and recognition, often leading them to adopt impression management strategies (Weber et al., 2004; Campagna et al., 2020). Research indicates that employees typically use two primary strategies under these pressures: pro-self impression management and pro-social impression management (Sosik et al., 2002; Peck and Hogue, 2018). Pro-self impression management focuses on emphasizing personal achievements and abilities to strengthen leaders' trust in their individual competencies, while pro-social impression management prioritizes team collaboration and collective interests to gain support and acceptance from both leaders and colleagues. These strategies reflect different needs and motivations that employees experience in the workplace.

Our study, grounded in role theory, explores how the relationship between employees' expected leader trust and perceived leader trust influences their choice of impression management strategy. When there is alignment between expected and perceived leader trust, this consistency fosters an increase in pro-social impression management while reducing the need for pro-self impression management. In such cases, employees experience psychological security, which encourages them to show support and cooperation with the team. However, where expected and perceived leader trust align in a linear manner, as expected trust increases, employees may simultaneously increase both pro-self and pro-social impression management, indicating a balance between personal and team-oriented image-building efforts. Conversely, when there is a mismatch between expected and perceived trust, strategy choices vary. If expected trust exceeds perceived trust, employees may tend toward pro-self impression management; if expected trust is lower than perceived trust, employees may shift toward pro-social impression management as a means to repair the trust relationship.

In summary, this study makes three key contributions. First, it advances research on employee impression management in the trust domain by distinguishing between pro-self and pro-social impression management strategies. Existing literature often treats impression management as a singular construct, focusing on how employees gain leader trust by emphasizing positive behaviors or masking negative ones. However, this oversimplified view overlooks the multidimensional nature of impression management, where distinct strategies arise from different motivations and yield varied outcomes. By introducing pro-self and pro-social strategies, this study addresses a critical theoretical gap, offering a nuanced perspective on how employees influence leader trust through diverse impression management approaches. Second, adopting a role theory perspective, this study sheds light on the complex relationship between employees' role expectations and leader trust—an aspect overlooked by fairness-based research. Fairness theory primarily conceptualizes trust through perceptions of input–output fairness, assuming stable role expectations in leader–employee interactions. However, trust dynamics involve evolving and subjective role perceptions, influencing employees' behavioral responses. This study highlights that when there is a misalignment between expected and perceived leader trust, employees strategically employ impression management (pro-self or pro-social) to signal role expectations and realign trust perceptions. This perspective extends trust research by uncovering the intricate signaling processes within leader–employee trust interactions, which fairness theory fails to capture. Finally, this study enriches the dynamic perspective of trust research by examining leader trust alignment and its impact on employees' impression management strategies. Trust is often treated as a static variable, with limited attention to its evolving nature and behavioral consequences. By analyzing the consistency, linearity, and misalignment between expected and perceived leader trust, this study demonstrates that trust is not fixed but continuously adjusted based on employees' perceptions and leaders' behaviors. Employees actively respond to trust fluctuations by selecting impression management strategies that align with trust dynamics, shaping subsequent work behaviors and performance. This bidirectional and interactive perspective offers a more comprehensive understanding of organizational trust, emphasizing its fluidity and strategic implications.

2 Theory and hypothesis development

2.1 Trust perceived and trust expected

Trust is defined as an individual's positive expectation regarding others' intentions, capabilities, and integrity, prompting reliance on others and a willingness to accept potential risks in uncertain situations (Mayer et al., 1995; Rousseau et al., 1998). Currently, trust is understood from two perspectives. One perspective frames trust as a psychological state characterized by positive expectations about others' motives and behaviors. This viewpoint is grounded in subjective assessments of ability, benevolence, and integrity (Mayer et al., 1995), emphasizing the emotional and cognitive factors that shape internal feelings of trust (McAllister, 1995). The other perspective considers trust as a behavior or tendency, focusing on actions within specific contexts. In this view, trust is manifested through behavior in particular situations or formed by observing

others (Lau et al., 2007), highlighting its role in social interactions (Brower et al., 2000, 2009).

Despite the varying perspectives on trust, the focus shifts depending on research objectives. Specifically, studies of trust typically emphasize the psychological state of the trustor, while research on being trusted concentrates on the behaviors that convey trustworthiness to the trustee (Baer et al., 2021). Building on this distinction, we define perceived trust as the degree to which an employee perceives their supervisor as engaging in behaviors that reflect trust in the employee. For instance, when employees are frequently solicited for input on significant projects, entrusted to represent their supervisor in meetings, or relied upon for their expertise and abilities, they interpret these actions as indicators of their supervisor's trust (Gillespie, 2011). Conversely, employees who are seldom asked to participate in critical tasks may perceive a lower level of trust from their supervisor (Baer et al., 2021).

When a project manager expects their supervisor to rely on their professional judgment and skills for important decisions, rather than depending solely on reports from other departments, and anticipates being granted autonomy throughout the project's implementation, this reflects a request for trust (Skinner et al., 2014). Trust expected refers to the extent to which employees expect their supervisors to exhibit trust behaviors. This includes the expectation that supervisors will rely on their judgment, skills, and abilities for important matters.

In organizations, leaders and employees interact through their respective roles, each holding role expectations that shape their behavior and communication. Employees develop expectations of their leaders based on their need for trust, which may include providing clear instructions, supporting teamwork, and resolving conflicts. When leaders meet these expectations, trust is reinforced; when they fail to do so, trust diminishes, adversely affecting work attitudes and performance. Individual differences, such as background and personality, also influence how both parties form and interpret these expectations. Misalignment can lead to role conflict and erode trust. When employees feel misunderstood, they may resort to impression management strategies to convey their needs and expectations.

2.2 Trust perceived, trust expected, and impression management

Impression management refers to the behaviors employed by employees, known as actors, to shape the perceptions of others—typically their supervisors and colleagues, but also potentially including employees and clients—in the workplace (Bolino et al., 2016). This process involves creating a expected image or maintaining and protecting an existing one through various tactics, including self-promotion, ingratiation, exemplification, intimidation, and supplication (Bolino and Turnley, 1999; Bolino et al., 2008).

The generation of expectations is a fundamental psychological function that underpins individual behavioral motivation (Leary and Kowalski, 1990; Merkl-Davies and Brennan, 2011; Johnson et al., 2016). When individuals believe they can achieve expected outcomes through successful performance, these expectations stimulate their motivation to act, driving them toward their ideal goals. Impression management, as a goal-directed behavior, can be categorized into two orientations: pro-self orientation, which maximizes personal benefits,

and pro-social orientation, which seeks to maximize benefits for both oneself and others (Peck and Hogue, 2018). While goal orientation is often viewed as a stable preference (Van Lange, 1999), research indicates that situational factors can influence individuals to engage in either pro-self or pro-social behaviors (Smeesters et al., 2003). Therefore, our focus is on understanding the situational contexts that give rise to employees' goal orientation preferences, rather than the inherent stability of these orientations.

Importantly, the pro-self or pro-social orientation of impression management strategies is determined not by the strategies themselves, but by the employees' underlying goals. This means that employees may utilize the same impression management tactics to achieve different outcomes depending on their motivations (Peck and Hogue, 2018). For instance, if an employee employs impression management strategies to gain personal benefits or enhance their self-image, this reflects a pro-self orientation. Conversely, if the intention is to promote the team or assist others, this aligns with a pro-social orientation.

2.2.1 Trust perceived, trust expected, and pro-self impression management

The pro-self impression management strategy focuses on projecting an ideal self-image for the individual (Van Lange, 1999). Such behaviors can emerge as inherent personality traits or be triggered by specific social contexts (Van Lange et al., 1997). When a particular situation activates an individual's identity recognition, they may engage in self-centered actions. For instance, during job interviews, candidates often employ self-promotion and ingratiation to shape perceptions of their competence and likability (Peck and Levashina, 2017). Thus, pro-self impression management strategies typically arise in distinct contexts.

According to role theory, individuals within organizations encounter role expectations from others, particularly from leaders, and adjust their behavior in response to these expectations. In a trust-related context, the behaviors exhibited by leaders can be seen as expressions of their role expectations for their employees. When the trust behaviors received by employees do not align with their expectations, they may resort to instrumental behaviors, including pro-self impression management, to cope with this misalignment.

We can distinguish between scenarios where there is a lack of perceived trusting behaviors and those where the trust individuals perceive aligns with their expected level of trust. In cases where the trust perceived by employees is lower than their expected level of trust, a situation of deficient trust emerges. Here, unmet role expectations can cause employees to feel neglected by their leaders in terms of attention and support. Role theory suggests that when individuals' role expectations are misunderstood or unfulfilled, they may engage in instrumental behaviors to communicate their needs (Katz and Kahn, 1978). In situations of deficient trust, employees might employ pro-self impression management behaviors to influence their leaders' perceptions and demonstrate their worthiness for greater trust. For example, they may emphasize their accomplishments, display loyalty, or exhibit heightened enthusiasm to reinforce their leaders' sense of trust in them.

Next, we consider the implications of perceived excess trust compared to the fit between expected and perceived trust. While trust is generally regarded as a positive attribute, excessive trust can generate additional stress or discomfort (Baer et al., 2021).

Employees may feel that their leaders have set unreasonably high expectations or may be uncertain about their ability to uphold such levels of trust. Role theory posits that employees will react to these heightened role expectations, potentially engaging in pro-self impression management behaviors to manage or meet their leaders' expectations and avoid disappointing them. For instance, they might strive to enhance their image by appearing more competent or loyal, ensuring that their leaders' high trust levels remain intact (Jin et al., 2022).

In contrast, when the level of trust expected aligns with the perceived level of trust, there is a strong fit between role expectations, fostering a more stable trust relationship. This congruence in trust suggests that leaders have a clear understanding of their employees' needs, facilitating smooth role interactions and preventing the behavioral pressures that can arise from either deficient or excessive trust. In situations of trust matching, individuals are more likely to express their authentic selves rather than engage in pro-self impression management aimed at adjusting or influencing others' perceptions. In such cases, the need for impression management diminishes, as the trust level is appropriate, and the expectations and role interactions of both parties are consistent. Accordingly, we propose the following hypothesis:

Hypothesis 1: Incongruence between the level of trust expected and the level of trust perceived will be positively associated with pro-self impression management. Specifically, individuals will engage in more pro-self impression management when they experience either a deficiency or excess of trust compared to what they expect, reflecting a congruence effect.

The role theory posits that individuals' expectations and interpretations of roles are influenced by individual differences. When employees have a high expect for trust in their leader and perceive that the leader provides sufficient trust (a match between high perceived trust and high expected trust), they may feel that the leader has high expectations of them. This high level of trust may motivate employees to engage in pro-self impression management behaviors to further solidify their positive image in the eyes of the leader, as they want to ensure they perform exceptionally well in a high-trust relationship. In contrast, when both perceived trust and expected trust are low, interactions between the leader and employees may be rather lukewarm, and employees' motivation may be weak, leading them to invest less effort in managing their image in front of the leader. Therefore, pro-self impression management behaviors are stronger in states of high perceived and high expected trust.

Individual differences play a crucial role here. Different employees may adjust their behaviors based on their characteristics (such as self-confidence, intrinsic motivation, and sensitivity to feedback) (Cheng et al., 2023). For instance, some employees may expect recognition from their leader more than others; in a high-trust environment, they may engage more actively in pro-self impression management, while others might behave more passively in a trusting context (Ispas et al., 2014). Thus, individual differences can influence how they respond to trust and the level of engagement in impression management. As a result, we propose the following hypothesis:

Hypothesis 2: A deficiency in the trust perceived compared to the expected trust will result in increased pro-self impression

management, with stronger effects observed as the level of deficiency escalates, reflecting a linear, rising-ridge effect.

Role theory posits that discrepancies between expected and actual role interactions lead to pronounced behavioral responses (Katz and Kahn, 1978). In situations characterized by low perceived leader trust and high expected leader trust, the widening trust gap heightens employees' need for behavioral adjustment, compelling them to engage in active impression management. Conversely, in contexts where perceived leader trust is high but expected trust is low, individuals perceive less urgency regarding trust, resulting in a smaller trust gap and reduced motivation for impression management (Legood et al., 2021).

When employees recognize a strong need for trust, they view it as a crucial resource that influences their expectations, growth opportunities, and performance (Dirks and Ferrin, 2002). A lack of sufficient trust from their leader (low perceived trust) may drive these employees to take proactive steps to alter their leader's perceptions. According to role theory, when individuals feel that their role expectations are misunderstood or unmet, they may resort to instrumental behaviors to communicate their needs and influence others' expectations. Thus, in circumstances of low perceived trust and high expected trust, employees are more inclined to engage in impression management to reshape their leader's trust and close the trust gap (Bolino et al., 2016).

In contrast, in scenarios where perceived leader trust is high but expected leader trust is low, employees may feel they already possess ample trust from their leader. Due to their diminished need for trust, they perceive no significant trust gap, resulting in a lack of motivation to engage in additional pro-self impression management (Gillespie and Dietz, 2009; Dirks et al., 2022). Instead, they may choose to maintain their current behavior without actively attempting to alter or reinforce their leader's perception of them, as their low need for trust does not necessitate further effort to gain more (Norman et al., 2010). Based on the preceding analysis, we propose the following hypothesis:

Hypothesis 3: Employees experiencing a deficiency in leader trust compared to their expected trust will engage in more pro-self impression management than those experiencing an excess of trust, reflecting an asymmetric effect.

2.2.2 Trust perceived, trust wanted and pro-social impression management

Pro-social impression management strategies are not only aimed at helping others, but they also bring benefits to the individual (Monyei et al., 2022). For instance, in work settings, pro-social behaviors can manifest in teamwork, such as when a customer service team works together towards a common goal (Grant and Mayer, 2009). These behaviors also surface in personal interactions, such as offering assistance or emotional support to colleagues. By fostering cooperation and a positive environment, pro-social actions benefit both the organization and its members, creating a harmonious atmosphere that supports overall well-being and productivity (Bolino, 2003). Moreover, research indicates that cultural norms emphasizing social responsibility, cooperation, and supportive behaviors can motivate employees to engage in pro-social impression management. For example, Krupka and Weber (2009) found that cultural norms encourage pro-social behaviors by prompting individuals to reflect on

their actions and observe those of others, reinforcing a cycle of supportive interactions (Krupka and Weber, 2009).

Role theory suggests that individuals within organizations engage with one another based on shared role expectations (Biddle, 1986; Anglin et al., 2022). When employees have specific expectations regarding leader trust, and leaders demonstrate a corresponding level of trust through their actions, the mutual exchange of trust becomes a crucial element of role interaction (Cropanzano and Mitchell, 2005). When individuals' expectations align with their perceptions of their roles, they are more likely to exhibit behaviors that reflect those expectations (De Jong et al., 2016). This alignment fosters a more cohesive working environment and enhances overall organizational effectiveness.

When employees' perceived leader trust aligns with their expected trust, the match between role expectations and reality is complete. This alignment indicates that employees' trust needs are met, and their role expectations are accurately understood and addressed by their leaders. According to role theory, when expectations and perceptions are congruent, individuals are more inclined to sustain or enhance this positive interactive relationship, leading to increased job satisfaction and organizational commitment (Dirks and Ferrin, 2002; De Jong et al., 2016). Furthermore, the reciprocal nature of trust fosters a supportive work environment, which is essential for team performance and overall organizational effectiveness (Gillespie and Mann, 2004; Cropanzano and Mitchell, 2005).

In scenarios where trust is aligned, employees are more inclined to engage in pro-social impression management behaviors. This alignment fosters a sense of belonging and responsibility, motivating employees to contribute positively (Colquitt et al., 2007). By practicing pro-social impression management, employees further strengthen their trust relationship with their leaders, which not only helps maintain existing trust but also enhances their image in the eyes of the leader (Kim et al., 2018).

Conversely, when trust is lacking, employees may diminish their engagement in pro-social impression management. Without the support of trust, they might feel that their efforts will go unrewarded, leading to decreased commitment to the organization or leader. In essence, unmet trust needs can result in reduced positive behaviors, as employees lack the motivation to enhance their image in others' eyes (Lapierre and Hackett, 2007).

Additionally, in situations of excessive trust, employees may also scale back their pro-social impression management behaviors. Feeling over-trusted, they might perceive no need to further enhance their leader's perception of them through additional positive actions. Consequently, they may consider the existing level of trust sufficient, rendering further efforts to improve their image unnecessary (Schaubroeck et al., 2011). Given this understanding of trust dynamics, we propose the following hypothesis:

Hypothesis 4: The alignment between perceived leader trust and expected leader trust will positively influence pro-social impression management. Specifically, individuals will engage in more pro-social impression management when their perceived trust level aligns with their expected trust level, demonstrating a congruence effect.

Role theory suggests that employees' behavior aligns with their role expectations within an organization, often shaped by mutual

trust dynamics between leaders and employees. When high trust alignment is present, employees experience role clarity, which motivates them to engage in pro-social behaviors such as impression management (Colbert and Witt, 2009). In such contexts, employees feel that their trust expectations are met, fostering a collaborative and constructive environment (Sluss and Ashforth, 2008).

However, in scenarios where trust alignment is low, employees may perceive a lack of recognition or feel undervalued, which can dampen their motivation to engage in behaviors that exceed basic role requirements, such as pro-social impression management (Podsakoff et al., 2006). This lack of trust alignment can lead to reduced engagement and potentially to role ambiguity, diminishing employees' expect to maintain or enhance their image proactively. Given this understanding of trust alignment through the lens of role theory, we can anticipate distinct employee behaviors based on varying levels of trust congruence. When trust between leaders and employees aligns at high levels, it not only meets role expectations but also fosters a mutual reinforcement of positive behaviors. Conversely, when trust alignment is low, employees may feel less motivated to engage in additional positive actions, as they perceive limited value in doing so. Building on these insights, we propose the following hypothesis:

Hypothesis 5: Higher perceived leader trust and expected leader trust will positively influence pro-social impression management to a greater degree than lower levels of trust alignment, exhibiting a linear, rising-ridge effect.

When the trust that employees expect from their leader does not align with their actual perceived trust, it can lead to varied behavioral responses. We will explore two specific scenarios: one where perceived trust is high but trust expectations are low, and another where perceived trust is low but trust expectations are high.

In the first scenario, employees anticipate low trust from their leader but perceive a higher-than-expected level of trust. This positive mismatch can create a pleasant surprise for employees, reflecting a favorable outcome overall. According to role theory, because their expectations are either met or exceeded, employees are unlikely to suffer significant negative consequences. They may continue to engage in pro-social impression management, driven by the security and support derived from the unexpected higher trust. While some pro-social behaviors might diminish—due to a perceived reduced need to enhance their image—the overall negative impact remains minimal (Grant and Sumanth, 2009; Carattini and Roesti, 2023).

Conversely, in the second scenario, employees expect a high level of trust but perceive a lower-than-expected level. This negative mismatch can lead to frustration and dissatisfaction, as unmet expectations diminish their sense of value and recognition within the organization. As a result, employees may withdraw from pro-social impression management behaviors, feeling that further efforts would not alter their leader's perception. The resulting disappointment and frustration can weaken their motivation, further straining the relationship with their leader (Wang et al., 2021). Thus, we propose the following hypothesis:

Hypothesis 6: Compared to scenarios of high perceived leader trust with low expected leader trust, the combination of low perceived leader trust and high expected leader trust will exert a

stronger negative effect on pro-social impression management, reflecting an asymmetric effect.

3 Materials and methods

3.1 Sample and procedure

We tested our hypotheses based on a sample of 330 employee-supervisor pairs from three companies in the service, finance, and technology sectors in northern China. To ensure the validity of the sample, we considered the following factors when selecting companies. First, we reviewed the companies' official websites and communicated with management to ensure that their organizational structures and cultures are highly dependent on the trust relationship between leaders and employees, with trust significantly influencing employee behavior. Second, companies whose primary business does not involve a high degree of teamwork or interpersonal interaction were excluded from consideration, as the impact of trust on employees' pro-social and pro-self behaviors may not be sufficiently evident in such environments. Third, the selected companies must have clear management hierarchies and communication channels to ensure that employees' pro-social and pro-self impression management behaviors can be clearly perceived by their leaders, thereby enhancing the accuracy of our measurements of the interaction between trust and behavior.

Our data collection process was conducted in several structured steps. First, we engaged with HR managers to communicate the study's objectives—specifically, to examine how perceived leader trust and the consistency of expected leader trust influence pro-social and pro-self impression management. We provided clear guidelines on the operational procedures and sought their assistance in identifying eligible line managers for participation. Next, HR managers reached out to line managers, who were instructed to randomly select one to four eligible subordinates from a provided name list. This random selection process helped ensure a representative sample and minimize selection bias. Additionally, line managers completed a supervisor questionnaire to assess the performance of the selected employees, allowing us to incorporate their subjective evaluations into our analysis. Once the list of eligible employees was finalized, all selected participants were gathered in a designated meeting room with the support of HR managers. They were thoroughly briefed on the study's purpose and its contribution to understanding the dynamics of leader trust and employee behavior. To encourage candid responses, we assured participants of the confidentiality of their answers, emphasizing that their input would be used solely for academic research.

Employees provided data on their demographic variables, perceived leader trust, and expected leader trust, while their supervisors rated their pro-self and pro-social impression management. To facilitate the matching of subordinate responses with their supervisors' evaluations, each questionnaire was assigned a unique identification number. To ensure confidentiality and response reliability, participants were given envelopes to seal their completed questionnaires. This design aimed to enhance their sense of privacy protection, encouraging more candid expressions of their views and feelings. The entire data collection process was carefully

monitored to ensure voluntary and anonymous participation, thereby enhancing the authenticity and credibility of the research data.

In summary, we sent out 400 questionnaires to 80 frontline managers and received 330 valid responses from 73 frontline managers and their 330 subordinate employees, resulting in a response rate of 82.5% for employees and 91.25% for frontline managers. Among the 330 employees, 56.4% were male and 43.6% were female. In terms of age, 70.3% were 30 years old or younger, while 29.7% were between 30 and 40 years old. Regarding education, 60% held an associate degree, while 40% held a bachelor's degree or higher.

3.2 Measures

We began by selecting internationally recognized scales to measure all variables in this study. Next, we applied a translation-back-translation method to ensure the accurate translation of all English-based measurement tools. Finally, we utilized a consistent response scale across all measurement tools, specifically a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

3.2.1 Pro-self impression management

Self-promotion can serve as an effective tool for measuring pro-self impression management, as it directly involves behaviors aimed at influencing others' perceptions by highlighting one's strengths and achievements. Pro-self impression management refers to a range of strategies individuals use to control or guide others' views of them, and self-promotion is a common and specific method to achieve this. Therefore, self-promotion is a key behavior in pro-self impression management, particularly in situations where emphasizing personal abilities and value is crucial, as it effectively reflects an individual's pro-self motivation. Ultimately, we chose self-promotion to measure pro-self impression management. Specifically, pro-self impression management was measured by self-promotion using a four-item scale originally developed by Bolino and Turnley (1999). Cronbach's alpha was 0.918.

3.2.2 Pro-social impression management

It is reasonable to use exemplification as an indicator of pro-social impression management because it demonstrates an individual's pro-social orientation through a series of concrete actions. For instance, behaviors such as selfless assistance, integrity, and high-performance standards not only shape a person's image within the organization but also contribute to fostering a cooperative team culture. As such, exemplification serves as an effective measure of pro-social impression management. Through these actions, individuals not only exhibit their contributions to others and the organization, thereby crafting a pro-social image, but also enhance teamwork and promote the maximization of collective benefits. This dual effect places exemplification at the core of pro-social impression management, making it a key indicator of pro-social tendencies. We selected exemplification to measure pro-social impression management, specifically, pro-social impression management was measured by exemplification using a five-item scale originally developed by Gardner and Cleavenger (1998). Cronbach's alpha was 0.869.

3.2.3 Perceived trust and expected trust

Perceived trust was measured using the five-item scale developed by Baer et al. (2021), with a Cronbach's alpha of 0.900. Expected trust was also measured using the five-item scale developed by Baer et al., with a Cronbach's alpha of 0.910.

3.3 Research methods

First, we first conducted a common method bias (CMB) test. Next, we conducted confirmatory factor analysis (CFA) to assess the validity of the key variables. To test the hypotheses, we then performed polynomial regression analysis, followed by response surface analysis (Edwards, 1994; Humberg et al., 2019). The primary polynomial regression was designed to capture the rising ridge, congruence, and asymmetry (RRCA) hypotheses (Humberg et al., 2022). A second-order polynomial can only test simple congruence hypotheses, as its function is always parabolic and symmetric. Evaluating more complex asymmetrical hypotheses requires more sophisticated polynomial regressions. The linear rising ridge enables us to analyze the main effects of predictor variables, in contrast to the "strict" model, which only accounts for congruence effects without linear effects. The RRCA model is a special case of the full third-order polynomial model, with specific parameter constraints that reflect the hypothesized relationships.

4 Research result

4.1 Common method bias test

To address the potential influence of common method bias (CMB) on the results, we first employed Harman's single-factor test to examine whether common method bias exists in the data. The results indicated that four factors with eigenvalues greater than one were extracted, accounting for 72.646% of the total variance. The variance explained by the first factor was 27.842%, which did not exceed 50% of the total variance. This suggests that the data does not suffer from a single factor explaining the majority of the variance, implying that common method bias is not severe (Podsakoff and Organ, 1986). To further ensure that common method bias would not pose a problem, we followed the unmeasured latent method construct (ULMC) technique recommended by Williams and McGonagle (2016). According to this test, we added a ULMC factor to the baseline four-factor model and compared the fit indices of the two models (Williams and McGonagle, 2016). The results showed that the baseline model ($\chi^2/df = 1.216$, CFI = 0.992, TLI = 0.990, SRMR = 0.033, RMSEA = 0.026) did not significantly improve after adding the ULMC factor to form the new model ($\chi^2/df = 1.567$, CFI = 0.979, TLI = 0.975, SRMR = 0.055, RMSEA = 0.041). Therefore, there is no common method bias (CMB) issue in this study.

4.2 Discriminant validity test of variables

In this study, confirmatory factor analysis was conducted using Mplus 8.3 to test the four constructs: expected trust, perceived trust, pro-self impression management, and pro-social impression management (see Table 1). The results indicate that the data fit indices

of the four-factor model are superior to those of alternative models, demonstrating that the four-factor model has good discriminant validity.

4.3 Descriptive statistics and correlation analysis

We conducted descriptive statistical analysis on the mean and standard error of each variable, as well as correlations between variables. As shown in Table 2, the correlations between variables are consistent with our theoretical expectations, providing preliminary support for the hypotheses of this study.

4.4 Hypotheses tests

We conducted three response surface analyses in the R environment (version 4.4.1) using the RSA package (version 0.10.6). Specifically, in the first step, we tested model constraints on the full third-order model to examine whether there is a significant difference between the RRCA model and the full model. In the second step, we tested whether the correlation coefficients were statistically significant. Finally, in the third step, we conducted an inspection of the range of realistic predictor combinations.

4.4.1 Pro-self impression management

The results are shown in the Table 3 below. The broad asymmetric congruence model did not fit the data significantly worse than the full model ($\chi^2 = 10.653, p = 0.100$), indicating that the data supports the broad asymmetric congruence model. Therefore, the broad asymmetric congruence model can be used for subsequent data analyses and hypothesis testing. Cohen (1988) introduced the effect size measure f^2 for applications in multiple regression, hierarchical regression, and analysis of variance. Following the analytical

approach of Humberg and Nestler, multiple regression was employed to test the proposed hypotheses. The results show that the f^2 value for the RRCA model is 0.23. According to Cohen (1988), this effect size indicates that the model explains a considerable proportion of the variance in the dependent variable, highlighting the practical significance of the examined relationships within the regression framework (Cohen, 1988).

The consistency between employees' expected leader trust and perceived leader trust has a negative effect on pro-self impression management ($b_3 = 0.305, p < 0.001$). The hypothesized positive effect of high perceived leader trust and high expected leader trust on pro-self impression management was not supported when compared to low perceived leader trust and low expected leader trust ($u_1 = 0.065, p > 0.05$). However, compared to high perceived leader trust and low expected leader trust, low perceived leader trust combined with high expected leader trust had a stronger positive effect on pro-self impression management ($b_6 = 0.104, p < 0.001$). As shown in the figure, the positive coefficient means that, beginning at the LOC, the surface rises faster in the direction of incongruence where "expected > perceived" than in the direction of "expected < perceived." Finally, there were no predictor combinations positioned beyond the second extremum line E2 (as shown by the pink line in the Figure 1). Thus, Hypothesis 1 and Hypothesis 3 are supported (Figure 1).

The coefficient estimates b_0 to b_9 refer to the full third-order polynomial model:

$$z = b_0 + b_1x + b_2y + b_3x^2 + b_4xy + b_5y^2 + b_6x^3 + b_7x^2y + b_8xy^2 + b_9y^3$$

where x = expected trust, y = perceived trust, z = pro-self impression management. u_1 = coefficient of the linear level effect in the RRCA model, computed as $u_1 = b_1 + b_2$.

$\Delta\chi^2$ = difference between the values of the two models.

TABLE 1 Confirmatory-factor analysis.

Model	χ^2	df	RMSEA	CFI	TLI	SRMR
Five factors	227.271	145	0.041	0.979	0.975	0.055
Four factors	177.530	146	0.026	0.992	0.990	0.033
Three factors (1)	902.987	149	0.124	0.804	0.775	0.135
Three factors (2)	1010.835	149	0.132	0.776	0.742	0.128
Two factors	1723.323	151	0.178	0.590	0.536	0.179
One factor	2973.427	152	0.237	0.265	0.173	0.260

Five-factor model: Pro-self impression management, pro-social impression management, perceived trust, expected trust, ULMC. Four-factor model: Pro-self impression management, pro-social impression management, perceived trust, expected trust. Three-factor model (1): Combined pro-self impression management and pro-social impression management, perceived trust, expected trust. Three-factor model (2): Combined perceived trust and expected trust, pro-self impression management, pro-social impression management. Two-factor model: Combined pro-self impression management and pro-social impression management, combined perceived trust and expected trust. One-factor model: All variables combined.

TABLE 2 Means, standard deviations, and correlations between variables.

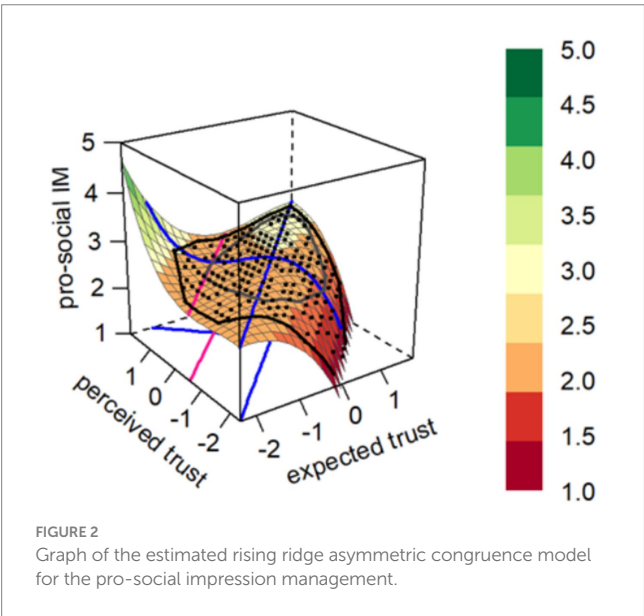
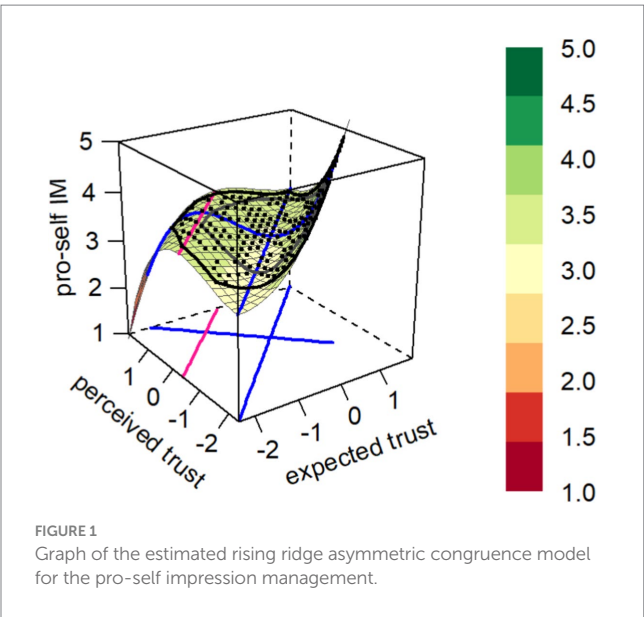
Variables	<i>M</i>	<i>SD</i>	1	2	3	4
1. Expected trust	3.270	1.016	1			
2. Perceived trust	3.381	0.984	0.386**	1		
3. Pro-self impression management	3.508	1.138	0.153**	−0.151**	1	
4. Pro-social impression management	2.560	0.880	0.032	0.249**	−0.142**	1

N = 330. **p* < 0.05; ***p* < 0.01.

TABLE 3 Cubic response surface analysis results for the pro-self impression management.

Model	b_0	b_1	b_2	b_3	b_4	b_5	b_6	b_7	b_8	b_9	u_1	$\Delta\chi^2$	R^2
RRCA model	3.184	0.033	0.033	0.305	−0.610	0.305	0.104	−0.312	0.312	−0.104	0.065	10.653	0.187
p -value	0.000	0.426	0.426	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.426	0.100	
Full model	3.351	0.286	−0.318	0.215	−0.624	0.226	0.023	−0.113	0.162	0.002	−0.033		0.213
p -value	0.000	0.070	0.048	0.000	0.000	0.001	0.698	0.221	0.076	0.982	0.872		

RRCA model = broad asymmetric congruence model. Full model = full third-order polynomial model.



4.4.2 Pro-social impression management

The broad asymmetric congruence model did not fit the data significantly worse than the full model ($\chi^2 = 8.754$, $p = 0.188$), suggesting that the data supports the use of the broad asymmetric congruence model (see Table 4). The results show that the f^2 value for the RRCA model is 0.189. The consistency between employees’

expected leader trust and perceived leader trust has a positive effect on pro-social impression management ($b_3 = -0.188$, $p < 0.001$). The hypothesized positive effect of high perceived leader trust combined with high expected leader trust on pro-social impression management was confirmed when compared to low perceived leader trust and low expected leader trust ($u_1 = 0.141$, $p < 0.01$). Furthermore, when compared to the combination of low perceived leader trust and high expected leader trust, high perceived leader trust combined with low expected leader trust had a stronger positive effect on pro-social impression management ($b_6 = -0.071$, $p < 0.001$). As illustrated in the figure, the negative coefficient indicates that starting from the line of congruence (LOC), the surface declines more sharply in the direction of incongruence where “expected > perceived” than where “expected < perceived.” Lastly, although 0.3% of predictor combinations were positioned beyond the second extremum line E2 (shown by the pink line in Figure 2), they still fall within an acceptable range. Hypothesis 4, Hypothesis 5, and Hypothesis 6 are thus supported (Figure 2).

The coefficient estimates b_0 to b_9 refer to the full third-order polynomial model:

$$z = b_0 + b_1x + b_2y + b_3x^2 + b_4xy + b_5y^2 + b_6x^3 + b_7x^2y + b_8xy^2 + b_9y^3$$

where x = expected trust, y = perceived trust, z = pro-social impression management. u_1 = coefficient of the linear level effect in the RRCA model, computed as $u_1 = b_1 + b_2$.

$\Delta\chi^2$ = difference between the values of the two models.

4.5 Empirical findings

4.5.1 Trust incongruence and pro-self impression management

The findings indicate that when employees’ expected trust and perceived trust are misaligned, pro-self impression management significantly increases. Compared to trust congruence, employees in incongruent trust situations are more likely to engage in strategic self-presentation to adapt to their environment, whereas trust congruence reduces such behavior. Further analysis reveals that high trust congruence (high perceived–high expected trust) does not significantly enhance pro-self impression management compared to low trust levels. This suggests that merely being in a high-trust environment does not inherently drive employees to engage in self-presentation, as high trust alone is not a decisive factor in shaping impression management behaviors. Additionally, trust deficits (expected trust exceeding perceived trust) are more likely to trigger pro-self impression management than trust surpluses (perceived trust

TABLE 4 Cubic response surface analysis results for the pro-social impression management.

Model	b_0	b_1	b_2	b_3	b_4	b_5	b_6	b_7	b_8	b_9	u_1	$\Delta\chi^2$	R^2
RRCA model	2.755	0.070	0.070	−0.188	0.376	−0.188	−0.071	0.214	−0.214	0.071	0.141	8.754	0.159
p -value	0.000	0.009	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.188	
Full model	2.756	0.301	0.083	−0.255	0.400	−0.121	−0.179	0.234	−0.260	0.081	0.384		0.179
p -value	0.000	0.020	0.481	0.000	0.000	0.017	0.000	0.001	0.000	0.091	0.011		

RRCA model = broad asymmetric congruence model. Full model = full third-order polynomial model.

exceeding expected trust). When employees perceive a gap between their expected and actual received trust, they are more inclined to adopt strategic behaviors to influence leadership perceptions, highlighting the negative impact of trust incongruence.

Overall, trust incongruence, particularly trust deficits, significantly increases employees' engagement in pro-self impression management. However, high trust congruence does not necessarily amplify such behavior. These findings underscore the need for leaders to not only acknowledge employees' perceived trust but also align it with their trust expectations. Reducing trust gaps can mitigate employees' reliance on strategic self-presentation, fostering more authentic and stable leader-employee relationships.

4.5.2 Trust incongruence and pro-social impression management

The results suggest that trust congruence enhances employees' engagement in pro-social impression management. When expected and perceived trust align, employees are more likely to demonstrate positive behaviors proactively rather than strategically adjust their image to conform to leadership expectations. The sense of security and stability derived from trust congruence enables employees to focus on organizational goals. Further analysis shows that high trust congruence (high perceived–high expected trust) is more effective in stimulating pro-social impression management than low trust congruence. Employees who both expect to be trusted and perceive strong trust from their leaders are more inclined to reciprocate through positive behaviors, reinforcing a culture of mutual trust. However, trust deficits exert a stronger negative impact on pro-social impression management than trust surpluses. When employees' trust expectations are not met, their willingness to engage in pro-social behaviors declines, weakening trust interactions within the organization.

These findings highlight the critical role of trust congruence in fostering employees' proactive behaviors. Organizations should not only cultivate trust but also ensure alignment between employees' trust expectations and their actual perceptions. Minimizing trust gaps can prevent employees from disengaging due to trust incongruence, ultimately promoting a stable and sustainable trust culture within the organization.

5 Discussion

5.1 Theoretical implication

This study broadly contributes to the trust literature in the following aspects. First, the traditional view holds that when employees feel more trusted by their supervisors, they tend to perform

better (Salamon and Robinson, 2008; Brower et al., 2009; Lau et al., 2014). However, recent studies suggest that such trust can also lead to pressure, which some employees may struggle to handle (Skinner et al., 2014; Baer et al., 2015, 2021). Therefore, the key lies in whether the “expected trust” and the “perceived trust” are aligned, rather than the absolute level of trust itself (Baer et al., 2021). Only when these are in alignment will employees' perceptions of fairness be positively influenced, which in turn enhances performance. Trust arises from the interpersonal interactions between leaders and employees, meaning that employees are not passively receiving the level of trust from their leaders or merely experiencing psychological reactions (Wong, 2019). Instead, they may engage in upward influence behaviors, such as impression management strategies. By examining employees' reactions to whether leaders understand their trust expectations, this study aims to contribute to the trust literature from a bottom-up perspective. This expands the traditional interpersonal view of trust and challenges the implicit assumption that employees remain passive in the trust process, merely reacting to trust-related decisions. This represents a significant shift in trust theory. Research on employees' upward influence behaviors in response to trust could offer new insights into the reciprocal nature of power dynamics and potentially open up broader areas for trust research.

Second, this study expands the intersection of trust and impression management. While existing research predominantly focuses on how employees' impression management behaviors influence leader trust (Weber et al., 2004; Campagna et al., 2020), our study takes a different approach by investigating how different combinations of expected leader trust and perceived leader trust, in turn, affect employees' impression management strategies. This offers a new framework for trust research, highlighting that trust is not a unidirectional behavior but rather a complex, bidirectional interaction process. Moreover, prior studies often overlook the differences in types of impression management (Gardner and Martinko, 1988; Bolino, 2003; Bolino et al., 2008; Al-Shatti and Ohana, 2021; Parker and Schmitz, 2022). By categorizing these types, this research offers deeper insights into the motives behind employees' use of these strategies and how leaders respond to them, enriching the theoretical lens of trust research. Exploring the potential drivers of both pro-self and pro-social impression management, particularly under different combinations of trust expected and perceived, uncovers the psychological mechanisms underlying employees' choices of these strategies. These findings not only advance theoretical understanding but also provide practical implications for management by helping managers better identify and respond to employees' impression management behaviors.

Third, this study introduces role theory as a theoretical foundation to explain how employees' perceived and expected trust levels influence their impression management strategy decisions.

Role theory helps to understand how employees respond to role expectations from supervisors or colleagues within the organization (Biddle, 1986). In an effort to adjust others' expectations and impressions, employees may exhibit specific behaviors, such as instrumental behaviors. The application of this theory reveals how employees respond behaviorally to different role expectations. Furthermore, role theory emphasizes the importance of individual differences in the formation and interpretation of role expectations (Eagly and Karau, 2002; Anglin et al., 2022). Building on this foundation, psychological contract theory (PCT) and social exchange theory (SET) provide complementary insights into employees' behavioral mechanisms under trust incongruence. Psychological contract theory suggests that discrepancies between expected and perceived trust influence employees' sense of psychological contract fulfillment or breach, which in turn shapes their behavioral responses. When perceived trust exceeds expectations, employees may engage in prosocial behaviors as a form of reciprocation. Conversely, when perceived trust falls short, they may adopt self-enhancement strategies to compensate for the trust deficit and restore their standing. Social exchange theory extends this perspective by explaining how employees navigate leader-employee trust relationships under conditions of trust asymmetry. Employees who receive greater trust than expected may strengthen prosocial behaviors to maintain relational balance, while those experiencing a trust shortfall may employ self-presentation tactics to reinforce their credibility and reliability in the eyes of their leaders. In summary, this study centers on role theory while incorporating psychological contract theory and social exchange theory to reveal how trust congruence influences employees' impression management strategies, offering a more comprehensive understanding of trust dynamics.

5.2 Practical implications

This study explores how trust misalignment influences employees' impression management behaviors and provides concrete managerial recommendations based on the findings. These recommendations aim to help organizations mitigate the negative effects of trust misalignment and foster a healthy organizational trust culture.

First, enhancing the alignment of leader trust is essential for improving team collaboration and the organizational climate. Managers should engage in regular communication and feedback processes to accurately assess employees' expected trust levels and their actual perceived trust. Timely adjustments to management strategies can help reduce the adverse effects of trust misalignment on employee behavior.

Second, implementing trust management training can enhance managers' awareness of trust dynamics. Through systematic training programs, managers can more precisely identify employees' trust expectations and adjust their leadership approaches accordingly, thereby minimizing strategic impression management behaviors resulting from trust misalignment.

Furthermore, establishing a structured feedback mechanism can effectively reduce the negative consequences of trust-related information asymmetry. Organizations should develop comprehensive feedback systems that include regular communication, bidirectional feedback, and transparent performance evaluations. This approach

enables employees to gain a clear understanding of their trust standing within the organization, thereby reducing the likelihood of engaging in strategic self-presentation behaviors.

In addition, clarifying role expectations can help mitigate trust misalignment caused by role ambiguity. By explicitly defining employees' responsibilities, leadership expectations, and organizational trust standards, managers can alleviate employees' uncertainty regarding trust perceptions, allowing them to focus on work contributions rather than relying on impression management strategies.

Finally, establishing trust-based communication mechanisms is crucial for fostering stable leader-employee trust relationships. Managers should proactively engage in trust dialogues with employees, such as through regular one-on-one meetings or team discussions. These interactions allow employees to express their trust expectations while enabling managers to communicate their trust in employees explicitly. Such mechanisms help reduce discrepancies in trust perceptions, minimize unnecessary strategic self-presentation behaviors, and promote more stable and sustainable leader-employee trust relationships.

By implementing these managerial practices, organizations can effectively mitigate the negative consequences of trust misalignment, encourage employees to exhibit more pro-social behaviors, and ultimately enhance team performance and organizational effectiveness.

5.3 Limitations and future research

Despite the valuable insights offered by this study, several limitations should be considered when interpreting the findings. This study explores how trust mismatch influences employees' impression management based on role theory. However, role theory primarily explains behavioral adjustments in response to external expectations, without fully capturing the psychological and long-term effects of trust mismatch. Employees experiencing trust mismatch may perceive psychological contract breaches, affecting their career development and organizational commitment. Future research could integrate psychological contract theory and social exchange theory to explore its impact on long-term behaviors such as commitment and turnover. Additionally, distinguishing cognitive and affective trust mismatches may clarify their effects on impression management strategies.

Moreover, cultural context may limit the generalizability of findings. In China's high power distance and collectivist culture, employees tend to adopt submissive strategies, aligning with leadership expectations. In contrast, employees in low power distance, individualistic cultures (e.g., Western countries) may employ assertive self-presentation or direct communication. Future research should conduct cross-cultural comparisons and examine whether cultural values, such as power distance and individualism-collectivism, moderate trust mismatch effects.

Furthermore, this study employs cross-sectional data. However, trust evolves dynamically, and employees may adjust their impression management strategies over time. Initially, they may conform to leadership expectations, but prolonged mismatch could lead to disengagement or turnover. Future research should adopt longitudinal designs or experience sampling methods (ESM) to track these behavioral changes and examine contextual factors like leadership transitions or performance evaluations.

In addition, self-reported surveys introduce potential social desirability bias, as employees may overestimate their adaptability or underreport negative impression management tactics (e.g., responsibility avoidance, error concealment). Future research should use multi-source data, including leader and peer evaluations and behavioral observations, to improve validity. Experimental studies could simulate trust mismatch scenarios to directly observe employee responses, enhancing external validity.

Additionally, the study focuses on service, finance, and technology sectors, where trust is crucial. However, in structured industries like manufacturing, healthcare, or government institutions, rigid regulations may limit impression management behaviors, altering the impact of trust mismatch. Future research should explore industry-specific differences and how organizational culture and job stability influence employee responses.

Finally, this study examines trust mismatch's direct effects but overlooks key moderating factors. Leadership styles (e.g., transformational, ethical leadership) and individual traits (e.g., self-esteem, risk tolerance) may influence employees' reactions. Future research should incorporate these variables and explore how psychological resilience and emotional regulation shape employees' ability to adapt to trust mismatch.

6 Conclusion

Drawing on role theory, this study examines how trust congruence and incongruence shape employees' impression management strategies. Based on a two-wave data collection, the findings reveal that employees with trust congruence exhibit a stable increase in pro-social impression management, whereas those experiencing trust incongruence adopt distinct coping strategies. Specifically, when expected trust is lower than perceived trust, employees tend to enhance pro-social behaviors to reciprocate trust. Conversely, when expected trust exceeds perceived trust, employees are more likely to engage in pro-self impression management to compensate for the trust gap. These findings highlight the behavioral implications of trust dynamics, offering new insights into trust management and organizational behavior. Practically, addressing trust misalignment through communication and trust-building initiatives can foster healthier workplace interactions.

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Data availability statement

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

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A causal model of leader ethical behavior and radical innovation: the mediating effect of leader identification and the moderating effect of promotion focus

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Introduction: Innovation is essential for an organization's survival and growth, with radical innovation driving transformative change. Despite its significance, the mechanisms that foster employees' radical innovation remain underexplored. This study examines how leader ethical behavior influences radical innovation, offering a novel perspective on leadership's role in fostering innovation.

Methods: A quantitative approach was employed, utilizing survey data from 371 employees of Chinese small and medium-sized enterprises (SMEs). Structural equation modeling (SEM) was applied to test the research model, which links leader ethical behavior to radical innovation, emphasizing the mediating role of leader identification and the moderating role of promotion focus.

Results: The findings reveal that leader ethical behavior positively influences both leader identification and radical innovation. Furthermore, leader identification mediates the relationship between leader ethical behavior and radical innovation. Promotion focus strengthens the effects of leader ethical behavior on radical innovation, as well as the impact of leader identification on radical innovation.

Discussion: This study contributes to radical innovation research by integrating leader ethical behavior into the innovation discourse, extending theoretical perspectives beyond conventional drivers. The findings provide practical insights for organizations seeking to cultivate innovative work environments, enhance leader identification, and empower employees for radical innovation.

KEYWORDS

leader ethical behavior, leader identification, promotion focus, radical innovation, relational identification theory, social exchange theory

1 Introduction

The challenges organizations face due to global innovation have become more severe and complex (Jiang et al., 2023). As an enterprise's most important human and intellectual capital, employees' innovative awareness and behaviors are key for enabling organizational development (Wang et al., 2023). To stand out among their fierce competition, companies need their employees to constantly conceive of new and groundbreaking ideas (Liu et al., 2022). Radical innovations cause dramatic shifts in products, services, and processes; these shifts dramatically change the existing market and industry landscape and even

give rise to new markets and industries (Miller et al., 2006). Domínguez Escrig et al. (2016) emphasize that organizations can circumvent rigidity by using radical innovation to enter entirely new areas and experiment with new processes. This explains the need for innovation among organization members and the importance of employee radical innovation for organizational survival and growth, reflecting the positive impact employee radical innovation has on an organization.

This study examines and validates a research model that leads to employee radical innovation by emphasizing its importance. Radical innovation entails acquiring and applying new knowledge to develop entirely new products or services for new customers or emerging markets (Benner and Tushman, 2003). It is characterized by the fact that it is set within change and therefore has high levels of high risk and uncertainty. While previous studies have explored variables that can be used to examine innovation, this study emphasizes the role of leader ethical behavior, which is expected to improve employee radical innovation. Leader ethical behavior refers to appropriate behaviors that are demonstrated by leaders through their personal conduct and interpersonal relationships (Brown et al., 2005). Specific examples of these behaviors include honesty, consideration for others, and fair treatment of employees (including respect and voice). Consequently, leader ethical behavior often manifests as altruism. When leaders demonstrate ethical behavior, they not only promote harmonious organizational member relationships, but also motivate team members to exchange knowledge and debate ideas, thus creating the appropriate conditions for radical innovation to occur (Qiao and Qiao, 2023). Moreover, leader ethical behavior allows employees to maintain positive emotions and initiate beneficial interactions with others (Xiu and Zhao, 2016). When employees experience positive emotions, such as happiness, love, and respect, they are motivated to discard time-tested or automatic (everyday) behavioral scripts in favor of novel, creative, and often unscripted paths of thought and action (Fredrickson, 1998). Therefore, leader ethical behavior that puts employees' needs and wellbeing first, making them feel respected and accepted, will strengthen employee-leader relationships and create a positive organizational climate. The resulting positive impact will set the stage for radical innovation.

This study's purpose is to verify whether leader ethical behavior influences radical innovation and determine which factors mediate the process between leader ethical behavior and radical innovation. Leader identification refers to a state that exists when an employee incorporates their perceptions of a leader into their self-concept (Kark et al., 2003). Employees with stronger leader identification are more likely to engage in innovative behaviors than employees without strong leader identification because they tend to view the organization's development as their job (Niu et al., 2018). Therefore, employee work behaviors are largely influenced by their leaders. When leaders demonstrate that they are trustworthy, concerned for employees, make fair decisions, and adhere to normative behaviors, they are likely to win employee trust and respect; this trust and respect helps stimulate strong leader identification. Leader identification prompts employees to pay more attention to developing their relationships with leaders to maintain good interactions between the two parties and to work actively and diligently. They will not only complete the tasks within

the scope of their stated duties and responsibilities but are also more likely than their peers to engage in the extra-role behaviors their leaders expect, including demonstrating innovative behaviors (Yang and Shang, 2022). These behaviors lead to radical innovation, which suggests that leader ethical behavior motivates employee radical innovation by stimulating leader identification. We argue that leader identification mediates the relationship between leader ethical behavior and radical innovation.

Research also suggests that promotion focus may affect employee radical innovation. Promotion focus exists when an employee's need for growth and advancement motivates them to strive to align themselves with their ideals and increase the gains to be realized in reaching their desired state (Brockner et al., 2004). Because employees with promotion focus tend to be more fixated on positive event outcomes, their disposition toward their work is exploratory; moreover, they are highly attracted to the development and fulfillment inherent in innovation (Wu and Zhang, 2023). Employees with promotion focus view their work as rewarding because they believe that it helps them realize their job and career potential (Wallace and Chen, 2006). Promotion focus also emphasizes change and motivates employees to engage in innovation, acquisition, and risk-taking oriented behaviors (Xiao and Xu, 2023). Therefore, exploring the moderating role of promotion focus on the relationship between leader ethical behavior and radical innovation and that between leader identification and radical innovation is essential to determine how the interaction changes the level of radical innovation.

Therefore, this study has three primary purposes. First, prior research on how leader ethical behavior guides employee ethical behavior is abundant (Rabie and Malek, 2020; Al Halbusi et al., 2021). In contrast, how leader ethical behavior influences employee radical innovation is relatively understudied, a situation that calls for additional research on radical innovation. Anderson et al. (2014) also suggest that future research should focus on exploring how leadership variables influence radical innovation. Given its importance, this study aims to determine the relationship between leader ethical behavior and radical innovation by investigating and revealing its role in employee radical innovation and to further show how leader ethical behavior can lead to radical innovation, expanding the field of radical innovation research.

Second, based on relational identification and social exchange theories, this study introduces leader identification as a mediating variable. Specifically, relational identification theory emphasizes the leader-employee role relationship; when employees find this relationship attractive, they incorporate the leader's values, goals, and beliefs into their self-concept (Sluss and Ashforth, 2007). Social exchange theory suggests that willingness to give back and associated behaviors are fostered when individuals receive care, support, and trust from others (Bandura, 1986). This payback behavior is not directed only toward the leader but also toward the organization as a whole, since the leader is often seen as the organization's representative (Rhoades and Eisenberger, 2002). This study suggests that employees with high leader identification not only adopt the leader's goals as their own and actively innovate to improve organizational performance, they also reinforce this identification when perceiving the leader's ethical behavior and actively engage in feedback behavior. Therefore, we expect that leader ethical behavior influences employee radical innovation by

motivating and strengthening employees' leader identification. This broadens the scope of research on radical innovation.

Finally, while prior studies have explored the moderating effect of employee promotion focus on employee behavior in terms of leadership style, they have all neglected the effect of leader identification on employee promotion focus (Zeng et al., 2018; He et al., 2023). This study is a novel attempt to determine how this interaction affects radical innovation by not only exploring the interaction between leader ethical behavior and promotion focus, but also by evaluating the interaction between leader identification and promotion focus.

This study's overall focus is to develop a research model that leads to radical innovation and argue for the significance of that research model. In addition, it provides a theoretical basis for related research. Thus, the study contributes to expanding the scope of radical innovation research.

2 Theoretical background and hypotheses

2.1 Leader ethical behavior and radical innovation

Leader ethical behavior refers to leader behavior that is consistent with ethical principles and values (Engelbrecht et al., 2017). Leader ethical behavior can motivate employees to actively participate in their work and make them more proactive and responsible in their work (Lee, 2016). It can also create an organizational environment that is suitable for innovation and encourages and motivates employees to think creatively (Chen and Hou, 2016). Intuitively, when leaders engage in ethical behavior, employees will be more positive, hopeful, and optimistic about their organization and work environment and will be more willing to stay and contribute to the organization's success (De Hoogh and Den Hartog, 2008). Therefore, this study suggests that leader ethical behavior may be a precondition for employee radical innovation. Radical innovation involves employees developing and implementing new ideas that are completely different from an organization's existing management practices or business processes (Zhang et al., 2014). Leaders' altruistic behaviors can promote radical innovation (Domínguez Escrig et al., 2016).

Employees often face a range of challenges generating and implementing new ideas, and leader ethical behavior plays a critical role in this process by promoting work ethics, autonomy, and self-accountability, which can be considered potential predictors of innovation (Shafique et al., 2020). Moreover, leader ethical behavior generally focuses on employee needs and wellbeing as a primary concern, which helps employees feel respected and accepted; it can also shape a safe organizational climate, providing the basis for radical innovation (Yoshida et al., 2014). Accordingly, leaders who engage in two-way open communication with their employees, listen to them sincerely and patiently, and encourage them to express their concerns and opinions can greatly contribute to the emergence of new ideas to improve existing work processes (Martins and Terblanche, 2003). Therefore, leader ethical behavior makes employees feel cared for, safe, and respected; acceptance of these behaviors is expected to enhance their courage and motivation to innovate. Consequently, employees will be happy to

perform positively in their organization and motivated to advance radical innovation. Based on this, we offer the following hypothesis.

Hypothesis 1. Leader ethical behavior will have a positive influence on radical innovation.

2.2 Leader ethical behavior and leader identification

Leader identification is a state in which employees define themselves based on their relationship with their leader (Guo et al., 2020). That is, employees see their leaders as role models and develop an attitude of recognition and acceptance toward them (Cui et al., 2021). Moreover, leader identification motivates employees to think proactively from the leader's perspective (Peng et al., 2020). Leader identification becomes more significant when employees and their leaders have similar values (Marstand et al., 2018). Employees are likely to be attracted to their leader's attitudes and behaviors if the leader engages in ethical behavior. Leader ethical behavior leads to positive interactions between employees and their leader; a strong personal attachment to the leader will be created through constant interactions and communication, stimulating high levels of leader identification (Niu and Liu, 2021a). Sluss and Ashforth (2007) research also suggests that employees with high leader identification pay more attention to building good interpersonal relationships with their leaders, increasing their understanding of and immersion in the organization.

Therefore, leader ethical behavior often generates positive perceptions and ethical role modeling among employees, motivating them to identify with their leaders (Lee, 2016). Specifically, leaders support and encourage employees so that they sense respect and recognition, satisfying employees' need for self-esteem. Hence, employees also reinforce respect and trust in their leaders and may develop higher levels of leader identification (Hao and Sun, 2020).

In terms of organizational climate, ethical behavior emphasizes a leader's integrity, selflessness, and accountability to the organization's employees, which creates a trustworthy, supportive, and encouraging atmosphere that is more likely to evoke leader identification among employees (Gu et al., 2015). Simply put, leader ethical behavior demonstrates integrity and altruism, which makes employees feel respected and cared for; at the same time, it inspires and reinforces the leader's personal charisma. This role model effect establishes a positive example in the organization, which in turn inspires employee leader identification. From this summary, we propose the following hypothesis.

Hypothesis 2. Leader ethical behavior will have a positive influence on leader identification.

2.3 Leader identification and radical innovation

Employees who identify with their leaders connect closely to those leaders, align their feelings and beliefs toward the leaders, and exhibit appropriate attitudes and behaviors (Cui et al., 2021).

Specifically, employees with high levels of leader identification are motivated to respond positively to their work because of their recognition and respect for their leaders (Yoshida et al., 2014). In contrast, employees with low levels of leader identification disapprove of their leaders' behaviors and disrespect or are fed up with their leaders, which can lead to psychological disengagement and negative behaviors (Wang et al., 2021). Peng et al. (2020) find that high levels of employee leader identification stimulate employee creativity because leader identification gives them a sufficient sense of psychological safety; this makes them feel that it is safe to try out new ideas and increases their willingness to engage in high-risk radical innovation. Thus, radical innovation inherently requires that employees have a flexible mindset and willingness to take risks (Wu and Zhang, 2023).

Employees who strongly identify with their leader will see the leader's goals as their own and voluntarily give their all for the leader's benefit and success (Liao et al., 2019), which can trigger radical innovation. Accordingly, the stronger an employee's leader identification, the more inclined they are to build positive relationships with their leaders and work more toward achieving organizational performance goals; at work, they are likely to more actively seek help and guidance, exploring and expanding new ways of doing things, and displaying greater innovative awareness and behaviors (Niu and Liu, 2021b). Even if organizational goals do not fit employee interests, strong identification with their leaders creates keen personal motivation for them to begin working toward innovation (Yoshida et al., 2014).

Overall, leader identification is more likely to result in a close working relationship and greater willingness to share information and resources. Employees will be and are more willing to invest their time and energy in working hard for the organization's success because they identify with the leader's vision and goals. Therefore, this suggests that leader identification is a positive factor in promoting employee radical innovation. Based on this, we suggest the following hypothesis.

Hypothesis 3. Leader identification will have a positive influence on radical innovation.

2.4 The mediating effect of leader identification

Leader identification is based on a deep understanding of and respect for their leader. Leader identification also influences employees to initiate positive behaviors that promote organizational development (Marstand et al., 2021). Specifically, employee leader identification can be fused into organizational identification through cognitive, affective, and behavioral processes, and this fusion mechanism can be influenced by leader characteristics (Sluss et al., 2012). Because leader ethical behavior demonstrates strong dedication and active defense of collective interests, employees who identify strongly with their leaders may view them as team or organization representatives (Gu et al., 2015). As a tangible manifestation of their sense of belonging to the organization and through this sense of belonging, employees

who identify with their organization are likely to be motivated to exhibit innovation (Tang and Naumann, 2016).

Leader ethical behavior also contributes to a positive organizational climate in which employees are more willing to take responsibility and proactively report problems in the organization (Brown et al., 2005). Ethical behavior, which emphasizes treating employees fairly and focusing on meeting their needs, creates a positive perception among employees that leaders are genuinely concerned about their wellbeing; this, in turn, inspires leader identification (Svendsen et al., 2020). After employees develop leader identification, they tend to translate the self-concept of leader identification into actual attitudes and specific behaviors, which may be used as feedback through demonstrations of higher levels of creative work (Hao and Sun, 2020). Related to this, leaders displaying leader ethical behavior makes employees feel good about their leaders, which strengthens the respect and trust for their leaders, allowing employees to easily identify with their leaders (Peng, 2020). Leader identification reflects the existence of a high-quality relationship between an employee and a leader, increasing the employee's sense of safety; subsequently, employees feel that innovation is less risky, making them more willing to attempt to execute their innovative ideas (Gu et al., 2016).

Therefore, in this study, we argue that when employees experience leader ethical behavior, they feel care, trust, and justice, which leads them to agree with their leader's ideas and expectations and form a sense of identification with the leader. This not only reduces an employee's perceived risk of innovation but also stimulates their desire for rewards and increases radical innovation behavior. From this summary, we propose the following hypothesis.

Hypothesis 4: Leader identification will mediate the relationship between leader ethical behavior and radical innovation.

2.5 The moderated effects of promotion focus

Promotion focus exists when employees are aligned with their self-ideals, view risks positively, and pursue positive outcomes (Higgins, 1997). Employees with promotion focus are eager to achieve and gain, specifically wanting to realize "success" and actively avoiding negligence or mistakes (i.e., loss of accomplishment) (Higgins, 1997). Employees with high promotion focus view difficulties at work as challenges and act quickly to deal with them positively and through their own efforts (Liao et al., 2022). Simply put, employees with promotion focus are concerned with development and growth and are more inclined to initiate change to achieve their goals.

Leadership behavior is an important signal in an organization and draws employees' attention to promotion focus (Brockner et al., 2004). Leader ethical behavior is admired, respected, and trusted by employees, motivating them to develop promotion focus, have a more positive attitude toward their work, and pursue high levels of work outcomes (Lai et al., 2018). In Tung's (2016) study, the higher the promotion focus, the greater the capacity for

employee creativity. Promotion focus increases employees' hunger for success; they thus value the opportunities in their organizations that may lead to success, making them more likely to innovate to achieve personal and organizational development (Xiao and Xu, 2023). We therefore suggest that employee promotion focus will play a moderating role in the relationship between leader ethical behavior and employee radical innovation. Specifically, employees with promotion focus who feel cared for and respected by their leaders are more likely to focus on pursuing opportunities for growth, gain, or success than on maintaining the status quo. Moreover, for employees with strong promotion focus, high demands lead to better outcomes in creative generation and insight tasks to promote radical innovation (Sacramento et al., 2013). Overall, in the presence of leader ethical behavior, promotion focus employees are more willing to take risks to express and initiate shifts in or innovations to the status quo. In contrast, promotion focus employees will be unable to take risks when they perceive rude and abusive leader behaviors and will not engage in challenging actions to achieve their goals (Kim et al., 2020). Therefore, we propose that strong employee promotion focus strengthens the relationship between leader ethical behavior and employee radical innovation.

Leader identification affects organization members' emotional experiences and behavioral motivation, which influences their subsequent behavior (Liao et al., 2019). Radical innovation means developing and applying entirely new technologies and processes in an organization (Moors and Vergragt, 2002), accompanied by higher risk and uncertainty. However, when employees adopt promotion focus, they tend to be willing to take greater risks in pursuing their goals (Wallace and Chen, 2006). When employees have promotion focus, the more they identify with their leaders, the higher their emotional safety. This emotional safety is reflected in more prominent self-esteem, a sense of belonging, and openness, which makes employees more comfortable expressing their views on issues. Employees will be more focused on realizing their personal ideals and passions through their work, actively looking for growth and advancement and striving to achieve radical innovation (Ryou and Kim, 2018). When employees with promotion focus develop leader identification, they use the leader as a role model, which motivates them to achieve the same. They focus more on pursuing success; by imitating and learning from their leader, employees will display exploratory tendencies during the work process and be willing to try new tasks and problem solving approaches, increasing the innovation level (Li and Shang, 2011). Therefore, this study suggests that employee promotion focus strengthens the relationship between leader identification and employee radical innovation.

Overall, through the optimism and sense of innovation brought about by promotion focus, not only will employees be able to eliminate concerns and participate more actively in innovation when their leaders demonstrate ethical behavior, but this sense of innovation will be further strengthened through leader identification. Therefore, we propose that promotion focus not only plays a positive role in moderating the relationship between leader ethical behavior and radical innovation but also has a positive role in moderating the relationship between leader identification and radical innovation.

Hypothesis 5: Promotion focus will have a positive moderating effect on the relationship between leader ethical behavior and radical innovation.

Hypothesis 6: Promotion focus will have a positive moderating effect on the relationship between leader identification and radical innovation.

3 Methods

3.1 Sample characteristics

This study focused on organizational members who work in Chinese SMEs and conducts a survey through an online questionnaire. The invitation to the survey clearly stated the purpose of the study and emphasized the anonymous and voluntary nature of the survey, while promising that there would be no adverse effects on the individual respondents and the organizations they belong to. In particular, none of the participants in the survey were minors, and the survey was conducted after obtaining prior consent from all participants. In addition, the questionnaire consists of five sections, with core content covering leader ethical behavior, leader identification, promotion focus, radical innovation, and demographic information. To ensure that Chinese SME employees are able to respond successfully, all survey questions have been accurately translated and rationalized to fit the local language and cultural context. Specifically, in order to ensure the accuracy of the content of the measurement tool, the English version was first translated into Chinese. Then, the Chinese was translated back into English to confirm the accuracy of the content once again. Therefore, the survey was conducted in a version translated into Chinese. A total of 371 data samples were collected and used for empirical analysis. Regarding the demographic characteristics of this study, there were 148 (39.9%) males and 223 (60.1%) females.

Regarding age, 1 (0.3%) people were under 20 years old, 63 (17.0%) were 20 to 29 years old, 80 (21.5%) people were 30 to 39 years old, 123 (33.2%) people were 40 to 49 years old, and 104 (28.0%) people were 50 or over.

Regarding education, 122 (32.9%) people had finished technical secondary schools or high schools, 78 (21.0%) were junior college graduates, 89 (24.0%) people were college graduates, 17 (4.6%) people had master's degrees, 3 (0.8%) person was a doctor, and 62 (16.7%) were other.

In terms of employment relationships, full-time jobs were the most numerous at 230 (62.0%) and informal positions were 141 (38.0%).

Regarding Service Years, 30 (8.0%) people had worked for a year or under, 47 (12.7%) had worked for 1 to 3 years, 47 (12.7%) had worked for 3 to 5 years, 40 (10.8%) had worked for 5 to 7 years, and 207 (55.8%) people had worked for 7 or over.

Regarding about the time to work with the current immediate leader, 53 (14.3%) people had worked for a year or under, 43 (11.6%) had worked for 1 to 2 years under, 58 (15.6%) had worked with the current immediate leader for 2 to 3 years under, 33 (8.9%) had worked with the current immediate leader for 3 to 4 years under, 36 (9.7%) worked with the current immediate leader for 4 to

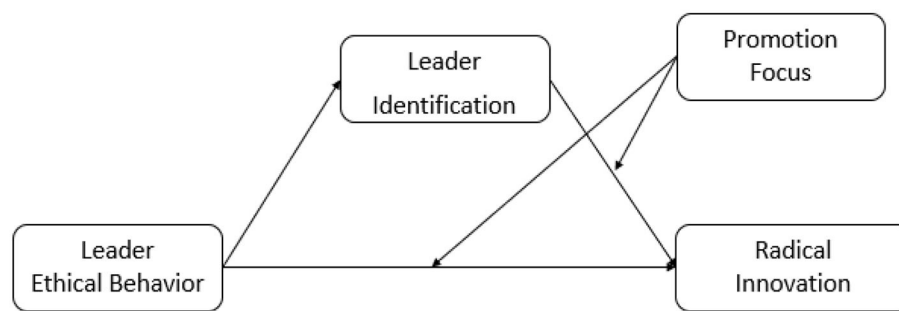


FIGURE 1
Research model 1.

5 years under, and 148 (39.9%) people had worked with the current immediate leader for 5 or over.

Regarding enterprise type, 30 (8.0%) people were working in education, 41 (11.1%) people were working in finance, 25 (6.7%) people were working in medical industry, 80 (21.6%) people were working in catering services, 41 (11.1%) people were working in coal mining, 9 (2.4%) people were work in media and 145 (39.1%) people were working in other occupations.

3.2 Measurement

Leader ethical behavior is when a leader engages in appropriate behavior that is ethical (Demirtas, 2015). To measure leader ethical behavior, this study used a tool from Lin et al. (2016). The measurement tool consists of 8 items. Sample items include: “My leader looks out for the best interests of his or her employees” and “My leader sets an example for employees in terms of ethics.”

Leader identification is an individual identity, a state in which employees define themselves based on the identity and behavioral performance of their leaders (Cui et al., 2021). To measure the employees’ leader identification in small and medium-sized enterprises (SMEs) in China, this study used the measurement scale in Shamir et al. (1998). The measurement tool consists of 7 items. Sample items include: “I respect my leader” and “My values are similar to those of my leader.”

Promotion focus means that employees who have aspirations or hopes as goals and focus on the emergence of positive outcomes will naturally move forward to achieve their goals (Tung, 2016). To measure the promotion focus of employees in SMEs in China, this study used the tool in Wallace and Chen (2006). The measurement tool consists of 6 items. Sample items include: “I can accomplish a lot at work” and “I can also do my job well in a short period of time.”

Radical innovation refers to new, disruptive ideas from employees that are different from the organization’s existing framework or processes and that create significant differences from the organization’s existing products, services, business processes, and management practices (Madjar et al., 2011). To measure the radical innovation of employees in SMEs in China, this study used the tool in Li et al. (2008). The measurement tool consists of 4 items. Sample items include: “I often create brand new business solutions” and “I am a creator of new techniques and technologies.”

All items were measured on a seven-point Likert scale, with responses ranging from “1 (strongly disagree)” to “7 (strongly agree).” The higher the score, the stronger the intent. The research model is shown in Figure 1.

4 Results

4.1 Confirmatory factor analysis

The confirmatory factor analysis (CFA) of Model 1 (four-factor model) showed that the scale was a good fit and had adequate construct validity. Next, we tested convergent validity. The results were as follows: The standardized regression weights of leader ethical behavior ranged from 0.792 to 0.928, leader identification from 0.826 to 0.928, radical innovation from 0.857 to 0.96, and promotion focus from 0.846 to 0.90. Furthermore, average variance extracted (AVE) reflects the proportion of variance that a latent variable captures from its observed variables. The average variance extracted (AVE) for leader ethical behavior was 0.801, leader identification was 0.782, radical innovation was 0.824, and promotion focus was 0.762. These values were all >0.5. Construct reliability (CR) evaluates how well multiple observed variables collectively represent a single latent variable, indicating the overall internal consistency of the scale. The value of the composite reliability (CR) of leader ethical behavior was 0.960, leader identification was 0.950, radical innovation was 0.919, and promotion focus was 0.940. All these values were >0.7. A measurement is considered to have significant validity if the AVE of variables is higher than 0.5 and CR is higher than 0.7 (Jin and Hahm, 2021).

Furthermore, we examined three types of model fit indices: the absolute fit index, incremental fit index, and parsimonious adjusted index. First, the absolute fit index was $\chi^2(p) = 1108.36$ (0.000), $\chi^2/df = 4.33$, and RMSEA = 0.095. The RMSEA is indeed a “badness of fit” index, with values very close to 0 indicating almost perfect fit and greater values indicating worse fit. For the RMSEA, values <0.05 reflect a small approximation error, values between 0.05 and 0.08 reflect an acceptable error of approximation, and those >0.10 constitute poor model fit (Browne and Cudeck, 1992). Second, the incremental fit index was IFI = 0.943 and CFI = 0.943. Third, the parsimonious adjusted index was PNFI = 0.791 and PGFI = 0.640. Based on these results, the CFA indicates that

TABLE 1 The result of confirmatory factor analysis.

Variables		Effect	SE	CR	p	Standardized regression weights	AVE	CR	Cronbach's alpha
Leader ethical behavior	A1	1				0.887	0.801	0.960	0.978
	A2	0.903	0.038	23.742	***	0.792			
	A3	1.092	0.031	35.313	***	0.928			
	A4	1.079	0.032	33.936	***	0.902			
	A5	1.097	0.032	34.414	***	0.921			
	A6	1.083	0.032	33.547	***	0.915			
	A7	1.015	0.032	31.492	***	0.901			
	A8	0.998	0.031	32.309	***	0.907			
Leader identification	B1	1				0.926	0.782	0.950	0.974
	B2	0.905	0.028	32.784	***	0.855			
	B3	1.048	0.028	37.826	***	0.935			
	B4	1.072	0.025	42.585	***	0.958			
	B5	0.95	0.038	24.88	***	0.826			
	B6	0.986	0.039	25.16	***	0.827			
	B7	1.011	0.037	27.541	***	0.855			
Radical innovation	C1	1				0.857	0.824	0.919	0.960
	C2	1.092	0.031	34.753	***	0.925			
	C3	1.266	0.041	30.782	***	0.96			
	C4	1.298	0.048	27.099	***	0.887			
Promotion focus	D1	1				0.863	0.762	0.940	0.962
	D2	0.913	0.035	25.78	***	0.859			
	D3	0.909	0.033	27.239	***	0.878			
	D4	1.004	0.04	24.868	***	0.846			
	D5	0.947	0.033	28.435	***	0.891			
	D6	0.964	0.036	26.438	***	0.900			
Model fit index		X ² (p) = 1108.36 (0.000), X ² /df = 4.33, RMSEA = 0.095, IFI = 0.943, CFI = 0.943, PGFI = 0.640, PNFI =0.791							

****p* < 0.001 indicates that all factor loadings are statistically significant.

the measures satisfy the requirements for acceptability (Jin and Hahm, 2021). Therefore, the structural equation model was found to be significant. Table 1 provides the results of the convergent validity tests. For the reliability analysis, when the Cronbach's Alpha coefficient base is above 0.7, reliability is guaranteed. The results of the reliability analysis of each variable in this study are as follows: leader ethical behavior (0.978), leader identification (0.974), radical innovation (0.960), and promotion focus (0.962). All values are above 0.7, thus, verifying confidence in each variable. Table 1 shows the results.

4.2 Descriptive statistics and correlation analysis

The descriptive statistical analyses included means and standard deviations. The mean values of leader ethical behavior, leader identification, radical innovation, and promotion focus were 5.645, 5.703, 5.293, and 5.698, respectively. The standard

deviations of leader ethical behavior, leader identification, radical innovation, and promotion focus were 1.209, 1.181, 1.397, and 1.122, respectively. The results of the correlation analysis showed that leader ethical behavior was associated with leader identification ($r = 0.897$, $p < 0.001$), and radical innovation ($r = 0.726$, $p < 0.001$) and promotion focus ($r = 0.788$, $p < 0.001$) have a positive correlation. Additionally, leader identification was positively correlated with radical innovation ($r = 0.693$, $p < 0.001$) and promotion focus ($r = 0.780$, $p < 0.001$). There was also a positive correlation between radical innovation and promotion focus ($r = 0.783$, $p < 0.001$). Table 2 shows the results of the descriptive statistics and correlation analysis.

To verify possible problems with multicollinearity, a linear regression analysis was performed using SPSS software. The results show that the value of the variance inflation factor (VIF) of leader ethical behavior is 5.675, leader identification is 5.506, and promotion focus is 2.842. Furthermore, when leader identification is used as a media variable, the VIF value is 5.102. As these are all <6, no serious multicollinearity problem is indicated.

TABLE 2 The result of descriptive statistics and correlation analysis.

Variables	Mean	SD	Leader ethical behavior	Leader identification	Radical innovation	Promotion focus
Leader ethical behavior	5.645	1.209	–			
Leader identification	5.703	1.181	0.897***	–		
Radical innovation	5.293	1.397	0.726***	0.693***	–	
Promotion focus	5.698	1.122	0.788***	0.780***	0.783***	–

***p < 0.001; **p < 0.01; *p < 0.05.

TABLE 3 The results of Process Model 4.

Path			Estimate	SE	<i>t</i>	<i>p</i>	LLCI	ULCI
Leader ethical behavior	→	Leader identification	0.875	0.022	38.905	0.000	0.8315	0.9200
Leader ethical behavior	→	Radical innovation	0.618	0.092	6.673	0.000	0.4362	0.8006
Leader identification	→	Radical innovation	0.252	0.094	2.656	0.008	0.0654	0.4386
Indirect effect			Effect	Boot SE	Boot LLCI		Boot ULCI	
Indirect effect(s) of X on Y								
Leader ethical behavior → Leader identification → Radical innovation			0.220	0.099	0.039		0.426	

4.3 Hypotheses tests

SPSS Process Model 4 was used to analyze the mediation effect of leader identification. The results showed that leader ethical behavior has a positive impact on perceptions of leader identification (Estimate = 0.875, $p < 0.001$) and radical innovation (Estimate = 0.618, $p < 0.001$). Additionally, perception of leader identification has a significant impact on radical innovation (Estimate = 0.252, $p < 0.01$). Therefore, Hypotheses 1, 2, and 3 were supported.

Hypothesis 4 proposed that leader identification mediated the relationship between leader ethical behavior and radical innovation. The indirect effect was 0.220. The bootstrapped confidence intervals were Boot LLCI = 0.039 and Boot ULCI = 0.426, as 0 was not included between Boot LLCI and Boot ULCI. These results indicate that the mediation effect of leader identification was significant. Thus, Hypothesis 4 is supported. Table 3 gives the results of the hypotheses tests.

4.4 Descriptive moderating role of promotion focus

This study tested the moderating role of promotion focus on the relationship between leader identification and radical innovation and on the relationship between leader ethical behavior and radical innovation. The moderation model was examined using SPSS PROCESS Macro 3.4.1 Model 1 and was tested using 95% confidence intervals and 5,000 bootstrapping re-samples. Tables 4, 5 provide the results of the analysis for Hypotheses 5 and 6. The conditional effects of the focal predictor at values of the moderator(s) are: –1 SD, mean (M), and +1 SD. Since 0 was not included between Boot LLCI and Boot ULCI at the level of –1 SD (standard deviation), mean level (M), and mean +1 SD (standard

deviation) confidence intervals, it was concluded that statistical significance was confirmed.

Hypothesis 5 tested the moderating effect of promotion focus on the relationship between leader ethical behavior and radical innovation, with an interaction of 0.076. The bootstrapped confidence intervals (Boot LLCI = 0.035, Boot ULCI = 0.116) did not include 0, supporting the hypothesis. Similarly, Hypothesis 6 tested the moderating effect of promotion focus on the relationship between leader identification and radical innovation, with an interaction of 0.078. The bootstrapped confidence intervals (Boot LLCI = 0.037, Boot ULCI = 0.118) also did not include 0, supporting this hypothesis as well.

As shown in Table 6, the results of the tests for leader ethical behavior ($t = 0.971$; $p = 0.332 > 0.05$), leader identification ($t = 0.586$; $p = 0.558 > 0.05$), promotion focus ($t = 0.184$; $p = 0.854 > 0.05$), and radical innovation ($t = 1.510$; $p = 0.132 > 0.05$) did not reach the level of significance, which means that the results of males and females’ perception of Leader ethical behavior, Leader identification, Promotional focus, and Radical innovation are not significantly different from each other, and it does not affect the results of the questionnaire because of the difference in the number of males or females. The moderation effect diagrams can be referred to Figures 2, 3.

5 Discussion

This study’s purpose was to explore the mechanisms that trigger employee radical innovation in Chinese SMEs. This study, grounded in the theoretical frameworks of relational identification and social exchange, explores the relationship between leader ethical behavior, leader identification, and employee behavior. It establishes a logical connection between leader ethical behavior and radical innovation through leader identification. The findings suggest that leader ethical behavior fosters positive relationships

TABLE 4 The results of Process Model 1.

Moderator	Level	Conditional effect	Boot SE	<i>t</i>	<i>P</i>	Boot LLCI	Boot ULCI
Dependent variable: radical innovation							
Promotion Focus	−1 SD (−1.122)	0.280	0.059	4.718	0.001	0.163	0.396
	M	0.364	0.058	6.287	0.000	0.250	0.478
	+1 SD (1.122)	0.449	0.066	6.856	0.000	0.320	0.578
	Estimate	Boot SE		<i>t</i>	<i>P</i>	Boot LLCI	Boot ULCI
Interaction: Leader ethical behavior × Promotion focus							
	0.076	0.021		3.638	0.000	0.035	0.116

TABLE 5 The results of Process Model 1.

Moderator	Level	Conditional effect	Boot SE	<i>t</i>	<i>P</i>	Boot LLCI	Boot ULCI
Dependent variable: radical innovation							
Promotion focus	−1 SD (−1.322)	0.205	0.060	3.407	0.001	0.087	0.323
	M	0.292	0.060	4.859	0.000	0.174	0.410
	+1 SD (1.322)	0.379	0.068	5.536	0.000	0.244	0.513
	Estimate	Boot SE		<i>t</i>	<i>P</i>	Boot LLCI	Boot ULCI
Interaction: leader identification × promotion focus							
	0.078	0.021		3.742	0.000	0.037	0.118

between leaders and employees, motivating employees to reciprocate through higher levels of radical innovation.

The results also indicate that employees who have a stronger sense of leader identification are more likely to engage in radical innovation as a form of reciprocal behavior when they perceive leader ethical behavior. This study contributes to our understanding of radical innovation by illustrating the role of leader ethical behavior and the mediating effect of leader identification. The implications are valuable for organizations looking to promote radical innovation by emphasizing leader ethical behaviors. In addition, we validate the moderating role of promotion focus. The findings suggest that employee promotion focus moderates not only the relationship between leader ethical behavior and radical innovation but also that between leader identification and radical innovation. This study focuses on validating a model of what triggers employee radical innovation and provides a valuable contribution to the in-depth study of radical innovation. The study has the following theoretical and practical implications.

5.1 Theoretical implications

First, the study investigated leader ethical behavior’s effect on leader identification and radical innovation. The study’s results show that leader ethical behavior positively affects leader identification and radical innovation. Leader ethical behavior helps employees realize that they are in a social exchange relationship with their leaders because they are treated fairly and with care. When employees attribute various positive qualities and behaviors

to an ethical leader, such as integrity, selflessness, and commitment to their work, strong leader identification follows (Gu et al., 2015). Therefore, as a result of leader ethical behavior, employees feel their leader’s care and support, which will stimulate their trust in their leader. In turn, this strengthens the leader’s charisma and increases employees’ positive perceptions, stimulating a high level of leader identification. In addition, leaders’ care and concern for employees and their fair and ethical treatment will motivate employees to pay more attention to the value of their work. Through this increased attention to value, they will generate and apply new ideas and find new ways to achieve organizational goals. Consequently, innovative attitudes in the organizational environment will increase their creativity, leading to radical innovation (Shafique et al., 2020). Therefore, leader ethical behavior positively impacts radical innovation.

Second, this study clarifies the strong link between leadership identification and radical innovation and validates leadership identification’s effect on radical innovation. The study results show that leader identification has a significantly positive effect on radical innovation. Employees with high leader identification regard their leaders as self-references and role models and actively participate in creative activities by learning and imitating leader behaviors (Wen et al., 2017). This internalization process causes employees to view their leader’s goals as their own, consequently motivating them. This motivation drives employees to further pursue and meet their leaders’ expectations through positive behaviors. This process can potentially produce radical innovation.

Third, the study verified leader identification’s mediating role in the relationship between leader ethical behavior and radical innovation. The results show that leadership identification significantly affects leader ethical behavior and radical innovation

TABLE 6 Independent samples test.

Variable	Equality of variances	F	Sig.	T	df	Sig. (2-tailed)	Mean difference	95% Confidence interval (Lower–Upper)
Leader ethical behavior	Equal variances assumed	0.274	0.601	0.971	369	0.332	0.124	(–0.12763, 0.37681)
	Equal variances not assumed			0.980	324.313	0.328	0.124	(–0.12554, 0.37471)
Leader identification	Equal variances assumed	0.065	0.799	0.586	369	0.558	0.073	(–0.17303, 0.32003)
	Equal variances not assumed			0.590	321.858	0.556	0.073	(–0.17156, 0.31857)
Promotion focus	Equal variances assumed	1.053	0.305	0.184	369	0.854	0.021	(–0.21244, 0.25620)
	Equal variances not assumed			0.183	309.770	0.855	0.021	(–0.21373, 0.25748)
Radical innovation	Equal variances assumed	0.333	0.564	1.510	369	0.132	0.223	(–0.06759, 0.51425)
	Equal variances not assumed			1.517	320.569	0.130	0.223	(–0.06622, 0.51288)

and that leader ethical behavior positively affects radical innovation through leader identification. Leader identification helps employees establish a strong emotional connection with their leaders, enhances their emotional attachment to their leaders, and leads them to more strongly identify with their leaders’ values and behaviors (Cao and Xue, 2023). Leaders who demonstrate the moral qualities of integrity, honesty, objectivity, and fairness are likely to win employee trust and respect, so that they form a sense of identification with the leader. Employees will actively agree with their leader’s ideas and hopes and be willing to work hard to achieve the leader’s expectations, thus displaying radical innovation behaviors (Ryou and Kim, 2018). Overall, employees feel leaders’ profound leadership charisma due to their display of ethical behaviors, such as high quality and emotional care. Leaders not only earn employee respect and admiration, but also establish a sense of empathy and leader identification. This emotional connection stimulates employees’ intrinsic motivation and pushes them to participate in the organization with a positive attitude, generating radical innovation that benefits the organization.

Finally, this study verified the moderating role of promotion focus in the relationship between leader ethical behavior and radical innovation and that of leader identification and radical innovation. The study results indicate that promotion focus has a significantly positive effect not only in moderating the relationship between leader ethical behavior and radical innovation but also in moderating the relationship between leader identification and radical innovation. Employees with promotion focus give organizations an innovation advantage because they are more positive in their approach to the environment, events, and opportunity assessment; this makes it easier to consider new possibilities and generate new ideas when developing innovative products, services, and business models (Li and Shang, 2011). The moderating role of the facilitation focus means that companies can inspire employees to engage in radical innovation by reinforcing leader ethical behavior and enhancing leader identification. Because radical innovation involves high risk and uncertainty, employees need psychological security, mission-driven and innovative motivation to challenge conventional thinking and explore cutting-edge areas. When leaders demonstrate high ethical behaviors such as integrity, fairness, and caring for employee development, it enhances employees’ sense of trust

and psychological security in the organization and reduces their concerns when innovating. For example, with a leader’s support, employees are more bold in coming up with disruptive ideas without undue fear of the consequences of failure. In addition, when employees develop leadership identification, they are more willing to take on high-risk challenges and take the initiative to explore cutting-edge technologies, drive industry change, and bring radical innovations to fruition.

5.2 Practical implications

In addition to the theoretical contributions, our theoretical and research findings have the following practical implications. First, leader ethical behavior values collective interests, which contributes to forming an organizational climate of candor, sharing, and inclusion and subsequently reduces organizational conflicts (Cheng et al., 2023). Moreover, by demonstrating ethical behavior to satisfy employees’ psychological needs, leaders stimulate good exchange relationships between employees and leaders; employees respond by displaying positive behaviors that benefit the organization (Yan et al., 2022). Therefore, leaders should fully recognize that their own behaviors have a significant impact on employees’ attitudes, behaviors, and organizational atmosphere. To cultivate leader ethical behavior that promote radical innovation, firstly, leaders should set an example of ethical decision-making and emphasize the importance of maintaining integrity, transparency, and responsibility in the innovation process. This will help ensure that innovation is not achieved at the expense of ethical standards. Secondly, leaders should create a trusting and open organizational environment that encourages free exchange of ideas, fosters trust among employees, and enables them to feel safe, thus speaking freely and expressing their opinions freely. Finally, organizations can implement training programs on ethical leadership to help leaders at all levels recognize the positive impact of leadership behaviors. These trainings will help leaders recognize the importance of ethical behavior, prompting them to follow ethical standards when making decisions and respect employees’ opinions, thereby promoting innovation while encouraging employees to actively participate in the overall development of the organization.

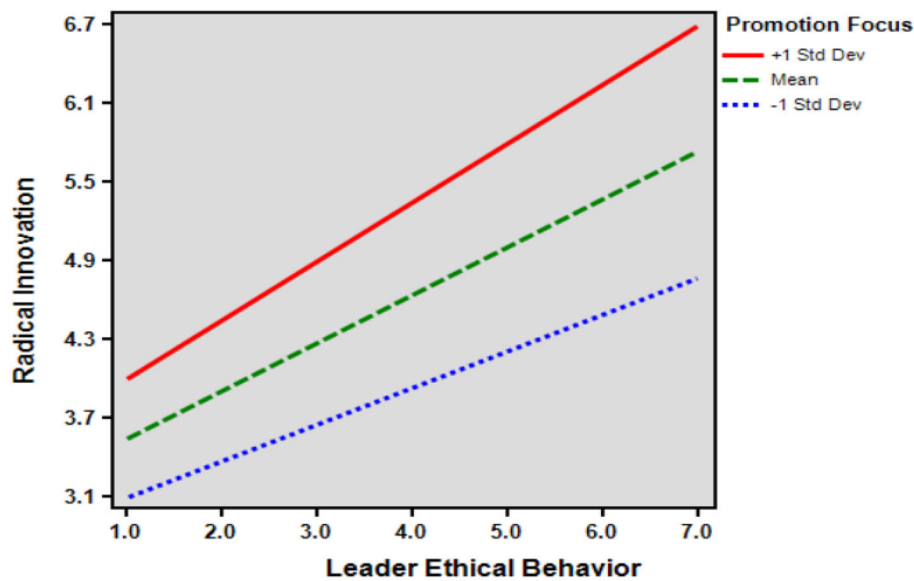


FIGURE 2
The moderating effect of promotion focus.

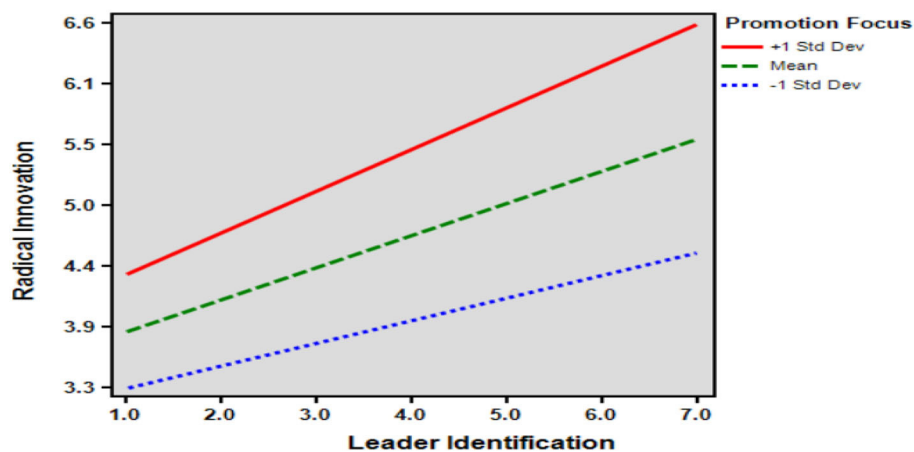


FIGURE 3
The moderating effect of promotion focus.

Second, leader identification reinforces employees' positive emotions at work, actively engaging them in their work (Liao et al., 2022). When employees develop leader identification, they internalize the leader's values and goals and consider the leader's focus on the organization's goals as their own, thus actively improving their own work performance. Leader identification is based on mutual respect, trust, and effective communication. Therefore, leaders should actively listen to employees' opinions and feedback, fully respect their viewpoints, and seriously consider employees' suggestions when making decisions. Giving employees the appreciation and recognition they deserve in a timely manner helps them believe that their work and efforts are genuinely recognized and valued. This positive feedback not only shows that their contributions are valued and respected, but also enhances

their trust in and satisfaction with their leaders. These positive interactions inspire employees to identify with their leaders, creating a more positive work atmosphere.

Third, Employees with promotion focus pursue desirable goals and achieve their desired states by pursuing success, leading to progress, growth, and fulfillment (Crowe and Higgins, 1997). The moderating role of promotion focus implies that leaders should stimulate the promotion focus of their employees to enhance their motivation to innovate and their willingness to develop professionally. This can be done through incentives, organizational culture shaping, and goal setting to optimize management decisions and drive organizational innovation. Leaders should understand employees' career goals, provide training and growth opportunities, and fairly recognize their achievements and provide incentives to

enhance their sense of belonging and commitment to innovation. Under a relaxed innovation climate and performance reward system, employees with a high promotion focus are more willing to explore new opportunities, take risks, and drive change. In addition, encouraging innovative thinking and a spirit of trial and error can help increase job satisfaction and promote long-term organizational growth. Therefore, companies should strengthen the promotion focus in incentive policies, performance appraisals and strategic planning to provide employees with development opportunities and promote win-win situations for both individuals and organizations.

Finally, radical innovation is risky for organizations but can bring them great rewards (Colombo et al., 2017). In China, SMEs tend to be smaller in scale and relatively weaker in financial strength, making them more vulnerable to business risks. To survive and thrive in an increasingly complex and competitive market environment, Chinese SMEs must demonstrate a strong commitment to innovation and focus on developing unique competitive advantages (Chen et al., 2012). This study highlights the crucial role of innovation for Chinese SMEs, aiming to help them better adapt to market dynamics. To achieve this, managers must find ways to encourage their employees' engagement in innovation, especially radical innovation. First, leaders should actively encourage creative thinking. Motivating employees to conceive novel ideas creates an organizational climate that is open and supportive of innovative development. Second, leaders should ensure that they allocate sufficient resources to R&D (research and development) and technological innovation to keep the organization at the forefront of innovation. Finally, leaders should pay attention to their employees' psychological states, listen to their views and difficulties, and promptly address any uneasiness and concerns that may arise during the process of employee radical innovation. Such care can enhance employee confidence and motivation and result in smoother innovation processes.

5.3 Limitations and future research

Although this study confirmed the relationship between leader ethical behavior and radical innovation, it has certain limitations, which are detailed below. In addition, we suggest directions for future research.

First, the study respondents all worked in Chinese SMEs. Future research could focus on examining SME employees in different cultural contexts to verify whether the results are similar to those in this study. A comparative study will deepen our understanding of the relationship between leader ethical behavior and radical innovation and provide a more comprehensive perspective of leadership behavior in SMEs.

Second, the only moderating variable considered in this study is promotion focus. In future research, in addition to considering promotion focus, the moderating role of prevention focus should be explored. Applying these two types of focus together will allow in-depth study of the effects of leadership behavior and identification on radical innovation to verify their specific moderating effects in this relationship.

Additionally, as a cross-sectional study, this study only measured a single point in time. The cross-sectional design restricts causal inferences. To improve the study's accuracy and depth, our future research will adopt a longitudinal research design to gain a more comprehensive understanding of time trends and the level of leader ethical behavior's influence on radical innovation by taking measurements at multiple points in time. Adopting this research methodology will enable drawing more reliable conclusions and reveal underlying causal relationships, thereby increasing the credibility of the findings.

Fourthly, this study exhibits a certain imbalance in gender distribution, with a relatively lower proportion of male participants, which may affect the generalizability of the findings. To minimize the potential impact of gender as a dummy variable, future research could adopt a more balanced gender ratio during the data collection phase to enhance the representativeness, robustness, and applicability of the study.

Fifth, although the confirmatory factor analysis (CFA) generally supports the measurement model of this study, the RMSEA value of 0.095 indicates that there is still room for improvement in the model fit. While the overall model remains within an acceptable range, future research could enhance the robustness and generalizability of the study by improving item selection, exploring more optimal measurement models, or validating the model using larger and more diverse samples.

Sixth, this study explored the impact of leader ethical behavior on employees' radical innovation and reached relevant conclusions. However, we must acknowledge the potential omission of certain variables that may influence radical innovation. For example, previous studies have highlighted the significant impact of authentic leadership, quality of leadership, and work-related stress on employee behavior (Fu et al., 2022; Van der Heijden et al., 2017; Mucci et al., 2015). Recognizing these factors not only reveals the limitations of this study but also provides a direction for future research. Therefore, future studies can further investigate the specific effects of authentic leadership, quality of leadership, and work-related stress on employees' radical innovation to validate their roles in driving innovation, thereby enriching and refining the existing theoretical framework.

Finally, this study relies on self-reported measures, there is a potential risk of common method bias (CMB). To improve its accuracy and credibility, future studies may consider a split method in which leaders report on matters related to their employees and employees report on matters related to their leaders. This can reduce the potential impact of common method bias on the study results and enhance the study's scientific and persuasive nature.

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 approval was not required for the study involving humans in accordance with the local legislation and institutional

requirements. The survey was conducted after obtaining prior consent from all participants.

Author contributions

LZ: Conceptualization, Data curation, Software, Writing – original draft. LW: Conceptualization, Data curation, Resources, Software, Writing – original draft. XJ: Formal analysis, Methodology, Supervision, Writing – review & editing.

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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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The effect of error aversion climate on impoverished leadership

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Introduction: Impoverished leadership, as a form of unethical leadership behavior, can have a wide range of negative impacts. It not only affects team morale, work efficiency, cohesion, and trust but also directly influences organizational performance, reputation, and the leader's own career development. However, previous research has rarely explored the antecedents of impoverished leadership.

Methods: Based on social cognitive theory and conservation of resources theory, this study investigated the impact of error aversion climate on impoverished leadership with mixed methodologies (i.e., a scenario experiment and a questionnaire survey).

Results: The results showed that error aversion climate positively influences impoverished leadership; moral disengagement and ego depletion serve as mediators between error aversion climate and impoverished leadership. Besides, regulatory focus moderate the relationship between error aversion climate and moral disengagement (ego depletion). Specifically, when leaders have high prevention regulatory focus and high promotion regulatory focus, the relationship between error aversion climate and moral disengagement (ego depletion) is stronger. Regulatory focus also moderate the indirect effect of error aversion climate on impoverished leadership through moral disengagement (ego depletion). The indirect effect of error aversion climate on impoverished leadership is stronger when leaders have high prevention regulatory focus and high promotion regulatory focus.

Discussion: The findings provide theoretical guidance for interventions to reduce impoverished leadership and offer new insights for promoting organizational sustainability.

KEYWORDS

impoverished leadership, error aversion climate, moral disengagement, ego depletion, regulatory focus

1 Introduction

Impoverished leadership refers to the behavior where leaders fail to fulfill or inadequately perform their job responsibilities, which is a form of unethical leadership behavior (Li et al., 2024). Two typical examples of impoverished leadership are evading responsibility and ignoring problems (Li et al., 2024). Impoverished leadership can hinder subordinates' task completion, leading to decreased work efficiency and negatively affecting the collaborative atmosphere among colleagues and the strategic deployment by higher-level leaders (Pless et al., 2022; Griffin et al., 2022). However, the majority of current research focuses on high-intensity unethical leadership behaviors, such as destructive leadership and abusive supervision (Asim et al., 2024; Almeida et al., 2022; Liu et al., 2025). In contrast, low-intensity unethical leadership behaviors, such as impoverished leadership, are often more easily overlooked or denied due to their subtlety and less noticeable nature, receiving far less attention compared to high-intensity

behaviors (Almeida et al., 2022). Given the potential negative impacts and the urgency of studying impoverished leadership, it has become a significant topic of interest for both academia and industry.

Existing studies on impoverished leadership have primarily focused on its conceptualization as a form of passive unethical behavior. For instance, Bass and Avolio (1996) positioned it within the managerial grid as a leadership style marked by minimal engagement with both tasks and people. Recent empirical work has expanded this view, linking impoverished leadership to systemic issues such as bureaucratic inertia in public sectors (Shen, 2019) and proceduralism in corporate settings (Fan, 2021). However, three critical gaps persist. First, prior research predominantly examines impoverished leadership through descriptive case studies (e.g., government inaction) rather than testing its antecedents via theoretical frameworks. Second, while high-intensity unethical behaviors like abusive supervision have been extensively explored (Almeida et al., 2022), low-intensity forms such as impoverished leadership remain under-theorized, particularly in organizational contexts. Third, existing explanations rely heavily on individual traits (Alamri, 2023) or structural factors (Belardinelli et al., 2023). Indeed, research by Ahmed et al. (2021) has highlighted that specific dimensions of organizational climates, especially climates emphasizing error aversion, can also act as catalysts for impoverished leadership (Ahmed et al., 2021). However, few scholars have responded to their call for research.

Error aversion climate refers to a shared perception among organizational members regarding the policies, procedures, and practices related to error management, which includes two dimensions: error strain and covering up errors (Van Dyck et al., 2005). In the VUCA (Volatility, Uncertainty, Complexity, Ambiguity) era, businesses face ever-evolving commercial environments, intense competition, and rapid changes that compel them to continually strive for and adapt to high standards of work environments. In this environment, the cost of trial and error for organizational decision-makers increases significantly. They tend to adopt more cautious and conservative strategies to avoid potential risks. The accumulation of this psychological and behavioral tendency gradually leads to the formation and solidification of error aversion climate (Taskan et al., 2022). Therefore, choosing the error aversion climate as a research perspective for the causes of impoverished leadership can better reveal issues in contemporary organizational management contexts. Theoretically, error aversion climate can cause psychological harm to organizational leaders, triggering a series of negative work attitudes or workplace behaviors, like impoverished leadership. These include conservatism due to fear of making mistakes, which leads to reduced psychological safety and continuous anxiety about errors (Yu et al., 2024; Eshet et al., 2024). Undoubtedly, error aversion climate becomes a source of stress. In such an environment, leaders tend to adopt a passive, conservative attitude to maintain the status quo and ensure their own safety and job stability in a complex and volatile environment, thereby leading to impoverished leadership.

On the one hand, social cognitive theory emphasizes the dynamic interplay among cognitive processes, environmental pressures, and behavioral outcomes (Detert et al., 2008). In error aversion climate, leaders face heightened accountability risks, which erode psychological safety and reinforce the belief that “inaction minimizes exposure to errors.” This cognitive narrowing activates moral disengagement—a process by which leaders decouple their behaviors from ethical standards through mechanisms such as externalizing blame and minimizing consequences (Azhar et al., 2024). Through the mediating role of moral disengagement, this study illustrates how environmental pressure drives leaders to rationalize negative avoidance behavior.

On the other hand, conservation of resources theory elucidates the resource-driven pathway to impoverished leadership. Error aversion climate force leaders into chronic hyper-vigilance, depleting cognitive and emotional resources, leading to ego depletion. When resources fall below a critical threshold, leaders adopt low-energy strategies (e.g., task avoidance) to conserve remaining reserves, manifesting as impoverished leadership (Hobfoll et al., 2018). This pathway highlights resource scarcity as a boundary condition: in contexts lacking psychological safety or institutional support, leaders prioritize survival over responsibility. This pathway is theoretically complementary to social cognitive theory: social cognitive theory emphasizes the cognitive distortion of moral judgment, while conservation of resources theory reveals how environmental stress weakens leaders' ability to fulfill their responsibilities through resource depletion, both of which jointly explain the dual destructive mechanism of error aversion climate on leadership effectiveness.

In addition, individuals are influenced by individual traits (e.g., regulatory focus) in the process of moral disengagement and ego depletion (Baldner and Pierro, 2024; Asfar et al., 2019). Regulatory focus reveals that due to differences in motivational regulatory tendencies, individuals adopt different self-regulatory strategies to avoid potential risks or pursue positive outcomes (Baas et al., 2011). Specifically, regulatory focus, as an intrinsic trait, can be divided into prevention regulatory focus and promotion regulatory focus. These, respectively, represent tendencies toward loss avoidance and growth pursuit, playing a crucial role in shaping individual behavior patterns (Liu et al., 2020). In addition, compared with stable personality traits, regulatory focus has situational plasticity, which provides a practical entry point for the subsequent design of organizational interventions. Therefore, this study introduces regulatory focus as a key variable, aiming to deeply explore and reveal its boundary-regulating role in an error aversion climate.

In summary, our research may contribute to the existing literature on error aversion climate and impoverished leadership in several ways. First, it redefines the spectrum of unethical leadership by positioning impoverished leadership as a “passive-conservative” counterpart to overtly destructive behaviors. It expands the scope of unethical leadership research by shifting focus from overtly destructive behaviors to passive avoidance patterns, addressing the under explored domain of conservative unethical leadership. Second, the dual-path framework bridges organizational climate (error aversion climate) with psychological processes (moral cognition and ego depletion), addressing calls for multilevel analyses in leadership research (Zhang et al., 2022). Specifically, we extend social cognitive theory by showing how environmental pressures (error aversion climate) distort moral reasoning toward passive harm, and enrich conservation of resources theory by revealing “defensive inaction” as a novel behavioral outcome of chronic resource loss. Third, the moderating role of regulatory focus challenges the simplistic “promotion-positive/prevention-negative” dichotomy, demonstrating synergistic effects where both amplify impoverished leadership.

2 Theory and hypotheses

2.1 Impoverished leadership

The concept of “Impoverished Leadership” can be traced back to the (1, 1) position in the management grid theory, which represents a leadership style that is neither interested in people nor tasks,

exemplifying a typical form of complete inaction (Blake and Mouton, 1964). Bass and Avolio (1996) described impoverished leadership as a behavioral deficit in leadership, where an individual occupies a position but fails to meet subordinates' expectations, thereby neglecting corresponding responsibilities to some extent. This perspective has been widely accepted among scholars, who further elaborate that impoverished leadership encompasses various types of non-leadership behaviors, such as evading responsibility, failing to respond to issues, being absent when needed, refusing to make decisions, and delaying responses.

While impoverished leadership and laissez-faire leadership share superficial similarities in passivity, their theoretical foundations and behavioral manifestations differ significantly. Laissez-faire leadership, as defined by Bass and Avolio (1996), is characterized by a deliberate avoidance of decision-making and responsibility delegation, often rooted in leaders' preference for autonomy or trust in subordinates' capabilities (Bass and Avolio, 1996). In contrast, impoverished leadership emerges from cognitive and resource-driven constraints in high-pressure environments. Unlike laissez-faire leaders who may intentionally refrain from intervention, impoverished leadership exhibit passive withdrawal due to fear of errors and resource scarcity. Empirical studies show that laissez-faire leadership is more related to leader traits (such as low achievement motivation), while impoverished leadership is more driven by organizational climate (Zhang et al., 2022; Chen Y. et al., 2021).

Research on "Impoverished Leadership" in the Chinese context focuses on public officials' "inaction," with limited studies defining impoverished leadership within corporate organizations. Shen (2019) notes that inaction among officials stems from their inability to adapt to contemporary professional demands, resulting in passive and arbitrary behaviors. Fan (2021) characterizes this leadership as a tendency for leaders to overthink major issues while neglecting minor ones, leading to superficial engagement in trivial tasks. Building on previous research, this study defines impoverished leadership as a failure to adequately fulfill or perform job responsibilities, resulting in low efficiency, poor quality of work, and incomplete tasks.

2.2 Error aversion climate and impoverished leadership

Error aversion climate can affect impoverished leadership in three ways. First, an error aversion climate is inherently a conservative and short-term oriented organizational culture (Klamar et al., 2022). It reflects an organization's tendency to advocate for maintaining the status quo to avoid risks and to reject bold experimentation (Oliveira et al., 2022). In such an environment, leaders are penalized for even minor mistakes, leading to increased psychological pressure and eroded enthusiasm for their work (Deng et al., 2024). This often results in leaders not fully or adequately performing their duties. Second, leaders are more likely to prioritize safety and avoid taking risks (Farnese et al., 2020). Consequently, this fosters a mindset of "the more you do, the more mistakes you make" and "slacking off to avoid trouble," making leaders more inclined to engage in impoverished leadership. Furthermore, in an error aversion climate, there exists a negative interaction between leaders and the organization, such as leaders concealing their mistakes to avoid organizational penalties (Plant and Devine, 2003). This negative interaction increases leaders'

anxiety and avoidance behaviors (Chen Y. et al., 2021), which in turn leads to more instances of impoverished leadership. Specifically, the formation of an organizational error aversion climate is often associated with leaders at higher levels of authority (Horvath et al., 2023). Given that individual leaders have limited power to change their work environment, they are more likely to choose tolerance or withdrawal from work (Deng et al., 2024), thereby exhibiting more signs of work withdrawal and impoverished leadership. Based on these discussions and empirical evidence, we propose:

Hypothesis 1(H1): Error aversion climate is positively related to impoverished leadership.

2.3 Mediating effect of moral disengagement

Organizational climate is a significant factor influencing moral disengagement (Moore, 2008). So we hypothesize that error aversion climate can lead to moral disengagement among leaders. On the one hand, as a crucial component of the overall organizational atmosphere, an error aversion climate instills a fear of mistakes among both leaders and regular employees. This fear results in individuals hiding their errors to protect themselves, and even when others' mistakes are noticed, they are not corrected. Consequently, leaders working in such a climate often experience a sense of helplessness, reduced psychological safety, and increased job insecurity, which can contribute to moral disengagement (Newman et al., 2020). On the other hand, when leaders make mistakes in an error aversion climate, they experience significant pressure and frustration. This increases their work stress and depletes their resources, leading to cognitive strain and, ultimately, moral disengagement (He and Harris, 2014).

Social cognitive theory points that leaders use a set of moral standards to monitor and evaluate their own behaviors (Tenbrunsel and Messick, 2004). If they act contrary to these internal standards, they experience guilt and a sense of conscience (Detert et al., 2008). Generally, individuals act in accordance with their internal moral standards. However, these standards can be moderated or suppressed by self-regulatory mechanisms. Moral disengagement is a process through which individuals suppress their internal moral standards via self-regulation, and it can manifest in three forms (Bandura, 2002). Leaders often use these forms to rationalize and justify their negative behaviors. Specifically, in cognitive restructuring, leaders may interpret impoverished leadership as a form of delegation aimed at developing subordinates, fostering talent within the organization, and thereby portraying their impoverished leadership in a positive light (Li et al., 2025). Furthermore, in neglecting or distorting outcomes, error aversion climate shapes leaders' interpretations and evaluations of the organization. Leaders may perceive such a climate as indicating that senior management discourages mistakes, leading them to believe that impoverished leadership is a means of avoiding errors and aligning with authoritative expectations. Lastly, in terms of blame attribution, leaders may attribute the harm caused by their inaction to deficiencies in subordinates' abilities to adapt promptly, rather than reflecting on their own need to adjust for improved performance (Frese and Keith, 2015).

In summary, social cognitive theory posits that individuals actively reconcile conflicts between their actions and moral standards

through cognitive rationalization. In error aversion climate, leaders systematically justify impoverished leadership by making moral disengagement through external attribution of responsibility and minimization of consequences. This mechanism reveals the intentionality behind leaders' paradoxical behavior of "knowing the right course of action yet refusing to act," reflecting a deliberate cognitive distortion process. Based on these discussions and empirical evidence, we propose:

Hypothesis 2 (H2): Moral disengagement mediates the effect of error aversion climate on impoverished leadership.

2.4 Mediating effect of ego depletion

Error aversion climate, as a negative organizational climate, is one of the important stressors for individuals, which can lead to ego depletion for leaders (Deng et al., 2024). On the one hand, error aversion climate implies low organizational tolerance for errors, resulting in heightened emotional responses such as tension, embarrassment, and frustration among both leaders and ordinary employees when facing errors (Aan Mourik et al., 2023). This consumes individuals' resources and energy, leading to ego depletion (Muraven and Baumeister, 2000). On the other hand, when leaders make mistakes, they experience fear, anger, and worry, with these negative perceptions becoming more intense in an error aversion climate (Dimitrova et al., 2017). They not only have to address the immediate work tasks but also have to deal with the potential negative consequences and the damaged self-image resulting from the errors (Van Dyck et al., 2005). This means that after making a mistake, leaders face additional demands, further exacerbating their feelings of stress and leading to ego depletion (Gillet et al., 2017).

Ego depletion can explain how individuals cope with a stressful work environment (Baumeister et al., 2018). Notably, individuals in an ego depletion state are more inclined to commit unethical behaviors, such as impoverished leadership (Ming et al., 2020). When leaders experience ego depletion, they show decreased attention and are more prone to shallow cognitive processing, meaning they rely more on intuitive heuristic systems in decision-making (Zhao et al., 2025). As a result, they may tend to make "snap decisions," leading to a disconnect between decisions and reality, thus failing to fulfill the important organizational decision-making role, which constitutes impoverished leadership. Emotionally, leaders in a state of ego depletion exhibit more negative emotions, such as emotional exhaustion (Yang et al., 2023), making it difficult for them to fulfill their role responsibilities required by the job and tending to engage in impoverished leadership. At the same time, they hold a more pessimistic outlook on the future, tend to have low future orientation, and lack the courage to face challenges (Faralla et al., 2017). Consequently, they are more likely to choose impoverished leadership to avoid potential trouble (Deng et al., 2024).

Conservation of resources theory focuses on the passive resource-depletion logic rooted in the dynamic equilibrium of resource management. Error aversion climate forces leaders into a state of chronic hyper-vigilance, which continuously consumes cognitive and emotional resources and leads to ego depletion. When resource reserves fall below a critical threshold,

leaders prioritize conserving remaining resources by adopting low-energy strategies, such as impoverished leadership. This pathway explains the "willing but unable" paradox, reflecting a passive adaptation mechanism shaped by environmental constraints. Based on these discussions and empirical evidence, we propose:

Hypothesis 3 (H3): Ego depletion mediates the effect of error aversion climate on impoverished leadership.

2.5 Moderating effect of regulatory focus

Social cognitive theory posits that moral disengagement is a flexible cognitive orientation arising from the dynamic interplay between individuals, their environment, and their behaviors (Eissa and Lester, 2021). We propose that individual traits (e.g., regulatory focus) and environmental factors (e.g., error aversion climate) jointly impact moral disengagement (Moore et al., 2012). Regulatory focus can be categorized into two types, each activating mechanisms for self-interest protection (Baas et al., 2011). Prevention regulatory focus, closely associated with the need for security, results in more cautious behavior, a preference for maintaining the status quo, and a tendency to avoid negative attention (Mühlberger et al., 2022). Leaders with prevention regulatory focus aim to minimize negative outcomes and reduce losses. Consequently, in an error aversion climate, leaders with a strong prevention regulatory focus are more likely to engage in moral disengagement as a self-protective strategy to avoid punishment, negative attention, and to preserve their image.

Promotion regulatory focus is closely related to the need for growth and development, encouraging individuals to take more risks in pursuit of positive outcomes and the maximization of benefits (Valle et al., 2019). However, such pursuits only occur when lower-level needs (e.g., physiological and safety needs) are met, leading to further self-actualization. In an error aversion climate, the safety needs of leaders may not be adequately fulfilled. Consequently, leaders with a high promotion regulatory focus may fall into a "conservatism" mindset, focusing on maintaining the status quo rather than striving for higher goals or personal and organizational growth. This situation can create a gap between the ideal self and the actual self, leading to negative emotions such as frustration (Liu et al., 2020), resulting in resource depletion, particularly of cognitive control resources, which in turn may lead to increased moral disengagement (Lee et al., 2016). Moreover, in an error aversion climate, leaders with a high promotion regulatory focus may set "zero errors" as their ultimate goal. This is mainly because, in such a climate, mistakes are severely punished, and only by avoiding mistakes can they gain the organization's approval and rewards, achieving personal development. Therefore, highly promotion regulatory focus leaders are more likely to take every possible measure to meet the organization's expectations, leading to a higher likelihood of moral disengagement regarding their own behaviors. Based on these discussions and empirical evidence, we propose:

Hypothesis 4a (H4a): Leader's prevention regulatory focus moderates the positive effect of error aversion climate on moral disengagement, such that the positive effect is stronger for leaders with high prevention regulatory focus than those with low prevention regulatory focus.

Hypothesis 4b (H4b): Leader's promotion regulatory focus moderates the positive effect of error aversion climate on moral disengagement, such that the positive effect is stronger for leaders with high promotion regulatory focus than those with low promotion regulatory focus.

According to the conservation of resources theory, individuals are generally more sensitive to the loss of resources than to their gain (Hobfoll, 1989). Leaders with high prevention regulatory focus tend to maintain safety and stability by setting goals and standards centered around defense. They focus on fulfilling obligations and continually adjust their behavior to meet rules and responsibilities (Valle et al., 2019). In an error aversion climate, these high prevention regulatory focus leaders set error aversion climate as their primary work goal. However, mistakes are inevitable and common in the workplace (Putz et al., 2013). Therefore, when high prevention regulatory focus leaders make mistakes, they experience negative emotions for not meeting their standards (Liu et al., 2020). Additionally, the zero-tolerance environment for errors instills a strong sense of fear, leading to further ego depletion as they try to hide their mistakes (Dimitrova et al., 2017).

For leaders with high promotion regulatory focus, the costs of trial and error increase in an error aversion climate. These leaders, who have a higher risk tolerance, are willing to take risks and try new things, which in turn raises their likelihood of making mistakes. However, mistakes result in severe punishments, depleting more resources and leading to greater ego depletion (Kark and Van Dijk, 2007).

Although leaders with high prevention regulatory focus and high promotion regulatory focus pursue their goals differently, in an error aversion climate, they both interpret errors as threats due to the organization's low tolerance for errors and their potential mistakes. They perceive the threat of resource loss. Based on these discussions and empirical evidence, we propose:

Hypothesis 5a (H5a): Leader's prevention regulatory focus moderates the positive effect of error aversion climate on ego depletion, such that the positive effect is stronger for leaders with high prevention regulatory focus than those with low prevention regulatory focus.

Hypothesis 5b (H5b): Leader's promotion regulatory focus moderates the positive effect of error aversion climate on ego depletion, such that the positive effect is stronger for leaders with high promotion regulatory focus than those with low promotion regulatory focus.

Considering Hypotheses 4a and 4b together, We further predict that regulatory focus will reinforce the relationship between error aversion climate and impoverished leadership.

Hypothesis 6a (H6a): Leader's prevention regulatory focus moderates the relationship between error aversion climate and impoverished leadership mediated by moral disengagement, such that the relationship becomes more vital in the presence of high prevention regulatory focus.

Hypothesis 6b (H6b): Leader's promotion regulatory focus moderates the relationship between error aversion climate and

impoverished leadership mediated by moral disengagement, such that the relationship becomes more vital in the presence of high promotion regulatory focus.

Considering Hypotheses 5a and 5b together, We further predict that regulatory focus will reinforce the relationship between error aversion climate and impoverished leadership.

Hypothesis 7a (H7a): Leader's prevention regulatory focus moderates the relationship between error aversion climate and impoverished leadership mediated by ego depletion, such that the relationship becomes more vital in the presence of high prevention regulatory focus.

Hypothesis 7b (H7b): Leader's promotion regulatory focus moderates the relationship between error aversion climate and impoverished leadership mediated by ego depletion, such that the relationship becomes more vital in the presence of high promotion regulatory focus (See, Figure 1).

3 Overview of studies

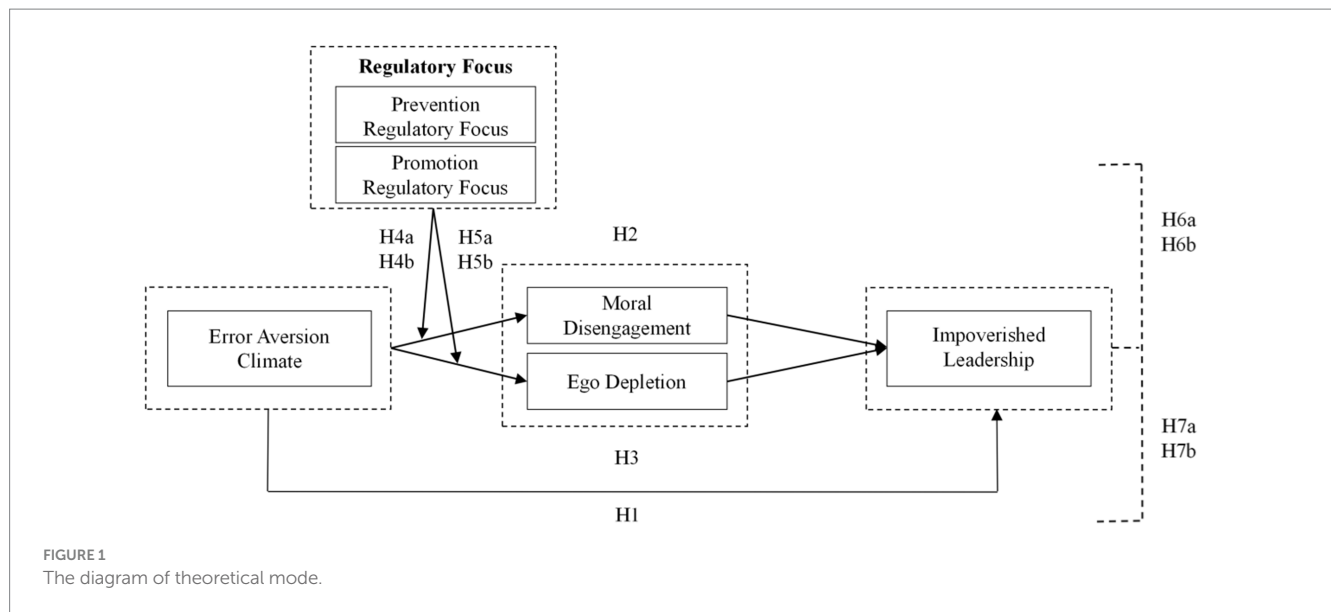
We conducted two studies (a scenario experiment and a questionnaire survey) to test our theoretical model. Study 1 manipulated the error aversion climate to infer its causal impact on impoverished leadership. To enhance external validity, Study 2 employed both online and offline surveys to examine the full theoretical model. Thus, the mixed design of these two studies provides complementary evidence for our model, addressing both internal and external validity issues.

3.1 Study 1: a scenario experiment

3.1.1 Sample and procedures

Study 1 utilizes an industry-acknowledged approach, selecting university students as subjects for the study (Qin et al., 2020). The scenario experiment was conducted through on-site responses, with situational experiments carried out in classes of Human Resource Management, Business Administration, and Marketing. Initially, 160 students were invited to participate in these experiments. After excluding samples that did not pass the attention check, 145 valid samples were obtained. Among the participants, there were 40 men and 105 women, with an average age of 20.34 years (SD = 0.930).

First, before the experiment began, the participants were informed of the rules of the experiment, emphasizing that participation was voluntary and that the data would be used solely for academic research. Second, the participants were randomly assigned to either the "high error aversion climate" group ($N = 79$) or the "low error aversion climate" group ($N = 66$). They were instructed to carefully read the corresponding experimental materials and imagine themselves as the managers of Company G, as described in the materials, for no less than 2 min. Finally, after reading the materials, the participants completed measurements of error aversion climate, moral disengagement, ego depletion, and impoverished



leadership, as well as demographic variables such as gender, age, and major. Upon completing the experiment, the participants received a reward as compensation.

3.1.2 Experimental materials

This study developed experimental materials on error aversion climate based on the method developed by Huang et al. (2019). The final materials are as follows:

High error aversion climate group:

"I am a manager at G Company. One common phrase from our 'head' is 'I never make mistakes and do not allow mistakes.' In our company, inadvertent errors by managers or employees often lead to severe negative consequences. For instance, failing to dispose of garbage in the bin can result in dismissal; a long-time employee was fired for once walking in the motor vehicle lane; a young supervisor was scolded to tears for causing disruptions during a live broadcast due to carelessness; during the early pandemic, an employee was dismissed for attending a gathering, and their department head was also removed from their position."

Low error aversion climate Group:

"I am a manager at G Company. In our company, if an employee makes a mistake, they do not face severe negative consequences. For example, we once launched a product that resulted in significant losses due to an error. The product manager, fearing dismissal, explained the situation to the 'head.' Unexpectedly, the 'head' said, 'You caused the company a loss of 25 million today; I hope you perform better tomorrow.' Additionally, some young technicians made adjustments to improve the quality of a new product, which unexpectedly resulted in a significant drop in quality. The 'head' did not blame them but encouraged them to keep striving to develop better products."

3.1.3 Measures

We followed the approach of Brislin to do the translation and back-translation process (Brislin, 1970). Unless otherwise noted, all the measures used a five-point Likert-type format, ranging from 1 = "Strongly disagree" to 5 = "Strongly agree."

3.1.3.1 Error aversion climate

We used the scale developed by Van Dyck et al. (2005), removing items with factor loadings below 0.4, resulting in nine-items. A sample item is "At G Company, I have to make a great effort to focus on certain tasks" (Cronbach's $\alpha = 0.912$).

3.1.3.2 Moral disengagement

We used the eight-item scale developed by Moore et al. (2012). A sample item is "At G Company, if people do something because an authority figure told them to, they should not be held responsible" (Cronbach's $\alpha = 0.832$).

3.1.3.3 Ego depletion

We used the five-item scale developed by Twenge et al. (2004). A sample item is "At G Company, I feel exhausted" (Cronbach's $\alpha = 0.895$).

3.1.3.4 Impoverished leadership

We used the five-item scale developed by Bass and Avolio (1996). A sample item is "At G Company, managers around me often avoid making decisions and delay responding to urgent issues" (Cronbach's $\alpha = 0.838$).

3.1.4 Results

3.1.4.1 Manipulation check

This study used an independent samples *t*-test. The results showed that there were 79 participants in the high error aversion climate group and 66 participants in the low error avoidance climate group. The mean score for the high error aversion climate group ($M_{\text{high}} = 3.60$, $SD_{\text{high}} = 0.723$) was significantly higher than that of the low error

aversion climate group ($M_{\text{low}} = 2.03$, $SD_{\text{low}} = 0.545$), with a significant difference ($F = 5.528$, $p < 0.001$). This indicates that the manipulation of the error aversion climate was successful.

3.1.4.2 Main effect hypothesis testing

An independent t -test was conducted to test the main effect hypothesis. The results showed that impoverished leadership in the high error aversion climate ($M_{\text{high}} = 3.377$, $SD_{\text{high}} = 0.699$) was significantly higher than in the low error aversion climate ($M_{\text{low}} = 2.276$, $SD_{\text{low}} = 0.858$), with a significant difference ($F = 3.146$, $p < 0.001$). Therefore, error aversion climate has a significant positive effect on impoverished leadership. Thus, Hypothesis 1 was supported.

3.1.4.3 Mediating effect hypothesis testing

This study employed hierarchical regression analysis to test the hypothesis regarding the mediating effect. The results indicate error aversion climate is significantly positively related to impoverished leadership ($\beta = 0.528$, $p < 0.001$), moral disengagement ($\beta = 0.221$, $p < 0.01$) and ego depletion ($\beta = 0.724$, $p < 0.001$). Moral disengagement is significantly positively related to impoverished leadership ($\beta = 0.304$, $p < 0.001$). When both error aversion climate and moral disengagement are included in the equation, the effect of error aversion climate on impoverished leadership significantly decreases but remains significant ($\beta = 0.485$, $p < 0.001$). Ego depletion is significantly positively related to impoverished leadership ($\beta = 0.603$, $p < 0.001$). When both error aversion climate and ego depletion are included in the equation, the correlation coefficient between error aversion climate and impoverished leadership becomes non-significant ($\beta = 0.187$, $p > 0.05$). Therefore, impoverished leadership had positive and significant indirect effects on error aversion climate via moral disengagement and ego depletion. Furthermore, the results of the mediation effect test using Bootstrap with 5,000 resamples indicate that the indirect effect of error aversion climate on impoverished leadership via moral disengagement is 0.035, with 95% CI [0.005, 0.075], which does not include 0. The indirect effect of error aversion climate on impoverished leadership via ego depletion is 0.279, with 95%CI [0.158, 0.410], which also does not include 0. Thus, H2 and H3 were supported.

3.1.5 Study 1: discussion

Study 1 used a scenario experiment to examine the causal relationship between error aversion climate and impoverished leadership, and it preliminarily tested the mediating effects of moral disengagement and ego depletion between error aversion climate and impoverished leadership, thereby enhancing the internal validity of the research. To further improve the external validity of the study and to test the moderating effect of regulatory focus, Study 2 utilized a survey method to test the overall model.

3.2 Study 2: a questionnaire survey

3.2.1 Sample and procedures

The focus of this study is on impoverished leadership, so the questionnaire was primarily distributed to leaders within various organizations. Data were collected using a combination of online and offline methods. Specifically, on the one hand, the study utilized Questionnaire Star, a data collection platform accepted by the Chinese

academic community, to create and distribute the questionnaire via links and QR codes on social media, covering regions including Hunan, Shanghai, and Hubei in China. On the other hand, the study distributed paper questionnaires to MBA students at colleges. To obtain more authentic data, a filter question was set, rendering questionnaires marked as “ordinary employee” under the demographic variable of position as invalid. Additionally, paper questionnaires were screened out if they contained many unanswered questions. A total of 425 paper and electronic questionnaires were distributed, resulting in 400 valid responses from leaders. Therefore, the effective response rate was 94.12%.

The study demographics are as follows. Among participants, 51.5% were male, and 48.5% were female. 52.5% were aged between 26–30 and 31–35. The education level of participants included bachelor's degree (65.5%), master's degree (18.8%), PhD (2.2%) and other (13.5%). Regarding their positions, grassroots managers (58.5%), mid-level managers (29.5%), and senior managers (12%) (Table 1).

3.2.2 Measures

The same scales from Study 1 were used to measure error aversion climate (Cronbach's $\alpha = 0.876$), moral disengagement (Cronbach's $\alpha = 0.908$), ego depletion (Cronbach's $\alpha = 0.916$), and impoverished leadership (Cronbach's $\alpha = 0.881$). To obtain more authentic responses, Study 2 utilized a projective method for measuring impoverished leadership, asking participants to evaluate the impoverished leadership around them as an indirect reflection of their own inaction. The instructions included, “The following describes some work behaviors of leaders around you. Please choose based on your understanding of the actual situation.”

3.2.2.1 Regulatory focus

We used the scale developed by Lockwood et al. (2002), which includes two dimensions and a total of seven items. The “promotion regulatory focus” dimension has four items, a sample item is “I often think about how to achieve good results” (Cronbach's $\alpha = 0.791$). And the “prevention regulatory focus” dimension has three items, a sample item is “I always worry about not meeting my work goals” (Cronbach's $\alpha = 0.811$).

3.2.2.2 Control variables

Chen X. et al. (2021) suggest that variables such as the leader's gender, tenure, and the nature of the organization can significantly impact impoverished leadership. Additionally, position level is also an important factor influencing leadership behavior. Therefore, this study includes six variables—gender, age, and position, among others—as control variables to minimize their impact on the data results and research conclusions.

3.2.3 Results

3.2.3.1 Descriptive statistics

Table 2 presents the means, standard deviations, and correlations of all variables. The results indicate that error aversion climate is significantly positively related to moral disengagement ($\beta = 0.591$, $p < 0.01$), ego depletion ($\beta = 0.488$, $p < 0.01$), and impoverished leadership ($\beta = 0.413$, $p < 0.01$). Additionally, moral disengagement is significantly positively related to impoverished leadership ($\beta = 0.551$,

TABLE 1 The information of samples demographic variable ($N = 400$).

Demographic		Frequency	Percentage
Gender	Male	206	51.5
	Female	194	48.5
Age	Under 25	71	17.8
	26–30	115	28.7
	31–40	146	36.5
	41–50	54	13.5
	Over 51	14	3.5
Education	Bachelor's Degree	262	65.5
	Master's Degree	75	18.8
	PhD	9	2.2
	Other	54	13.5
Position	Grassroots managers	234	58.5
	Mid-level managers	118	29.5
	Senior managers	48	12
Tenure	Less than 1 year	54	13.5
	1–5 years	175	43.75
	6–10 years	84	21
	11–15 years	51	12.75
	More than 15 years	36	9.0
Enterprise category	State-owned enterprise	94	23.5
	Private enterprise	172	43
	Foreign-funded enterprise	16	4.0
	Other	118	29.5

$p < 0.01$), and ego depletion is significantly positively related to impoverished leadership ($\beta = 0.453$, $p < 0.01$). These results provide preliminary data support for the subsequent hypotheses.

3.2.3.2 Confirmatory factor analysis

We conducted a confirmatory factor analysis to examine the discriminant validity of the measured constructs using Amos 27. The results in Table 3 show that the six-factor (error aversion climate, moral disengagement, ego depletion, promotion regulatory focus, prevention regulatory focus, and impoverished leadership) model fits data well ($\chi^2/df = 3.08 < 4$, RMSEA = $0.072 < 0.08$, IFI = 0.869 , TLI = 0.856 , CFI = 0.869). Comparisons indicate that this model fits better than the other four models, demonstrating good discriminant validity of the measurement tools.

Building on this foundation, we calculated the average variance extracted (AVE) and composite reliability (CR) based on the factor loadings derived from confirmatory factor analysis (CFA) to re-examine the convergent and discriminant validity of the variables. The AVE values all exceeded the recommended threshold of 0.6 (Samy et al., 2021). Similarly, the CR values all surpassed the suggested criterion of 0.6 (Samy et al., 2021). These results reaffirm the convergent validity and discriminant validity of the measurement model used in this study.

To assess potential common method bias, we first conducted Harman's single-factor test using principal component analysis

with unrotated solutions. The results revealed nine factors with eigenvalues greater 1, collectively explaining 68.04% of the total variance. Notably, the first factor accounted for 23.91% of the variance, well below the critical threshold of 40% (Podsakoff et al., 2003), suggesting no severe common method bias in the data.

To further validate this finding, we adopted a more rigorous approach by constructing a bifactor model (Aiken et al., 1991). Specifically, we compared the fit of the original six-factor model with an extended model incorporating an additional method factor (a global factor capturing shared variance across all items). The bifactor model demonstrated acceptable fit indices: $\chi^2/df = 2.128$, RMSEA = 0.053 , IFI = 0.934 , TLI = 0.922 , CFI = 0.933 , and SRMR = 0.041 . Compared to the original six-factor CFA model (SRMR = 0.075), the improvements in model fit were marginal: increases in IFI and CFI were less than 0.1, and reductions in RMSEA and SRMR were below 0.05.

3.2.3.3 Hypothesis testing

According to the model structure, data characteristics, and study scenario, we used SPSS 22.0 and the PROCESS macro program to test the hypotheses. All continuous predictor variables were mean-centered prior to constructing interaction terms to reduce multicollinearity and enhance the interpretability of the coefficients (Hayes, 2018).

TABLE 2 Descriptive statistics and correlation coefficients of variables.

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Gender	1.49	0.50											
2. Age	2.96	1.60	−0.133**										
3. Education	2.10	0.64	0.048	−0.046									
4. Position	2.54	0.70	−0.063	0.318**	0.046								
5. Tenure	2.60	1.14	−0.137**	0.689**	−0.019	0.293**							
6. Enterprise category	2.80	1.77	0.024	0.018	0.111*	−0.109*	0.004						
7. Impoverished leadership	2.24	0.89	0.031	−0.174**	0.060	−0.075	−0.122*	−0.061					
8. Error aversion climate	2.78	0.74	−0.057	−0.098	0.039	−0.102*	−0.078	0.045	0.413**				
9. Moral disengagement	2.03	0.78	−0.148**	−0.121*	0.040	0.005	−0.051	−0.102*	0.551**	0.591**			
10. Promotion regulatory focus	3.57	0.72	−0.011	0.065	−0.014	0.103*	0.033	0.053	0.006	0.127*	0.031		
11. Prevention regulatory focus	2.79	0.92	−0.043	−0.068	−0.085	−0.032	−0.117*	−0.002	0.336**	0.461**	0.413**	0.206**	
12. Ego depletion	2.63	0.92	−0.020	−0.07	0.001	−0.036	−0.055	−0.026	0.453**	0.488**	0.507**	0.070	0.633

$n = 400$; ** $p < 0.01$; * $p < 0.05$ (two-tailed).

TABLE 3 Model fit results for confirmatory factor analyses.

Model	χ^2 / df	RMSEA	CFI	IFI	TLI	SRMR	AIC	BIC
1. Six-factor model(EA; MD; ED; PRF; CRF; LD)	3.08	0.072	0.869	0.869	0.856	0.079	1742.924	2074.215
2. Five-factor model(CRF + PRF)	3.92	0.086	0.814	0.815	0.798	0.087	2183.808	2495.142
3. Four-factor model(ED + MD; CRF + PRF)	5.62	0.108	0.703	0.704	0.680	0.105	3078.303	3373.672
4. Three-factor model(ED + MD + EA; CRF + PRF)	6.54	0.118	0.642	0.643	0.616	0.114	3571.096	3854.490
5. Tow-factor model (ED + MD + EA + CRF + PRF)	7.24	0.125	0.595	0.597	0.568	0.112	3944.877	4220.288
6. Single-factor model (ED + MD + EA + CRF + PRF + LD)	8.27	0.135	0.527	0.529	0.497	0.122	4495.054	4766.473

$n = 400$; “EA” indicates error aversion climate; “MD” indicates moral disengagement; “ED” indicates ego depletion; “PRF” indicates prevention regulatory focus; “CRF” indicates “promotion regulatory focus”; “LD” indicates impoverished leadership.

3.2.3.3.1 Main effect hypothesis testing

This study conducted hierarchical regression analyses to test the hypotheses, as shown in Table 4, the relationship between error aversion climate and impoverished leadership was positive and significant ($\beta = 0.405$, $p < 0.001$, Model 7). Thus, Hypothesis 1 was supported.

3.2.3.3.2 Mediating effect hypothesis testing

This study employed hierarchical regression analysis to test the hypothesis regarding the mediating effect, as shown in Table 4. Error aversion climate is significantly positively related to moral disengagement ($\beta = 0.587$, $p < 0.001$; Model 1) and ego depletion ($\beta = 0.490$, $p < 0.001$; Model 4). Moral disengagement ($\beta = 0.554$, $p < 0.001$; Model 8) and ego depletion ($\beta = 0.442$, $p < 0.001$; Model 9) are significantly positively related to impoverished leadership. When error aversion climate is included in the equation along with moral disengagement and ego depletion, the effect of error aversion climate on impoverished leadership significantly decreases but remains significant ($\beta = 0.123$, $p < 0.05$; Model 10), ($\beta = 0.246$, $p < 0.001$; Model 11). We then adopt the bootstrap method (with sampling for 5,000 times, the same below) to examine the mediating role of moral disengagement and ego depletion. The results are shown in the

Table 5. The indirect impact of error aversion climate on impoverished leadership via moral disengagement and ego depletion are significant (effect = 0.334, 95% CI [0.250, 0.422]; effect = 0.188, 95% CI [0.123, 0.259]). Thus, Hypothesis 2 and 3 were supported.

3.2.3.3.3 Moderating effect hypothesis testing

The interaction effect of error aversion climate and prevention regulatory focus(a) ($\beta = 0.172$, $p < 0.001$, Model 2) and promotion regulatory focus(b) ($\beta = 0.149$, $p < 0.001$, Model 3) on moral disengagement were positive and significant. The interaction effect of error aversion climate and prevention regulatory focus(a) ($\beta = 0.097$, $p < 0.05$, Model 5) and promotion regulatory focus(b) ($\beta = 0.160$, $p < 0.001$, Model 6) on ego depletion were positive and significant.

To better illustrate this effect, a JN technique plot was used to visualize the moderating effect of regulatory focus based on its values (Aiken et al., 1991). As shown in Figure 2, with prevention regulatory focus as the horizontal axis and the effect of error aversion climate on moral disengagement as the vertical axis, when prevention regulatory focus scores exceed 6.071, the slope of error aversion climate on moral disengagement becomes significantly greater than zero ($p < 0.05$). Moreover, as prevention regulatory focus scores increase, this slope progressively strengthens. This indicates that error aversion climate

TABLE 4 Regression analysis.

Variables	Moral disengagement			Ego depletion			Impoverished leadership				
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11
Gender	−0.119**	0.049	0.022	0.007	0.039	−0.022	0.038	0.098	0.02	0.095	0.035
Age	−0.134*	−0.115*	−0.119*	−0.024	−0.032	−0.010	−0.128*	−0.059*	−0.131*	−0.063	−0.12*
Education	0.027	−0.117**	−0.118**	−0.017	0.017	0.008	0.046	0.034	0.061	0.033	0.052
Position	0.071	0.032	0.072	0.019	−0.02	0.014	−0.004	−0.049	−0.027	−0.038	−0.01
EA	0.587***	0.494***	0.582***	0.490***	0.242***	0.478***	0.405***			0.123*	0.246***
PRF		0.183***			0.528***						
CRF			−0.016			0.036					
EA*PRF		0.172***			0.097*						
EA*CRF			0.149***			0.160***					
MD								0.554***		0.480***	
ED									0.442***		0.323***
F	36.057	30.681	34.781	17.838	15.732	37.503	13.832	27.397	16.916	24.961	17.838
R2	0.398***	0.415***	0.417***	0.242***	0.266***	0.464***	0.198***	0.329***	0.232***	0.338***	0.242***
ΔR2	0.336***	0.021***	0.028***	0.235***	0.025***	0.009***	0.160***	0.290***	0.194***	0.14***	0.235***

n = 400; “EA” indicates error aversion climate; “MD” indicates moral disengagement; “ED” indicates ego depletion; “PRF” indicates prevention regulatory focus; “CRF” indicates “promotion regulatory focus; “LD” indicates impoverished leadership. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$ (two-tailed).

TABLE 5 The bootstrap test on the mediating effect.

Paths and effects	Effects (std_Effect)	SE	95% confidence intervals
Error aversion → Moral disengagement → Impoverished Leadership			
Indirect effect (OLS)	0.334 (0.288)	0.044 (0.038)	[0.250, 0.422]
Indirect effect (HC3)	0.334	0.044	[0.252, 0.419]
Error aversion → Ego depletion → Impoverished leadership			
Indirect effect(OLS)	0.188 (0.162)	0.035 (0.030)	[0.123, 0.259]
Indirect effect(HC3)	0.188	0.034	[0.125, 0.257]

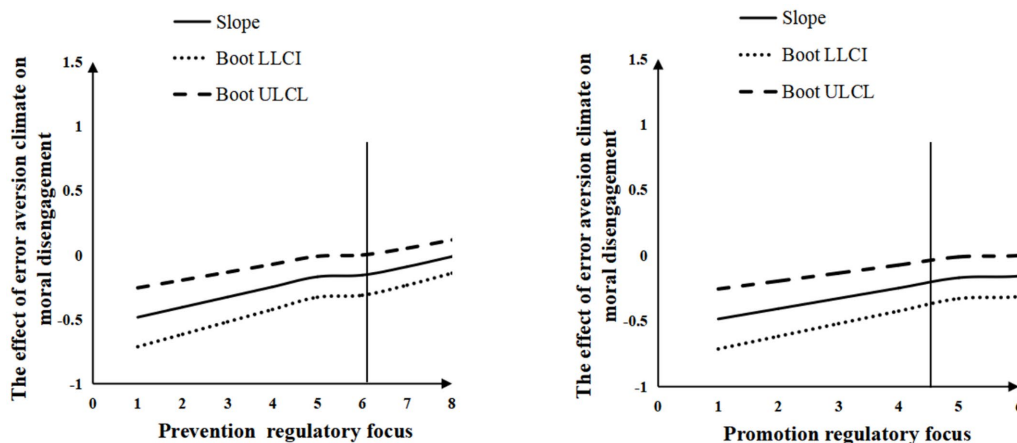


FIGURE 2
The moderating effect of regulatory focus.

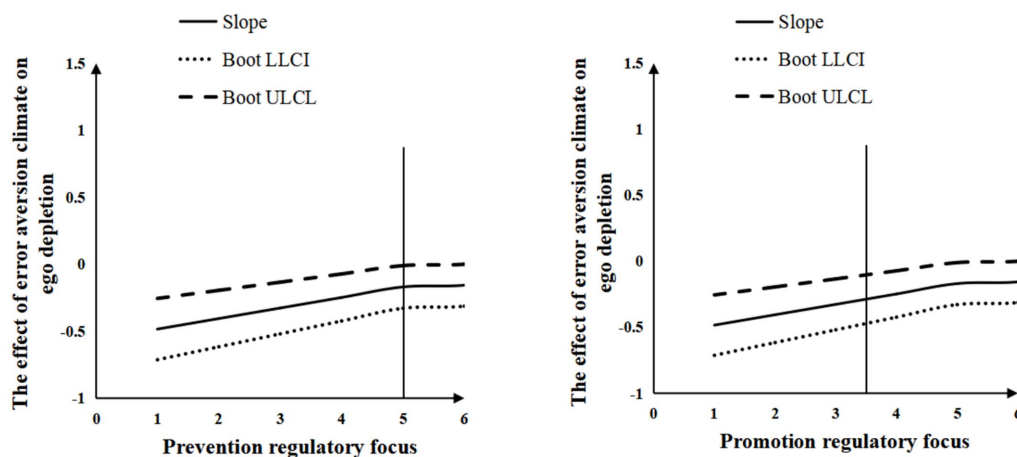


FIGURE 3
The moderating effect of regulatory focus.

exerts a positive predictive effect on moral disengagement when prevention regulatory focus scores surpass 6.071, and this effect intensifies with higher prevention regulatory focus.

Similarly, when promotion regulatory focus is plotted as the horizontal axis, the analysis reveals that when promotion focus scores exceed 4.534, the slope of error aversion climate on moral disengagement becomes significantly positive ($p < 0.05$). As promotion regulatory focus scores rise, the slope further increases, demonstrating that error aversion climate positively predicts moral disengagement under high promotion regulatory focus conditions (scores >4.534), with the effect growing stronger as promotion regulatory focus intensifies. Thus, Hypothesis 4a and 4b were supported.

In Figure 3, with prevention regulatory focus as the horizontal axis and the effect of error aversion climate on ego depletion as the vertical axis, when prevention focus scores exceed 4.993, the slope of error aversion climate on ego depletion becomes significantly positive ($p < 0.05$). This slope strengthens progressively with higher prevention regulatory focus scores, indicating that error aversion climate

positively predicts ego depletion when prevention regulatory focus scores surpass 4.993, and this predictive effect amplifies as prevention regulatory focus increases.

For the promotion regulatory focus analysis (horizontal axis), when promotion regulatory focus scores exceed 3.413, the slope of error aversion climate on ego depletion becomes significantly greater than zero ($p < 0.05$). As promotion regulatory focus scores rise, the slope continues to increase, suggesting that error aversion climate has a positive predictive effect on ego depletion under high promotion regulatory focus conditions (scores >3.413), with the effect intensifying alongside higher promotion regulatory focus. Thus, Hypothesis 5a and 5b were supported.

3.2.3.3.4 Moderated mediation effect hypothesis testing

This study employs the PROCESS macro for bootstrap analysis to test the moderated mediation effect, with a bootstrap sampling of 5,000 iterations. The results are shown in the Table 6. When prevention regulatory focus(a) and promotion regulatory focus(b) are at a higher level (+1SD), prevention focus path: effects = 0.360, 95% CI = [0.263,

TABLE 6 The moderated-mediation effects.

Paths and Effects	Effects	SE	95% confidence intervals
Error aversion climate → Moral disengagement → Impoverished leadership			
Moderated mediation			
Higher prevention regulatory focus (+1SD)	0.360	0.051	[0.263, 0.463]
Lower prevention regulatory focus (−1SD)	0.203	0.038	[0.133, 0.283]
Difference	0.085	0.025	[0.036, 0.136]
Higher promotion regulatory focus (+1SD)	0.399	0.058	[0.298, 0.512]
Lower promotion regulatory focus (−1SD)	0.264	0.046	[0.184, 0.367]
Difference	0.092	0.038	[0.012, 0.163]
Error aversion climate → Ego depletion → Impoverished leadership			
Moderated mediation			
Higher prevention focus (+1SD)	0.116	0.028	[0.072, 0.183]
Lower prevention focus (−1SD)	0.069	0.021	[0.025, 0.109]
Difference	0.032	0.013	[0.009, 0.061]
Higher promotion focus (+1SD)	0.232	0.048	[0.144, 0.330]
Lower promotion focus (−1SD)	0.135	0.031	[0.083, 0.203]
Difference	0.067	0.029	[0.011, 0.124]

0.463], not including 0; promotion focus path: effects = 0.399, 95% CI = [0.298, 0.512], not including 0. When prevention regulatory focus(a) and promotion regulatory focus(b) are at a lower level (−1SD), prevention regulatory focus path: effects = 0.203, 95% CI = [0.133, 0.283], not including 0; promotion regulatory focus path: effects = 0.264, 95% CI = [0.184, 0.367], not including 0, thus supporting hypotheses H6a and H6b.

Similarly, the differences in the indirect effects of error aversion on impoverished leadership through ego depletion at different levels of prevention regulatory focus and promotion regulatory focus are also significant. Higher level: (prevention regulatory focus path: effects = 0.116, 95% CI = [0.072, 0.183], not including 0); (promotion regulatory focus path: effects = 0.232, 95% CI = [0.144, 0.330], not including 0), Lower level: (prevention regulatory focus path: effects = 0.069, 95% CI = [0.025, 0.109], not including 0); (promotion regulatory focus path: effects = 0.135, 95% CI = [0.083, 0.203], not including 0), thus supporting hypotheses H7a and H7b.

4 Discussion and conclusion

4.1 Research conclusion

The main conclusions of this study are as follows: Error aversion climate positively affects impoverished leadership; moral disengagement and ego depletion serve as mediators in the relationship between error aversion climate and impoverished leadership respectively; regulatory focus moderates the relationships between error aversion climate and both moral disengagement and ego depletion. Specifically, when leaders have high prevention regulatory focus and high promotion regulatory focus, the positive effect of error aversion climate on moral disengagement is stronger, and the indirect effect of error aversion climate on impoverished leadership is stronger, with moral disengagement mediating the

relationship between error aversion climate and impoverished leadership. When leaders have high prevention regulatory focus and high promotion regulatory focus, the positive effect of error aversion climate on ego depletion is stronger, and the indirect effect of error aversion climate on impoverished leadership is stronger, with ego depletion mediating the relationship between error aversion climate and impoverished leadership.

4.2 Theoretical implications

The current research possesses three theoretical implications. Firstly, this study employs a combination of scenario surveys and questionnaire experiments to systematically explore the impact of error aversion climate on impoverished leadership, thereby enriching unethical leadership behavior research. Existing leadership studies mostly focus on intense unethical leadership behaviors like abusive supervision and destructive leadership (Bhattacharjee and Sarkar, 2024; Pletzer et al., 2024). However, there is relatively little attention given to conservative leadership behaviors. By focusing on “impoverished leadership,” this research broadens the behavioral spectrum of leadership studies and responds to previous scholars’ calls for more research on leadership avoidance antecedents (Zhang et al., 2022), thereby enriching the field of leadership, particularly in the area of leadership avoidance.

Secondly, this study systematically reveals the dual-path mechanism by which an error aversion climate triggers impoverished leadership by integrating social cognitive theory and conservation of resources theory, making an important expansion to the existing theoretical framework. Firstly, extending from Social cognitive theory, previous research has mostly focused on the explanatory role of moral disengagement in proactive unethical behaviors (such as corruption and deception) (Bandura, 1999). However, this study discovers that moral disengagement also plays a crucial role in passive unethical behaviors

(such as impoverished leadership). Specifically, under an error aversion climate, leaders unconsciously rationalize their inaction through cognitive restructuring mechanisms such as “minimizing responsibility” (e.g., “Doing less to avoid mistakes is for the stability of the team”). This process breaks through the traditional social cognitive theory explanatory boundary of “intentional wrongdoing,” revealing the unique role of moral cognitive biases in passive avoidance behaviors. This finding expands the application scenarios of social cognitive theory from “intentional violations” to “unintentional dereliction,” providing a new perspective for understanding the implicit moral risks in organizations.

In the deepening of the resource of conservation theory (COR), this study breaks through the traditional single correlation between resource depletion and job burnout (Hobfoll, 1989), and proposes a new mechanism of “resource conservation inaction.” It is found that the error aversion climate continuously consumes leaders’ psychological resources, forcing them to adopt the strategy of “minimizing input” to preserve the remaining resources, and ultimately leading to impoverished leadership. This mechanism not only extends the theoretical focus of resource of conservation theory from individual mental health to the field of leadership behavior decision-making, but also reveals the central role of resource dynamics in passive behavior choice. Unlike previous studies that emphasized the incentive of resource access to active behavior, this study suggests that resource depletion may indirectly trigger unethical behavior through “defensive withdrawal,” thereby enriching the interpretive dimension of resource of conservation theory in organizational ethics.

Furthermore, the study highlights the synergistic explanatory power of SCT and COR through the construction of a dual-path model. Although other theories, such as moral decision theory, can partially explain the logic of rational choice in which leaders do not act (Zhang et al., 2023), their premise that individuals have full moral consciousness contradicts the reality of “bounded ethicality” (Rees et al., 2019). In contrast, the two-path model in this study covers both unconscious moral cognitive bias (SCT path) and resource-constrained behavioral withdrawal (COR path), which is more suitable for leaders’ decision-making in high-pressure situations.

Finally, this study introduces regulatory focus as a moderating variable to explore the boundary conditions that trigger impoverished leadership. Most existing studies regard prevention regulatory focus and promotion regulatory focus as opposite dimensions (Wang and Wang, 2021), but this study found that the two may produce synergistic effects under specific situations: In error aversion atmosphere, the promotion regulatory focus leaders will accelerate ego-depletion due to excessive pursuit of “zero error” goal, and prevention regulatory focus leaders will intensify moral disengagement due to “error aversion priority” tendency. This finding challenges the simple “promotion-positive/prevention-negative” dichotomy, suggesting that both types of regulatory may work together to reinforce irrational behavior patterns in stressful situations.

4.3 Practical implications

This study provides several practical implications for organizational managers to consider.

Firstly, the establishment of a “tolerance-learning” mechanism serves as the cornerstone for balancing error aversion with organizational effectiveness. Central to this approach is the need for

organizations to clearly differentiate between “exploratory failures”—reasonable missteps arising from innovation-driven experimentation—and “negligent inaction”—failures stemming from passive avoidance of responsibility. Exploratory failures should be systematically exempted from punitive accountability frameworks, while negligent behaviors must remain subject to strict consequences. To operationalize this distinction, organizations can institutionalize non-punitive error debriefing protocols, such as structured post-failure review sessions, to codify lessons learned from setbacks into actionable knowledge assets. These insights can then be disseminated across teams via internal platforms, transforming failures into shared organizational resources. Concurrently, incentive realignment is critical: leaders who proactively pursue innovation within predefined risk thresholds should be recognized through performance-based rewards (e.g., bonuses, promotions) to reinforce a culture of “intelligent risk-taking.” To prevent misuse, transparent risk-assessment criteria and accountability safeguards must be embedded to ensure error tolerance does not incentivize recklessness. By integrating these strategies, organizations can shift from a fear-driven paralysis rooted in error aversion to a learning-oriented agility that empowers leaders to act decisively while maintaining accountability, thereby breaking the cycle of impoverished leadership.

Secondly, Human resources departments must employ targeted intervention tools to prevent impoverished leadership. By embedding ethical sensitivity metrics (e.g., “propensity for responsibility avoidance,” “frequency of moral disengagement”) into leadership evaluations and integrating 360-degree feedback mechanisms, organizations can achieve early identification of potential risks associated with impoverished leadership. For leaders exhibiting high levels of resource depletion, HR should design personalized resource recovery plans, such as introducing mindfulness-based stress reduction programs or offering temporary role detachment periods, to help them rebuild psychological resources and restore decision-making capacity. Additionally, scenario-based simulation assessments should be incorporated into leadership selection processes. These simulations could replicate high error aversion climate (e.g., rapid decision-making during crises) to observe candidates’ behavioral patterns under pressure, prioritizing those who demonstrate the ability to balance risk-taking with accountability. This multi-pronged approach ensures proactive mitigation of impoverished leadership while fostering resilience and ethical accountability in organizational leaders.

Finally, leadership development strategies grounded in regulatory focus theory can maximize organizational adaptability. For promotion regulatory focus leaders, training should emphasize resource conservation tactics, such as breaking high-risk tasks into manageable sub-goals to reduce cognitive load per decision, while equipping them with resilience-building techniques (e.g., cognitive reappraisal) to sustain decision-making capacity under high-pressure scenarios. For prevention regulatory focus leaders, interventions must target cognitive bias correction—for instance, systematically exposing them to case studies highlighting team failures caused by inaction to amplify accountability awareness. A phased approach can be implemented, starting with low-stakes decisions and incrementally increasing responsibility weight (e.g., from approving routine budgets to crisis response planning), thereby dismantling the “inaction-as-safety” mindset.

4.4 Limitation and future direction

Although this study makes some contributions to the existing research, it has several limitations, which provide suggestions and opportunities for future research.

Firstly, While the experimental design of Study 1 effectively controlled variables through scenario simulations, its reliance on a sample primarily drawn from university student populations introduces potential limitations to external validity. Students may systematically differ from actual corporate managers in terms of workplace experience, risk perception, and organizational accountability. For instance, students' lack of practical managerial experience could lead to under-sensitivity to accountability risks, potentially skewing experimental effects (e.g., overestimating or underestimating relationships in real-world corporate settings). To enhance generalizability, future research should replicate the experimental protocol with mid-level corporate managers as participants and conduct comparative analyses to assess cross-sample consistency.

In the part of this study 2 that investigates the impact of an error aversion climate on leadership avoidance through a questionnaire survey, only cross-sectional data were collected. However, due to the limitations of cross-sectional data in explaining dynamic relationships between variables, this study cannot test the dynamic impact of an error aversion climate on impoverished leadership. Therefore, future research could be designed as longitudinal studies, such as using experience sampling methods or collecting data at multiple time points to explore the role of time in the process by which an error aversion climate affects impoverished leadership. Additionally, to collect authentic data without causing inconvenience to the participants, this study used projective methods to measure leadership avoidance. Future research could measure leadership avoidance through other evaluations, such as by having subordinates or superiors of the leaders provide assessments through paired methods.

Secondly, While this study constructs its theoretical model based on social cognitive theory and conservation of resources theory, it acknowledges the potential validity of alternative explanatory frameworks. For instance, social exchange theory could further elucidate leaders' risk-reward trade-off mechanisms (Ahmad et al., 2023). In error aversion climate, leaders may perceive an effort-reward imbalance (e.g., anticipated penalties for proactive accountability outweigh potential rewards), prompting psychological withdrawal as a self-protective strategy. Future research could develop integrated models to compare the explanatory power of distinct theoretical pathways, while employing cross-level analyses to examine how organizational systems (e.g., error tolerant climate, institutional support) interact with individual perceptions to shape leadership behaviors.

Additionally, The study did not test measurement invariance across demographic or organizational subgroups (e.g., senior vs. grassroots managers). While our sample demonstrated homogeneity in key variables (e.g., education, tenure), future research should establish configural, metric, and scalar invariance to ensure cross-group comparability. The sample of this study is from Chinese organizations, and cultural values (such as collectivism, high uncertainty avoidance) may influence the results. In the future, the theoretical model should be validated in a multicultural context to enhance its universality.

Finally, while this study identified the moderating role of regulatory focus in the relationship between an error aversion climate and impoverished leadership, it did not consider the moderating

effects of other personality traits, such as the Dark Triad and the Big Five personality traits. The Dark Triad consists of psychopathy, narcissism, and Machiavellianism. Leaders with Machiavellian or psychopathic traits often disregard others' feelings and traditional morality for their own benefit, while narcissistic leaders tend to be self-centered and are commonly found in leadership positions (Schlegel and Mortillaro, 2019). Conscientiousness, a dimension of the Big Five personality traits, is associated with high achievement motivation in leaders (Umphress et al., 2020). Given this, the Dark Triad and Big Five personality traits may also have moderating effects. Therefore, future research could explore these personality traits to examine the boundary conditions in the relationship between an error aversion climate and impoverished leadership.

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.

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 or patients/participants legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

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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.

Generative AI statement

The authors declare that no Gen AI was used in the creation of this 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.2025.1503447/full#supplementary-material>

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Developing an index for measuring gender lens investing in organizations: the GLIMETRICS framework

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Introduction: The objective of this article is to develop and validate a metric for assessing gender lens investing (GLI) practices within organizations. The validation of these measurement items constitutes a methodological innovation, responding to calls in the literature for the exploration of novel approaches in comparative studies.

Methods: To achieve this objective, the development of the measurement items was informed by a comprehensive literature review, and their content validation was conducted through a Delphi study.

Results: The primary outcome of this research is the recommendation and validation of a tool designed to measure various dimensions of GLI practices, from both an academic standpoint and the perspective of expert evaluators.

Implications: The application of this tool is expected to facilitate the integration and generalization of diverse perspectives on GLI. As Investment Fund Agencies and companies increasingly invest in GLI initiatives, there is a growing demand for robust instruments to effectively assess their impact.

KEYWORDS

gender lens investing (GLI), Delphi method, gender issues, value creation, gender metrics

1 Introduction

Gender lens investing (GLI) practices refer to a movement that, for ethical reasons, establishes or capitalizes funds and companies supporting women as leaders and throughout society (Roberts, 2016). The idea that women should have access to training and jobs in all areas of work, receive equal pay, be able to reconcile work and family life on equal terms with men, and that companies should be organized not only by men but also by women who understand the diverse needs of consumers, aligns with key objectives in organizational psychology. According to Chmiel et al. (2017), in 'organizational psychology', psychology plays a central role, as it pertains not only to management but also to how managers lead, how coworkers interact, and how organizations function. In this sense, measuring the effectiveness of GLI policies in companies means assessing whether organizational psychology accounts for gender diversity.

Initial measurements focused on economic impact and risk distribution (Criterion Institute, 2020). Indeed, similar to environmental, social, and governance funds (ESG), investing with a gender lens has proven advantageous for companies. This approach not only fosters a sense of safety and inclusion among but also leads to better long-term economic results (Subramanian, 2022). In fact, numerous reports have demonstrated the importance of this concept, including “Just Good Investing: Why Gender Matters to your Portfolio and What You Can Do about it” (Calvert Impact Capital, 2019), “Gender Lens Investing Landscape. East & Southeast Asia” (2020), “Gender Lens Investing: Legal Perspectives” (2021), which discusses the incorporation of gender considerations in loans and in equity investment, and the “Gender Lens Investing Report” (2021), among others. All these reports reference projects funded by investment funds (equity or public), yet it is reasonable that the portfolios themselves are not publicly disclosed. Nonetheless, private investment in such funds is on the rise, and therefore, some companies are mentioned as business cases (Sasakawa Peace Foundation, Catalyst at Large, and SAGANA, 2020).

However, the initial initiatives to develop a tool for measuring investment with a gender lens seem not to have studied the earlier attempts at measurement. These initiatives either focus on different aspects to be measured, use different metrics, or address different fronts such as investment funds, small businesses, entrepreneurship, governance, etc. Among the most recent initiatives, Sustainable Finance Geneva suggested five infrastructures along with their respective tools for measuring GLI criteria (2021):

- 1 EDGE (Economic Dividends for Gender Equality). It assesses the gender balance within organizations across their talent pipeline, examines pay equity, evaluates the effectiveness of policies and practices aimed at fostering equitable career progression, and examines the inclusivity of their organizational culture.
- 2 UN Women and UN Global Compact. It establishes the Women’s Empowerment Principles (WEPs): This operational framework helps private companies promote gender equality and women’s empowerment within their organizations or community. Rather than measuring, it generates GLI criteria to influence public opinion internationally.
- 3 The IRIS+ System evaluates social and environmental factors, as well as gender equality. However, this evaluation system is aimed only at investment funds (not at individual companies or entrepreneurs) and therefore focuses on risks and returns in investment decisions.
- 4 The Small Assistance Fund (SEAF) Gender Equality Scorecard assesses six factors: pay equity, workforce participation, leadership in governance, benefits or professional development, workplace environment, and women-powered value chains. However, these measurements are aimed only at small and medium enterprises (SMEs).
- 5 The 2X Criteria was launched to help investors assess gender-smart businesses, targeting both funds and companies equally. They measure risk and impact on the one hand and gender aspects on the other. The criteria have been globally adopted and supported by IRIS+, HIPSO (Harmonized Indicators for Private Sector Operations), the Organization for Economic Cooperation and Development’s (OECD), UN Women’s WEPs.

They have also been adopted by the International Finance Corporation (IFC).

To our knowledge, Small Enterprise Assistance Funds (SEAF) has generated the first tool to identify small businesses founded by women, through which diversity can be promoted via private funds. This identification is based on the six vectors aforementioned (2020). The inception of GLI focuses on female entrepreneurship because it stimulates aggregate demand, enhances the consumption of final goods and services, and contributes to economic and social development, thereby fostering more equitable societies by empowering women to secure their own livelihoods (Aljarodi et al., 2021).

The economic independence of women can pose significant challenges, especially for those who are single mothers or of foreign origin (Yin et al., 2023). Therefore, it is crucial to undertake the implementation of the commitments established in the 2030 Agenda, the most comprehensive global action plan worldwide, by all subscribing countries, to ensure the respect for the rights of women and girls. Although not the primary focus of this article, the support for female entrepreneurship is instrumental in integrating economically dependent family members into society, such as elderly relatives, as explored in the “Silver Economy” (Argentum, 2024) or dependent minors (Becker, 1991).

Following SEAF, the social enterprise Pro Mujer was founded in 1999 to help women develop their economic potential in Latin America. Together with Deetkeen and with the support of the United States Agency for International Development (USAID), they developed a document called “Tools for Investing with a Gender Perspective” (2021). These tools are divided into four sub-lenses that structure the topics of the yearly GLI Latam forums from 2020 to 2024, namely: (1) Women in leadership; (2) Equality in the workplace; (3) Products and services that benefit women and girls; (4) Equality in the value chain and advocacy practices. This document marked the initial comprehensive endeavor to measure gender equality within a company, alongside its gender-oriented investment strategy. “Tools for Investing with a Gender Perspective” assesses internal management policies and collaboration with civil society, as well as other local or global organizations. The document evaluates the efforts of organizations or funds to offer integrated services, including financial assistance, health, and educational loans, to low-income women in Latin America and the Caribbean.

A condensed version of this document, titled “Self-diagnosis of Gender Approach in Management,” has also been developed by Pro Mujer in partnership with Deetkeen Impact in their joint fund, the Ilu Women’s Empowerment Fund. This fund represents the first gender lens investing fund aimed at empowering women and advancing gender equality in Latin America and the Caribbean (Ilu Women’s Empowerment Fund, 2021). Unlike the comprehensive assessment, this self-diagnosis tool focuses solely on evaluating a company’s management of gender lens investing rather than its investment actions in civil society. Its aim is to categorize a company as meeting the GLI criteria for receiving gender lens investments. The purpose of this exercise is to enable organizations to make informed decisions, prioritize actions, and effectively implement their commitment to gender equality. The results of the assessment outline three possible levels of advancement (basic, intermediate, or advanced) and recommend referring to the tools available for each lens.

Two years later, the PNC Financial Services Group, introduced six criteria to gender lens investors: gender diversity, women in leadership, women founders and fund managers, women-majority enterprise, gendered policies and practices, and products and services tailored to meet the needs of women (2023). “Diversity” appears to be the only aspect not explicitly addressed in the sub-lenses of the Ilu Women’s Empowerment Fund questionnaire, but it is a theme that emerges when discussing the second lens (“equality”).

EDGE auditing provides EDGE Certification, recognized as the leading global standard for Diversity, Equity, and Inclusion (DE&I) (EDGE Certified Foundation, 2024). The EDGE Standards and the Certification System are built on four pillars:

- 1 Representation at all levels of the organization, with particular emphasis on boards of directors and senior management.
- 2 Pay equity.
- 3 Effectiveness of policies and practices to ensure equitable career progression, including equal pay for equivalent work, recruitment and promotion processes, leadership development training and mentoring, flexible working arrangements, and organizational culture.
- 4 Inclusiveness of the culture, as indicated by employees’ ratings regarding career development opportunities (EDGE, 2024). Although the self-diagnosis developed by the Ilu Women’s Empowerment Fund in 2021 does not explicitly mention “culture,” it is implicitly considered within the metrics of “value chain and advocacy practice.” Like the Ilu Women’s Empowerment Fund, EDGE aims for equity at the workplace; specifically, a minimum of 30% female representation at all levels of companies. However, achieving this 30% threshold poses a greater challenge in boards of directors and senior management (reports from the national securities market commission).

Regarding the 2X Criteria, it can be utilized by any entity to establish their own benchmarks for new business and portfolios, as well as for self-reporting. Specifically, the 2X Criteria aids in identifying eligible investments through four criteria focused on the company itself: (1) entrepreneurship; (2) leadership; (3) employment; and (4) consumption of products and services for women (2X Challenge, 2024). Additionally, it incorporates an indirect criterion, “investments through financial intermediaries.” Therefore, it aligns with SEAF’s emphasis on small businesses and women entrepreneurs, as well as with the Ilu Women’s Empowerment Fund’s four sub-lenses, while also incorporating aspects such as “diversity” (PNC), “culture” (EDGE), and frameworks developed by the IRIS+ System and WEPS. Notably, the 2X Criteria is regarded as the global standard for gender finance.

Female participation and involvement in decision making processes is a component of a “virtuous circle” that brings economic and social benefits to new generations, particularly emphasizing young women (Daher et al., 2022). In Spain, an innovative program has been implemented to promote gender equality and bolster female leadership in the professional realm. Known as “Destino Talento” this initiative is the result of an agreement between *Closingap* and 50&50 GL, aimed at mentoring young women to achieve specific objectives (50&50 Gender Leadership, 2023). The primary objective of this program is to enhance women’s self-esteem and self-confidence,

focusing on digital transformation and the values society needs, in line with the #ODS hashtags.

As more investors seek transparency regarding the criteria for selecting Gender Lens Investing (GLI) within portfolio companies, there is an increasing urgency to develop an integral tool for measuring and evaluating GLI policies and practices. Efforts to measure investment through a gender lens so far appear to complement one another; in fact, many of these initiatives have been supported by public funding from the UN (e.g., UN Women, UN Global Compact, and the 2X Criteria), which seem to advocate for an international tool that can assist their Supreme Audit Institutions (SAIs). However, no existing tool currently combines the strengths of the methods mentioned above. Therefore, the primary objective of this research is to propose a tool for self-assessing the impact of Gender Lens Investment (GLI) within companies, addressing the gaps left by previous measurement methods. Several organizations have already aimed to measure investment through a gender lens; however, to our knowledge, no academic metrics validated by both company and academic experts in Gender Lens Investing (GLI) have been identified.

Considering this, the purpose of this study is to develop a tool that will assist large national and international companies in measuring their organizational practices with a gender lens to establish a metric. This will facilitate their identification by investment fund consultants and inclusion in portfolios sought by investors with a gender lens. To accomplish this goal, a comprehensive review of prior tools, in collaboration with a board of experts, has provided critical insights into: (a) the dimensions to be incorporated in a metric designed to identify exemplary organizational practices in Gender Lens Investing (GLI); (b) the specific aspects of GLI organizational practices that merit particular emphasis; and (c) the prioritized importance of these identified dimensions based on expert evaluation.

As demonstrated, the objectives of the aforementioned organizations in measuring Gender Lens Investing (GLI) have been varied, encompassing legal compliance, support for women facing exclusion, the promotion of women-led small businesses, and enabling companies to self-assess their management practices and social investments in women-supportive activities. Consequently, firms should adopt proactive organizational mechanisms to empower and reinforce gender balance, considering the established benefits associated with this approach (Saeed et al., 2023).

Given these diverse dimensions, managers, mid-level professionals, and gender experts should combine efforts to develop a standardized metric applicable to both medium-sized and large enterprises. In this context, the Delphi method serves as a structured approach to address the current lack of consensus on such a metric.

After this introduction, the second section outlines the Delphi methodology, and the sequential phases employed to validate the questionnaire based on the identified dimensions, Part 3 describes the results and in section discussion and conclusions are presented.

2 Materials and methods

The Delphi is a widely used method in the context of research, especially in the field of Business and Social Sciences (Cabero Almenara and Infante Moro, 2014; Reguant-Alvarez and El Torrado-Fonseca, 2016). Many studies have shown its effectiveness to collect

an expert view on different topics (Guldenmund, 2007; Fife-Schaw, 2020).

It is a valuable tool to assess the rigor and relevance of the items of a questionnaire based on the opinion of a group of experts through repeated consultations as they have several opportunities to give and revise their opinion (Giannarou and Zervas, 2014). It is an iterative process (López Gómez, 2018), controlled, guaranteeing the anonymity of the experts who receive statistical feedback of the overall response of the participants derived from the different rounds (Reguant-Alvarez and El Torrado-Fonseca, 2016) and allows consensus to be obtained avoiding direct confrontation between them, groupthink (Holeman et al., 2024) or that a few dominate the process (Boulkedid et al., 2011) and other types of influences or biases (Santaguida et al., 2018). Ultimately, it is characterized by anonymity, iteration and controlled feedback (Cuhls, 2023). These characteristics allow obtaining a balanced group response based on statistical data.

2.1 Delphi stages

In the context of the preparation and execution of a Delphi study, a series of steps are deployed that are often grouped into different stages. The number and names of these stages vary according to the literature consulted. Within the framework of this research (Bravo Estévez and Arrieta Gallastegui, 2005), three fundamental phases have been identified: preparatory, exploratory and final.

2.2 Preparatory phase

The following tasks were carried out during the first phase, preparatory:

- Configuring the Coordination Group: it is composed of the four authors who participated in the research.
- Literature review: an exhaustive search was conducted for papers related to ways of measuring the impacts of LIGs. The literature review made it possible to recognize the particularities of isolated recommendations on how to measure LIGs. For this reason, a set of items was included in the expert survey.
- Elaboration and revision of the GLI questionnaire for its validation. The coordinating team prepared the questionnaire, and, after its revision, 3 dimensions related to each of the GLI variables and 1 dimension with sociodemographic data were included (see Image 1). Each dimension included different objectives with a 6-point Likert scale, where 1 was totally disagree and 5 was totally disagree, 6 was do not know/no answer, open questions because they offer very valuable information (Hung et al., 2008, p. 197) and multiple response questions (See Table 1).

To evaluate the expertise of these two GLI experts, the Competence Coefficient (Kcomp) proposed by García-Martínez et al. (2012, p. 212) was applied, which is calculated as follows:

$$K_{comp} = 0.5 * (K_c + K_a)$$

In this expression, Kc is obtained from the self-assessment made by the experts, and Ka is obtained from the professional experience and the number of publications (See Table 2). Both experts obtain scores above 0.8; therefore, they can be considered as valid because their level of competence is high.

The items of first draft of questionnaire were submitted for evaluation through the Delphi technique during the month of January 2024.

- Elaboration of the questionnaire for the first round of the Delphi:

The questionnaire sought the experts' opinions on the clarity and relevance of the items related to each of the dimensions considered in GLI and their corresponding measurement scales (Table 1).

Figure 1 presents the dimensions and objectives that, once considered most outstanding antecedents, our proposed questionnaire to measure practices centered on gender lens investing should include in any company.

- Selection of the panel of experts:

The selection of experts was one of the key aspects for the validity of the Delphi results. In this sense, the criteria for the selection of experts and the number of experts selected depended on the topic to be addressed and the objective to be achieved with the application of the Delphi method (appointments) and to avoid a high number of experts, since in this case the "dropout and rejection rate" is higher (Reid and Reid, 1988; Ortega Mohedano, 2008). According to Varela-Ruiz et al. (2012), this technique makes it possible to congregate knowledge increased by the concurrence of various experts.

Given the specificity of the object of study and the lack of previous studies, a small panel of experts was chosen. The coordinating team invited 20 potential experts who met the selection criteria. Ultimately, 10 of them agreed to participate in the study. The size of the panel is appropriate, given that, although there are clear discrepancies in the academic community as to the optimal number of panellists (minimum 5, maximum 30), it is within the parameters of representativeness (Zartha Sossa et al., 2019).

In this phase, the aim is to obtain a collective and diverse view of the experts on GLI through successive rounds of questions.

The objective criteria for the selection of the panellists (see Table 3) were as follows:

- Gender: Priority was given to the participation of women.
- Work Experience: Panellists with more than 15 years of experience were considered.
- Educational level: At least a bachelor's degree was required and, preferably, higher education (master's or doctorate).
- Age: Representatives of generations Z, Y, X and Baby Boomers were included.
- Professional category: Diversity was sought, from technical to managerial or middle management positions.
- Position: many panelists are employed in roles that entail diversity and gender responsibilities, or in human resources department.
- Professional recognition: through participation in scientific or professional publications, some of the panelists are members of relevant professional associations.
- Sector: Panellists were selected from organizations belonging to different economic activities.

TABLE 1 Dimensions, related objectives and number of items of the questionnaire.

Dimension	Objective	Number of Likert-type scale items.	Number of items with open-ended questions
 Leadership	Objective 1: To know if the company conducts diagnostics on women's participation in the company	7	3
	Objective 2: To know if the company has a commitment to gender equality and gender mainstreaming in business management.	17	
	Objective 3: To know if the company has an inclusive governance approach with a gender perspective.	14	
	Objective 4: Find out if the company develops actions among the organization's strategies to promote the participation and presence of women in decision-making and management positions.	5	
 Equal employment opportunity	Objective 5: To determine whether the company has implemented work-life balance measures	11	1
	Objective 6: Find out whether the company takes equal pay into account.	4	
	Objective 7: Find out if the company has protocols in place to prevent and address workplace harassment (of any kind), violence, including sexual harassment	8	
	Objective 8: To determine whether the company measures the work environment from a gender perspective.	5	
 Equality of products and services that the company offers to the Market	Objective 9: Find out if the company develops or provides any product or service with a gender perspective.	5	1

		Multiple choice questions	Number of items with open-ended questions
 Sociodemographic	Gender, year of birth, educational levels, work experience, time worked, category of organization, sector, year of creation, size of company, job category, % of women in the company, % of women in management positions, % of women on board of directors or similar and others	19	3
Total		95	8

Own elaboration.

- Preparation of the final questionnaire for the first round of the Delphi:

In this phase, two experts (a university professor and a manager of a multinational company in the financial sector, both with extensive knowledge and experience in gender) were asked to propose improvements to the questionnaire.

Their suggestions involved including some questions (Example: 6.4. Salaries are equal for men and women in identical job profiles; 7.11. In my company, people who take advantage of reconciliation measures have the same career development opportunities as the rest of the staff) and that we included the alternative Do not know/No answer.

The above suggestions were incorporated into the questionnaire that was finally sent to the panel of experts. Before sending the questionnaire, the coordinating team sent an email describing the objective, the process, a QR code and an electronic link to the Microsoft Forms questionnaire.

2.3 Exploratory phase

During this exploratory phase, two rounds of expert consultations were carried out to reach a consensus on the appropriateness and validity of the GLI items and its measurement scale.

TABLE 2 Criteria for the argumentation coefficient.

Sources of argumentation	Degrees of influence of sources on their knowledge and judgement		
 Professional experience	15 or more years	Between 5 and 10 years	5 years or less
	0,5	0,4	0,25
 Publications related to the object of study	Scientific publications	Scientific publications	No Publication
	0,5	0,4	0,25
Total	1	0,8	0,5

Adapted from Paris, 2015.

TABLE 3 Panel of experts who participated in the study.

Id	 Sector	 Time worked	 Educational levels	 Job category	 Position	 Year of birth
1	Manufacturing industry	+ 20 years	Master's degree	Middle Management Position	Human Resources Management	1965–1980
2	Education and Training	+ 20 years	Doctorate	Executive Position	Vicepresident	1946–1964
3	Professional Services and Consulting	+ 20 years	Master's degree	Executive Position	Principal Partner -Insurance Leader	1965–1980
4	Energy and Environment	+ 20 years	Bachelor's Degree, University Degree, Engineering or similar	Technical Position (from all departments: HR, financial,...)	Performance Management	1965–1980
5	Others (Specify): Entertainment and leisure	+ 20 years	Master's degree	Executive Position	Corporate Director of Talent Acquisition	1965–1980
6	Others (Specify): Media Agency	+ 20 years	Bachelor's Degree, University Degree, Engineering or similar	Middle Management Position	Customer Service Director	1965–1980
7	Finance, banking and insurance	+ 20 years	Master's degree	Middle Management Position	Deputy Director of International Affairs	1965–1980
8	Technologies/Computer Science and Telecommunications	16–20 years	Master's degree	Middle Management Position	Talent Management Leader	1981–1996
9	Manufacturing industry	+ 20 years	Master's degree	Middle Management Position	Development Manager	1946–1964
10	Professional Services and Consulting	+ 20 years	Master's degree	Executive Position	Director of Experience and Culture	1965–1980

Own elaboration.

- First round: the questionnaire proposed by the coordinating team was sent to the 10 experts so that they could give their opinion on the suitability of the items chosen for measuring the GLI. The questionnaire was divided into 10 blocks corresponding to the 3 dimensions of GLI. In each block, the expert is asked to indicate whether he/she considers that these questions correctly measure the aspects they are intended to measure. If he/she considers that the question is inadequate, he/she is asked to propose an alternative question and/or to make any suggestions or appreciations he/she may have in this regard. At the end of each section of the questionnaire, the expert was asked if, based on his or her professional experience, he or she could identify other

aspects of GLI not covered by the study. This first round was carried out during week 3 of the month of January and February 2024.

- Second round: after processing the responses and analysing the overall results of the first round, the coordinating team prepared a report with the results obtained in the first round. Table 4 shows the level of consensus during the rounds.

After analyzing the comments and suggestions made by the experts, the questionnaire to be sent out in the second round was prepared, including information on the degree of agreement on each question and most of the suggestions revolving around the

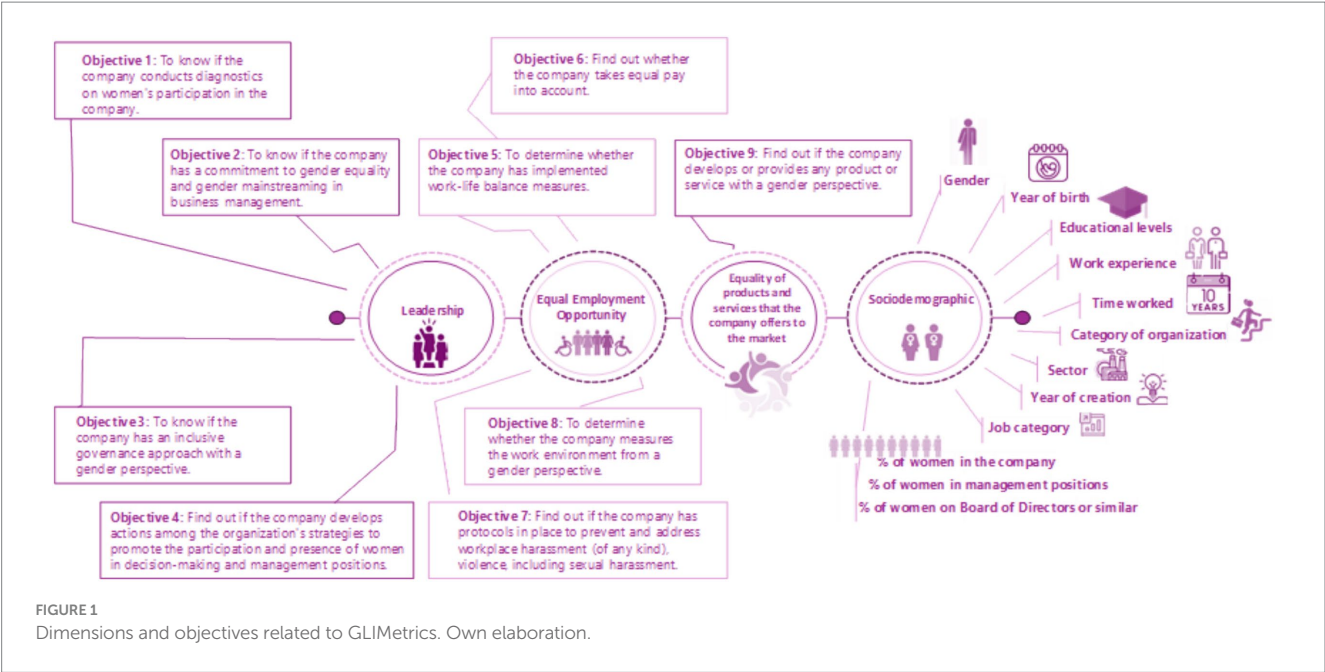


TABLE 4 Level of expert consensus during the rounds.

Level of consensus		
Agreement (A)	Neutral (N)	Disagreement (D)
Mdn ≥ 4 and IQR ≤ 1.5		Mdn ≤ 3.5 and IQR ≤ 1.5
or	If Mdn ≥ 3,5 and IQR ≤ 2	or
If Mdn ≥ 4 and IQR ≤ 2 and f (4–5) 70%		If Mdn ≤ 3.5 and IQR ≤ 2 and f (1–3) 70%

Mdn = median; IQR = interquartile range. Adapted from Mengual-Andrés et al. (2016).

terminology used. This second round was carried out during the month of June 2024.

In this second round, the experts were asked to re-evaluate their responses considering the new information obtained in the first round in search of consensus.

2.4 Final phase

At the end of second round, a statistical analysis was carried out to quantify the responses, aggregate values and obtain a score that reflects the consensus among the experts. As a result of the whole process, the definitive and validated GLI items were generated and incorporated into the GLI metrics questionnaire. Figure 2 shows an outline of the steps followed in the 3 phases that have been carried out in this study.

3 Results

Once the information from the first round was collected, the responses of the 10 experts were analyzed on 76 items grouped into 11 objectives around each of the 3 dimensions identified, GLI and

leadership, GLI and labor equality, and GLI on Equality of products and services offered by the company to the market, and on 19 items related to socio-demographic variables and gender. The experts responded on a Likert scale of 1 to 5, where 1 was strongly disagree, 2 was disagree, 3 was neither agree nor disagree, 4 was agree, and 5 was strongly agree.

Although there is no single way of determining when a consensus is reached among the different experts consulted in the Delphi, in this study it is understood to be reached under the criteria established by Mengual-Andrés et al. (2016) and López Gómez (2018). The median was chosen as the indicator of central tendency, supported by the interquartile range (IQR) (López Gómez, 2018; Margherita et al., 2021). Furthermore, the median value is very close to the mean, indicating that the distribution is approximately symmetrical.

Several studies have used 70% as the cutoff point (Lee et al., 2013; Campbell et al., 2018). Taking this into account, approximately 70% of GLI and Leadership were agreed, excluding the following items: 2.5, 2.10, 2.11, 2.12, 2.13, 2.14, 2.15, 2.16, 2.17, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 4.1, 4.2, 4.3, 4.4, and 4.5. Tables 5–7 shows the results of the first round of the Delphi.

As it can be observed in Tables 5–7, the results demonstrate a high level of consensus among participants with regard to the identification of gender gaps, the implementation of measures designed to promote

TABLE 5 Round I Delphi results: GLI and leadership.

Dimension 1: GLI and leadership						Quartile					
	Mean	Mo	Mdn	SD	CV	1	3	IQR	RIR	f (4-5)	CONS ¹
Objective 1: To know if the company conducts diagnostics on women's participation in the company											
1.1. The company identifies the gaps between women and men.	4.6	5	5	0.97	21%	5	5	0	0	90%	A
1.2. The company identifies areas where women are under-represented.	4.4	5	5	0.97	22%	4	5	1	0.2	90%	A
1.3. The company identifies: the number of employees promoted.	4.3	5	5	1.49	35%	5	5	0	0	80%	A
1.4. The company identifies: the number of female board members.	4.1	5	5	1.73	42%	4.25	5	0.75	0.15	80%	A
1.5. The company identifies: the number of female managers.	4.6	5	5	0.97	21%	5	5	0	0.15	90%	A
1.6. The company analyses the barriers to women's access to decision-making positions.	3.9	5	4.5	1.45	37%	3.25	5	1.75	0.39	70%	A
1.7. The results of the above analyses are used to design strategies to promote the participation of women in decision-making and management positions.	4	5	4	1.05	26%	3.25	5	1.75	0.44	80%	A
Objective 2: To know whether the organisation is committed to gender equality and gender mainstreaming in management.											
2.1. My organization's mission statement includes a commitment to gender equality.	4.3	5	5	1.06	0.25	4	5	1	0.2	80%	A
2.2. Gender equality is included in my organization's objectives.	4.4	5	4.5	0.7	0.16	4	5	1	0.22	90%	A
2.3. My company formally acknowledges its responsibility for equality to its workforce and to society	4.6	5	5	0.7	0.15	4.25	5	0.75	0.15	90%	A
2.4. An equality plan is in place.	4.6	5	5	0.84	0.18	5	5	0.00	0	80%	A
2.6. The equality plan is published on the website to give effect to the organization's commitment.	4.22	5	5	1.09	0.26	4	5	1	0.2	70%	A
2.7. My organization has specific gender awareness and training programs for all staff.	4.1	5	4	0.99	0.24	4	5	1	0.25	80%	A
2.8. Employees confirm that their views are considered in the organization's internal actions on gender issues.	3.9	5	4	1.2	0.31	3.25	5	1.75	0.44	70%	A
2.9. HR implements strategies and concrete actions to neutralize possible gender bias in selection processes.	4.3	5	4.5	0.82	0.19	4	5	1	0.22	80%	A
Objective 3: To know if the company has an inclusive governance approach with a gender perspective.											
3.1. There is a strategic document setting out the organization's internal actions.	3.9	4	4	0.99	0.25	3.25	4.75	1.5	0.38	70%	A
3.12. The strategic plan has been approved by senior management.	4.22	5	5	1.2	0.28	3	5	2	0.4	67%	A
3.13. Senior management is committed to the plan	4.11	5	5	1.17	0.28	3	5	2	0.4	67%	A

1 Mdn = median; Mean = arithmetic mean; SD = standard deviation; CV = coefficient of variation; IQR = interquartile range; RIR = relative interquartile range; f(4-5) = frequency of assessment 4 and 5; CONS = level of consensus. Own elaboration.

TABLE 6 Round I Delphi results: GLI and equal employment opportunity.

Dimension 2: GLI and equal employment opportunity						Quartile					
	Mean	Mo	Mdn	SD	CV	1	3	IQR	RIR	f (4–5)	CONS ¹
Objective 5: To determine whether the company has implemented work-life balance measures											
5.1. The company has implemented some work-life balance measures (for example: teleworking, flexible schedules, compressed work weeks, paid and unpaid leave, workroom...).	4	5	5	0.53	0.13	4	5	1	0.2	100%	A
5.2. Reconciliation measures are published.	3.89	4	4	0.53	0.14	4	5	1	0.25	100%	A
5.3. There is a known process for requesting conciliation measures.	4	5	5	0.53	0.13	4	5	1	0.2	100%	A
5.4. Reconciliation measures avoid stereotypes and roles.	3.67	5	4	0.83	0.23	4	5	1	0.25	78%	A
5.9. In my company, the need to reconcile work and family life is seen as something that concerns both male and female employees.	3.78	4	4	0.71	0.19	4	5	1	0.25	89%	A
5.11. In my company, people who use conciliation have the same career opportunities as the rest of the staff.	3.89	4	4	1.05	0.27	3	5	0.5	0.5	67%	A
Objective 7: Find out if the company has protocols in place to prevent and address workplace harassment (of any kind), violence, including sexual harassment.											
7.1. The company publicly supports zero tolerance.	4	5	5	0.76	0.19	4	5	1	0.2	88%	A
7.2. A protocol is in place to prevent and address workplace violence, including all forms of harassment	4.56	5	5	1.01	0.22	5	5	0	0	89%	A
7.3. The protocol is made public.	4.56	5	5	1.01	0.22	5	5	0	0	89%	A
7.4. The mechanisms for activating the protocol are clear.	4.33	5	5	1.12	0.26	4	5	1	0.2	78%	A
7.5. The mechanisms for activating the protocol are friendly	4.22	5	5	1.09	0.26	4	5	1	0.2	78%	A
7.6. The Protocol guarantees confidentiality.	4.56	5	5	1.01	0.22	5	5	0	0	89%	A
7.8. The people who design and implement the protocol are trained in gender equality, workplace violence, sexual harassment and bullying.	4.5	5	5	1.27	0.28	4	5	1	0.2	67%	A
Objective 8: To determine whether the company measures the work environment from a gender perspective.											
8.1. A work climate survey is conducted with a gender perspective.	3.9	5	4	1.2	0.31	3.25	5	1.75	0.44	70%	A
8.2. It is applied to all personnel on a regular and confidential basis.	4.1	5	4.5	1.1	0.27	3.25	5	1.75	0.39	70%	A
8.5. The persons responsible for the design and implementation of the protocol receive training in the following areas: gender equality, workplace violence, sexual harassment and bullying.	4.13	5	4.5	1.13	0.27	3.75	4.75	1.25	0.28	75%	A

¹ Mdn = median; Mean = arithmetic mean; SD = standard deviation; CV = coefficient of variation; IQR = interquartile range; RIR = relative interquartile range; f (4–5) = frequency of assessment 4 and 5; CONS = level of consensus. Own elaboration.

TABLE 7 Round I Delphi results: GLI and equality of products and services that the company offers to the market.

Dimension 3: GLI and equality of products and services that the company offers to the market						Quartile					
	Mean	Mo	Mdn	SD	CV	1	3	IQR	RIR	f (4–5)	CONS ¹
Objective 9: Find out if the company develops or provides any product or service with a gender perspective.											
9.3. Information from different genders (customers) is utilised in an equal manner for the purpose of product or service development.	3.89	4	4	1.05	0.27	3	5	2	0.5	67%	A
9.6. In customer service, care is taken not to reproduce gender stereotypes.	4.5	5	5	0.97	0.22	4.25	5	0.75	0.15	90%	A

1 Mdn = median; Mean = arithmetic mean; SD = standard deviation; CV = coefficient of variation; IQR = interquartile range; RIR = relative interquartile range; f (4–5) = frequency of assessment 4 and 5; CONS = level of consensus. Own elaboration.

equality and reconciliation, and the existence of anti-harassment protocols. The median score for these items on the first Delphi round questionnaire is 4 or above, indicating agreement. This value remains constant in the second and third quartiles, indicating that the majority of responses are concentrated in Likert scale scores 4 or 5. This confirms a relatively symmetrical distribution. The interquartile range (IQR) reaches a maximum value of 2 (≤ 1.5), indicating a low dispersion of responses. Moreover, the proportion of ratings 4 and 5 (agree, strongly agree) is at least 70% ($\geq 70\%$), reaching 100% in some cases. Except for items 3.12, 3.13, 5.11 and 7.8, which were included with 67% of ratings 4 and 5. The remaining items were included because they met the other conditions and were close to the 70% level of agreement.

The data presented above indicates that a consensus has been reached among the experts participating in the initial round of the Delphi study with respect to the appropriateness and clarity of the GLI items illustrated in Tables 5–7. For items related to GLI Leadership, and GLI Quality of products and services that the company offers to the market, the frequency of ratings 4 and 5 on the Likert scale is 79%, and for GLI Equal Employment Opportunity 83%. Applying the acceptance criteria, we observe that, for all items, the median ≥ 4 and $IQR \leq 1.5$ are met. Subsequent to the aforementioned conclusions, the coordinating group proceeded to conduct a second round of questioning, encompassing those items which were identified as exhibiting discrepancies of opinion and failing to satisfy the requisite conditions:

As illustrated in Table 4, the medians (4 and 5) indicate a predominantly positive perception of the assessed areas, while the interquartile ranges (IQRs) vary, demonstrating a divergence in consensus among respondents. The data demonstrate a slight positive skewness. This is characterized by a mean that is lower than both the median and mode. However, there are instances where the mean, median and mode are almost equivalent. This suggests that the distribution is more symmetrical. In round II, all experts who participated in the first round participated too. The results of the second round are shown in Tables 8–10.

As shown in Table 9, the values of all statistical parameters improve with respect to the previous round, indicating that the redrafting of the questions following the suggestions of the experts has strengthened the degree of consensus among them. For items related

to GLI and Leadership, the frequency of ratings 4 and 5 on the Likert scale is 38%; GLI and Equal Employment Opportunity 57% and for GLI and Equality of Products and Services that the company offers to the Market 10%. Applying the acceptance criteria, we observe that for all items, the median ≥ 4 and $IQR \leq 1.5$, are met.

In Table 11, both rounds are compared to find out the stability of the panel, which is understood as the consistency in the experts' opinions between successive rounds of the Delphi, regardless of their degree of convergence (Pozo et al., 2007). In Table 8, the different parameters analyzed in both rounds are compared, and improvements are shown.

Stability occurs if the variation of the interquartile range between rounds is less than 0.30 and consensus is reached if the variation of the coefficient of variation between rounds is less than 0.40 (Mengual-Andrés et al., 2016) as shown in Figure 3.

Based on the results obtained, the Delphi is closed after the second round, given that the criteria for closing the Delphi are met, as there is a high degree of consensus (median and interquartile range) and great stability in the opinions of the experts between rounds (variation in RIR and CV between rounds).

A comparative analysis of the two rounds revealed notable variation in the coefficient of variation (CV) and relative interquartile range (RIR) across three key dimensions. The dimensions of GLI and Leadership, GLI and Equal Employment Opportunity, and GLI and Equality of Products and Services were examined.

With regard to GLI and Leadership, the CV demonstrated an increase of 0.10 units, thereby indicating a greater dispersion in the second-round data in comparison to the first round. Concurrently, the RIR increased by 1.16 units, indicating a greater degree of relative variability in the distribution of the data. In the domain of equal employment opportunities, the coefficient of variation (CV) decreased by 0.11 units, indicating a reduction in the dispersion of the data. Conversely, the relative interquartile range (RIR) increased by 0.74 units, suggesting greater relative variability. Lastly, with regard to equality in products and services offered by the company, the coefficient of variation (CV) exhibited a modest increase of 0.02 units, while the relative interquartile range (RIR) demonstrated a pronounced surge of 1.88 units, indicating a considerable variability in the distribution between the two rounds.

TABLE 8 Results of Delphi round II GLI and leadership.

Dimension 1: GLI and leadership						Quartile					
	Mean	Mo	Mdn	SD	CV	1	3	IQR	RIR	f (4–5)	CONS ¹
Objective 2: To know whether the organization is committed to gender equality and gender mainstreaming in management.											
2.5. The staff is regularly informed about the actions of the equality plan.	3.80	4.00	4.00	1.03	0.27	4.00	4.00	0.00	0.00	80%	A
2.10. Training programs are in place to promote women to management positions.	3.50	2.00	3.50	1.27	0.36	2.50	4.75	2.50	0.71	50%	N
2.11. Staff are periodically asked for their opinion on internal actions on gender issues.	3.30	4.00	3.50	1.34	0.41	2.50	4.00	1.75	0.50	50%	N
2.12. Employees are regularly asked for their opinion on internal actions on gender issues.	2.60	2.00	2.50	1.07	0.41	2.00	3.00	1.00	0.40	10%	D
2.13. Gender differences are regularly reviewed in my organization.	3.30	3.00	3.00	1.06	0.32	3.00	4.00	1.00	0.33	40%	N
2.14. More men than women are employed on temporary contracts.	2.30	3.00	2.50	1.06	0.46	1.25	3.00	1.75	0.70	10%	D
2.15. Permanent contracts are more common for men than for women.	2.20	3.00	2.50	0.92	0.42	1.25	3.00	1.75	0.70	0%	D
2.16. Is there a job/occupation where only men have been recruited?	3.10	4.00	3.50	1.37	0.44	2.25	4.00	1.75	0.50	50%	N
2.17. Is there any job/occupation where only women have been recruited?	2.90	4.00	3.00	1.37	0.47	2.00	4.00	2.00	0.67	40%	N
Objective 3: To know if the company has an inclusive governance approach with a gender perspective.											
3.2. There is a strategic document that states the organization's actions at the external level.	3.70	4.00	3.85	0.95	1.04	3.00	4.00	1.00	0.26	60%	N
3.3. The document includes guidelines for the design of equality policies in the four investment lenses with a gender perspective: Women in leadership.	3.30	3.00	3.15	0.95	0.95	3.00	4.00	1.00	0.32	40%	N
3.3. The document contains guidelines for the design of gender equality policies in the four investment lenses: Women in leadership.	3.30	4.00	3.50	0.82	0.25	3.00	4.00	1.00	0.29	50%	D
3.5. The document provides guidelines for the design of equality policies in the four investment lenses from a gender perspective: –Products and services that benefit women.	3.00	3.00	3.00	0.82	0.27	2.25	3.75	1.50	0.50	30%	D
3.6. The document provides guidelines for designing gender equality policies in the four investment lenses from a gender perspective: –Girls and gender in the value chain and advocacy practices.	2.70	3.00	3.00	0.67	0.25	2.00	3.00	1.00	0.33	10%	D
3.7. The strategic plan includes detailed objectives, targets and indicators by gender.	3.50	3.00	3.50	1.08	0.31	3.00	4.00	1.00	0.29	50%	N
3.8. The strategic plan includes concrete actions to be taken.	3.70	4.00	4.00	0.95	0.26	3.00	4.00	1.00	0.25	60%	N
3.9. The strategic plan identifies those responsible for its implementation (names and surnames).	3.10	2.00	3.00	1.10	0.36	2.00	4.00	2.00	0.67	40%	N
3.10. The strategic plan includes deadlines.	3.60	4.00	4.00	1.07	0.30	2.00	4.00	2.00	0.50	60%	N
3.11. There is a budget for the implementation of the plan.	3.30	2.00	3.50	1.25	0.38	3.00	4.00	1.00	0.29	50%	N
3.14. In my organization there is sensitivity toward Trans and non-Binary groups.	3.90	4.00	4.00	1.20	0.31	2.00	4.00	2.00	0.50	80%	A

(Continued)

TABLE 8 (Continued)

Dimension 1: GLI and leadership		Quartile							CONS ¹			
		Mean		Mo	Mdn	SD	CV	1		3	IQR	RIR
Objective 4: To find out if the company develops measures within the organisation's strategies to promote the participation and presence of women in decision-making and management positions.												
4.1. A parity ratio of 50% is established for the presence of women in decision-making and management positions.		2.80	3.00	3.00	1.14	0.41	2.00	3.00	1.00	0.33	20%	D
4.2. Special measures are activated for promotion (e.g., women candidates on all pre-selection lists, or favoring the promotion of women in the case of exclusive positions for women).		3.33	2.00	2.00	1.06	0.46	2.00	2.75	0.75	0.33	20%	D
4.3. There is a gender balance in all areas of your organization.		3.83	2.00	2.00	0.82	0.36	2.00	2.75	0.75	1.33	10%	D
4.4. There is a gender balance in work teams in your organization.		1.17	3.00	2.00	1.03	0.47	1.25	3.00	1.75	1.33	10%	D
4.5. In your organization there is gender balance in ownership.		0.33	1.00	2.00	1.16	0.50	3.25	4.00	0.75	1.33	20%	D

1 Mdn = median; Mean = arithmetic mean; SD = standard deviation; CV = coefficient of variation; IQR = interquartile range; RIR = relative interquartile range; f (4–5) = frequency of assessment 4 and 5; CONS = level of consensus. Own elaboration.

4 Discussion and conclusion

The primary objective of this study was to develop and validate a comprehensive questionnaire designed to identify and assess the presence and frequency of Gender Lens Investing (GLI) practices within firms, alongside providing recommendations for enhancement. Particular emphasis was placed on three key dimensions of GLI practices as highlighted in the literature and recent influential reports: GLI and leadership, GLI and labor equality, and GLI concerning the equity of products and services offered by the company to the market.

In this regard, it is surprising that [Chmiel et al. \(2017\)](#), when assessing personnel selection and assessment (PSA) processes and the effectiveness of Human Resource Management (HRM) in training, overlook the fact that gender bias acts as a significant ‘barrier to entry’ for certain jobs. Additionally, they fail to address the need for promoting equity within organizations, ensuring equal job opportunities for all. For [Chmiel et al. \(2017\)](#), the gender lens appears more as a problem than a necessity, which stands in contrast to the United Nations’ emphasis on ‘Gender Equality’ in SDG 5. More recent research by [Pignault and Houssemand \(2021\)](#) acknowledges that their study does not consider crucial social, cultural, or individual factors and fails to address gender issues. This omission suggests that occupational psychology has yet to fully integrate gender considerations into its research.

The fact that Sustainable Finance Geneva suggests five infrastructures with their respective measurement methods highlights the lack of consensus on these measurements. Considering the differences between these and later tools: (1) EDGE does not provide a numerical approach but rather an approximate one, and it neglects the needs of female consumers; (2) Sustainable Finance Geneva generates criteria rather than measuring, making it not a tool in itself but rather a set of recommendations for measurement; it explains how to create the tool but does not implement it; (3) The IRIS+ System supports investment fund managers but does not assist companies; (4) SEAF is limited to measuring small and medium-sized enterprises; (5) The 2XCriteria is more focused on measuring economic return than on internal gender policies within companies; and finally, (6) Pro-Mujer, in partnership with Deekten, concentrates on gender policies applicable to any company—whether local, national, or international—but, like the others, it lacks numerical measurement scales, offering only general assessments that would not be useful for evaluating investment funds.

Questionnaire validation prior to its deployment is crucial, as it ensures the quality, reliability, and validity of the data collected, as well as the appropriateness and comprehensibility of the questions for the target population. The Delphi method, widely recognized in both business and social science research, is especially valuable in contexts where information is implicit or biased. In this study, two rounds of expert consultation following the Delphi method were conducted to refine and validate the GLI metrics questionnaire. The statistical analysis of these rounds demonstrated high levels of consensus, stability, and agreement among experts. Following the first round, which showed a substantial level of agreement, experts contributed open-ended feedback and suggestions for improvement. This input allowed for the reformulation of certain items in the second round, incorporating expert insights on specific aspects of GLI organizational practices that warranted particular attention. The validated questionnaire in this study is based on the most developed tool created by the 2XCriteria, incorporating three of its key thresholds: leadership, equality, and products or services for women consumers. Additionally,

TABLE 9 Results of Delphi round II GLI and equal employment opportunity.

Dimension 2: GLI and equal employment opportunity						Quartile					
	Mean	Mo	Mdn	SD	CV	1	3	IQR	RIR	f (4–5)	CONS ¹
Objective 5: To determine whether the company has implemented work-life balance measures											
5.6. The company analyses the results of work-life balance from a gender perspective.	3.90	4.00	4.00	0.74	0.18	3.25	4.00	0.75	0.18	70%	A
5.7. Working hours are always respected with or without the use of work-life balance measures.	3.40	4.00	3.50	0.96	0.28	3.00	4.00	1.00	0.28	50%	N
5.8. Maternity and paternity leave is extended beyond the legal deadlines.	2.80	3.00	3.00	1.13	0.40	2.00	3.00	1.00	0.33	202%	D
5.10. In my company, the percentage of (male) fathers using work-life balance measures is higher than the average of other companies.	2.90	2.00	3.00	0.94	0.34	2.00	3.00	1.00	0.33	20%	D
Objective 6: To find out whether the company takes equal pay into account.											
6.1. Salary scales shall be published solely on the basis of the objective characteristics of each post.	3.10	1.00	3.50	1.72	0.55	1.25	4.75	3.50	1.00	50%	N
6.2. Salaries and salary increases are determined through a documented and transparent process.	2.70	3.00	3.00	1.16	0.42	1.75	4.75	3.00	1.00	30%	D
6.3. Publish data disaggregated by gender and by level of position in terms of remuneration.	2.80	3.00	3.00	1.31	0.47	2.00	3.75	1.75	0.58	30%	D
6.4. Salaries are equal for men and women in identical job profiles.	3.60	4.00	4.00	1.35	0.37	2.00	3.75	1.75	0.43	60%	N
Objective 7: Find out if the company has protocols in place to prevent and address workplace harassment (of any kind), violence, including sexual harassment.											
7.7. The protocol takes into account events outside the physical workplace (e.g., virtual or other environments).	3.80	4.00	4.00	1.03	0.27	3.00	4.75	1.75	0.44	60%	N
Objective 8: To determine whether the company measures the work environment from a gender perspective.											
8.3. Based on the diagnosis, identify different gender gaps and opinions.	4.00	4.00	3.60	1.08	0.29	3.00	4.00	1.00	30.00	30.0%	D
8.4. The results are used to address the problems identified and to guide the action plan to implement measures to promote gender equality in the workplace.	4.00	4.00	3.70	0.95	0.26	3.00	4.00	1.00	30.00	20.0%	D

¹ Mdn = median; Mean = arithmetic mean; SD = standard deviation; CV = coefficient of variation; IQR = interquartile range; RIR = relative interquartile range; f (4–5) = frequency of assessment 4 and 5; CONS = level of consensus. Own elaboration.

TABLE 10 Results of Delphi round II GLI and equal employment opportunity.

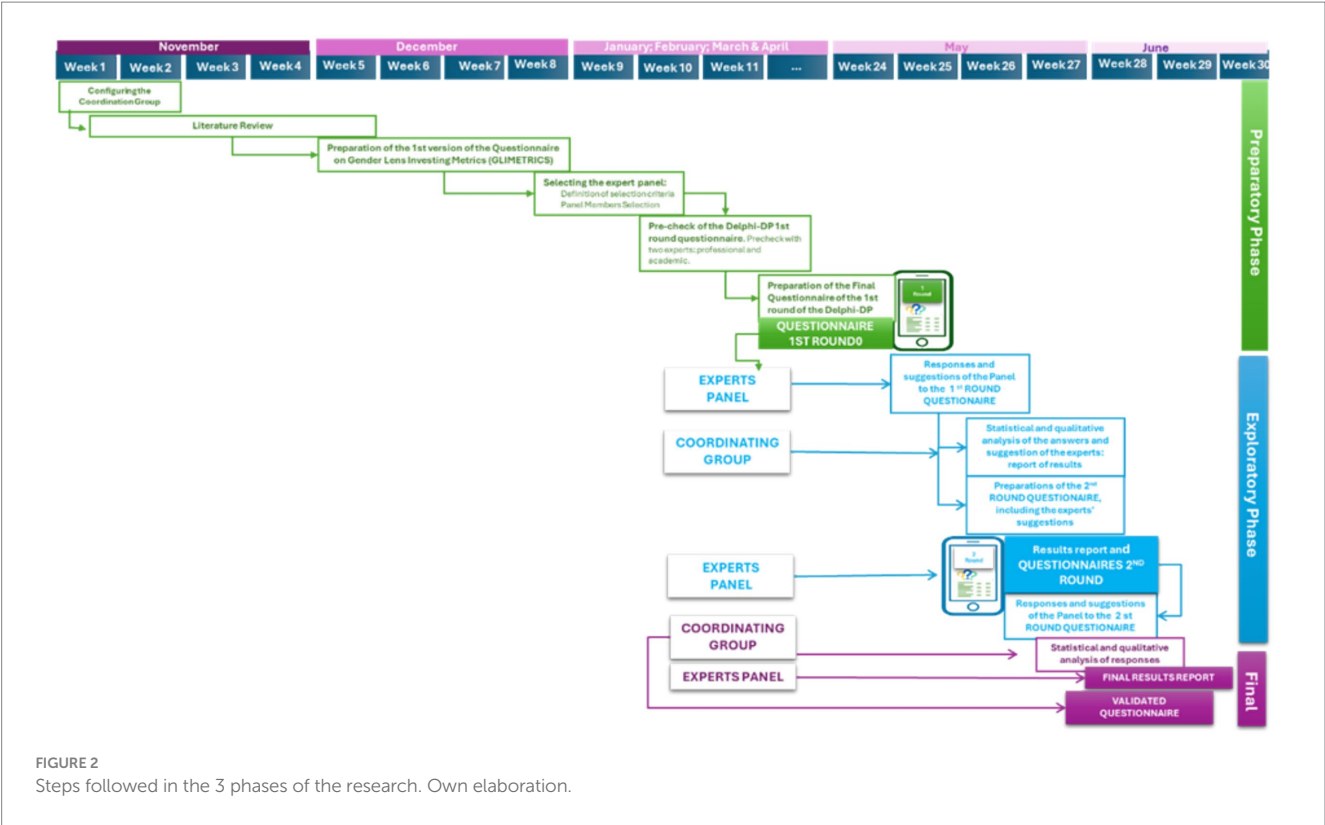
Dimension 3: GLI and equality of products and services that the company offers to the market						Quartile					
	Mean	Mo	Mdn	SD	CV	1	3	IQR	RIR	f (4-5)	CONS ¹
Objective 9: Find out if the company develops or provides any product or service with a gender perspective.											
9.1. Participation of all genders is ensured in all work teams involved in the process of a product or service.	3.30	3.00	3.00	0.82	0.25	3.00	3.75	0.75	0.25	30.00	D
9.2. Strategies are used to understand gender needs, interests and expectations.	2.80	3.00	3.00	0.63	0.23	2.50	3.00	0.75	0.25	10.00	D
9.4. We consider the context and product- or service-related inequalities experienced by customers on the basis of gender.	2.90	3.00	3.00	0.32	0.11	3.00	3.00	0.00	0.00	0.00	D
9.5. Reducing gender inequalities through the product or service is considered a bottom line priority.	2.30	2.00	2.00	0.67	0.29	2.00	3.00	1.00	0.50	0.00	D

¹ Mdn = median; Mean = arithmetic mean; SD = standard deviation; CV = coefficient of variation; IQR = interquartile range; RIR = relative interquartile range; f (4-5) = frequency of assessment 4 and 5; CONS = level of consensus. Own elaboration.

TABLE 11 Comparison of results in Rounds I and II.

GLI	Rounds	Mdn	Mean	SD	Quartile			IQR	f (4-5)	CONS ¹
					1	2	3			
GLI1	R1	4.00	3.73	0.67	3.75	4.00	4.00	0.25	80%	A
	R2	4.50	4.50	0.53	4.00	4.50	5.00	1.00	100%	A
GLI2	R1	4.00	4.09	0.57	3.00	4.00	4.00	1.00	90%	A
	R2	4.00	4.27	0.67	4.00	4.00	5.00	1.00	90%	A
GLI3	R1	4.00	4.27	0.48	4.00	4.00	4.00	0.00	100%	A
	R2	4.50	4.50	0.53	4.00	4.50	5.00	1.00	100%	A
GLI4	R1	4.00	4.09	0.57	3.00	4.00	4.00	1.00	90%	A
	R2	5.00	4.64	0.52	4.00	5.00	5.00	1.00	100%	A

¹ Mdn = median; Mean = arithmetic mean; SD = standard deviation; CV = coefficient of variation; IQR = interquartile range; RIR = relative interquartile range; f (4-5) = frequency of assessment 4 and 5; CONS = level of consensus. Own elaboration.



	GLI & Leadership	GLI & Equal Employment Opportunity	GLI and Equality of Products and Services that the company offers to the Market
Variation of CV ¹	0.10	-0.11	0.02
Variation of RIR ²	1,16	0,74	1,88

¹Variation of CV = $\left(\frac{SD}{Mean}\right)_{Round\ 1} - \left(\frac{SD}{Mean}\right)_{Round\ 2}$

²Variation of RIR = $\left(\frac{Q3 - Q1}{Q2}\right)_{Round\ 1} - \left(\frac{Q3 - Q1}{Q2}\right)_{Round\ 2}$

FIGURE 3
Variation of RIR and CV between rounds.

it draws on key criteria from other relevant literature and aims to serve as an international model tool that consolidates these efforts. The questionnaire is intended to be a reference for Supreme Audit Institutions (SAIs). By providing numerical results that measure management practices and policies across various types of companies, the tool can be easily utilized by both national and international audits for local, national, or global companies within investment fund portfolios.

Through the Delphi stages, the study established the dimensions to be prioritized within the metric and refined the clarity and relevance of the items. Furthermore, the terminology used was adapted to align with language commonly employed by Spanish firms. The validated questionnaire developed through this research offers a new methodological tool with several practical implications: (1) identifying and measuring gender lens investing practices; (2) enabling self-assessment based on the established metric to guide organizational

routines; (3) informing decision-making related to gender lens investing; and (4) allowing for the testing of propositions regarding the reciprocal influence between GLI practices and organizational outcomes. In short, this tool is designed to provide evidence of how gender lens organizational practices impact firm performance.

Additionally, the tool offers significant potential for raising awareness. It enables organizations and professional groups to recognize the importance of regularly investing in GLI as part of established organizational practices, which is essential for effectively measuring GLI impact. Furthermore, it provides researchers with a valuable new instrument to support comparative studies, facilitate generalization of case study findings, and explore potential correlations across diverse GLI approaches.

4.1 Limitations

The questionnaire developed in this study has yet to be implemented across multiple companies and, therefore, remains untested in practical organizational settings. This limited application is attributed to the instrument's novelty, the necessity for further validation, and limited dissemination among organizations that could potentially benefit from its use. Regarding organizational practices, existing literature frequently emphasizes the outcomes of gender lens investments, such as increased female representation in leadership roles or enhanced pay equity indicators. However, there is comparatively less focus on the specific practices companies adopt to realize these outcomes.

4.2 Further research

Adopting a comprehensive approach that accounts for both organizational practices and the outcomes of gender equality investments will be essential. Further, a more rigorous academic analysis of these practices can yield valuable insights into the mechanisms that actively foster gender equality and inclusive leadership.

In conclusion, widespread implementation of the questionnaire across a diverse range of companies, along with a refined academic focus on organizational practices, is critical to advancing the understanding and promotion of workplace gender equality. Broadening the application of the questionnaire will not only allow for its validation but also enable refinement and enhancement of its components, ensuring its relevance across various sectors and organizational cultures. This approach supports comparative analysis and facilitates the potential generalization of findings derived from case studies.

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 approval was not required for the study involving humans in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was not required from the [patients/participants OR the patients/participants' legal

guardians/next of kin] in accordance with the national legislation and the institutional requirements.

Author contributions

MP-V: Data curation, Formal analysis, Investigation, Resources, Software, Validation, Writing – original draft, Writing – review & editing. A-LO-L: Conceptualization, Validation, Visualization, Writing – original draft, Writing – review & editing. M-JB-B: Investigation, Visualization, Writing – original draft, Writing – review & editing. CD-P-H: Conceptualization, Supervision, Visualization, Writing – original draft, Writing – review & editing.

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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.

Generative AI statement

The authors declare that no Gen AI was used in the creation of this 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.2025.1534355/full#supplementary-material>

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Belonging through values: ethical leadership, creativity, and psychological safety with ethical climate as a moderator

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Introduction: This study aims to provide conceptual insights on how varying levels of value congruence vary employees' sense of belongingness within ethically led organizations. The ethical leadership effect was tested directly and indirectly through belongingness and psychological safety on creativity; the ethical climate was considered as a moderator.

Methods: Study 1 data was multi-sourced and was collected from 377 participants at three different time points. Study 2 was scenario-based data collection. 208 employees participated in this study. The process and Hayes techniques were used for SPSS.

Results: Findings were that ethical leadership was a significant factor in influence directly and indirectly through belongingness and psychological safety on creativity; the moderating role of ethical climate was also found significant. Belongingness varies at high and low levels of congruency with the leader.

Conclusion: Findings suggest that ethical leadership is a strong predictor of belongingness and psychological safety that helps employees to be creative. Overall, the working climate, if it is ethical, also improves the impact of ethical leadership. Then, it discusses the theoretical and practical implications of ethical leadership for research and practices.

KEYWORDS

ethical leadership, ethical climate, belongingness, psychological safety, value congruence, creativity

Introduction

The impact of ethical leadership on organizational outcomes has become a pivotal focus, especially given its influence on fostering positive work environments and promoting employee engagement (Fischer and Sitkin, 2023). Like once Martin Luther King said "I am not interested in power for power's sake, but I am interested in power that is moral, that is right and that is good." Ethical leadership has been shown to create climates that enhance performance and well-being, contributing to overall organizational success (Shafique et al., 2020). In raising with interest in ethical leadership, what consequences it can have on follower behaviors have been recognized, but how does this give a sense of belonging? This need to belong plays a central role in follower behaviors. We thus find it of greater practical implications to study the link between ethical leadership and creativity through belongingness. The previous research focus was pointed toward ethical leadership on follower extra effort (Tu and Lu, 2016), follower-helping behavior (Li et al., 2023), engagement, and commitment (Asif et al., 2019) but has neglected the role of a situational leadership lens through and what conditions these relationships can be built. Owing to individual differences, followers may have different levels of sensitivity to leadership.

The question we seek to address is: Which individuals are most positively influenced by ethical leadership, and how might those who share similar values feel a greater sense of belonging and alignment under such leadership? We aim to explore how ethical leadership can create an environment where individuals feel valued and connected, particularly when they see their leader embodying the same principles they hold dear. Research suggests that ethical leadership promotes accountability and integrity (Brown et al., 2005), yet critical, relational dynamics underpin employees' behaviors in ethical leadership contexts. For instance, beyond structural incentives or leader attributes, value congruence between employees and leaders—an alignment of beliefs and values—can profoundly shape how employees perceive their belongingness to the organization. Such a sense of belongingness, though underexplored, is instrumental in cultivating psychological safety, which in turn encourages employees to engage in creative behaviors.

Creativity requires an environment where employees feel safe to express new ideas and take risks. Nonetheless, the roles of belongingness and psychological safety as mediators in this process have been considered vital. Understanding how these psychological processes enable ethical leadership to foster creativity is crucial, as creativity fuels innovation and organizational adaptability (Sawyer and Henriksen, 2024). Investigating these mechanisms is essential for organizations seeking to harness ethical leadership not only to improve performance but also to drive innovation (Amabile and Khair, 2008). By fostering environments that support a sense of belonging and psychological safety, ethical leaders can help unlock the creative potential of employees, making this an important area of study.

Furthermore, it is important to foster a supportive ethical climate and enhance employees' sense of belonging and psychological safety to maximize the creative potential within organizations (Javed et al., 2018). These insights offer valuable implications for leaders and practitioners aiming to cultivate ethical and innovative workplaces (Den Hartog, 2015). This research studies the relationship between employees' low and high levels of value congruency and their sense of belonging within an organization. By analyzing insights into organizational ethical beliefs, this study explores how alignment with organizational ethics enhances employees' feelings of inclusion. For instance, it is commonly assumed that the leader's values are the "norm" and that employees will naturally align with these values. However, employees have their unique interests and values, which may or may not align with those of their leader. As such, ethical leadership literature has yet to consider examining the match or mismatch between leader and employee values in order to determine follower outcomes. Employees who possess high-value congruency are more likely to experience a sense of belonging when working under ethical leaders. This alignment fosters stronger organizational commitment, as congruence between employees and leaders can deepen workplace attachment and reinforce organizational identity (Ahmad and Umrani, 2019; Qin et al., 2021).

A lack of research examining the specific pathways through which these effects occur (Hendriks et al., 2020) motivates us to test the serial mediation mechanisms involving belongingness and psychological safety. Understanding how these mediating processes can provide deeper insights into the impacts of ethical leadership on creativity, which is essential for organizational innovation and competitiveness (Asif et al., 2019), is crucial.

This article explores the impact of ethical leadership on employees' sense of belonging and psychological safety and how these factors contribute to their creativity. While ethical leadership is known to

foster a positive organizational climate (Brown and Treviño, 2006), the specific psychological processes linking ethical leadership to creativity remain underexplored (Al Halbusi et al., 2023). Additionally, the moderating role of ethical climate and value congruence in this relationship has yet to be thoroughly examined (Hegarty and Moccia, 2018). Addressing these questions offers new insights into how ethical leadership can be strategically capitalized on to unlock greater employee creativity.

Our research makes several important contributions to the literature on ethical leadership and organizational behavior. First, by identifying belongingness and psychological safety as serial mediators, we provide a more nuanced understanding of the pathways through which ethical leadership influences creativity. Second, this study suggests that employees with strong ethical principles may find increased alignment and purpose when their values are mirrored by ethical leadership, ultimately enhancing their sense of belonging and satisfaction at work (Aftab et al., 2023). Third, our investigation into the moderating role of ethical climate offers new insights into how organizational context can enhance the effectiveness of ethical leadership. Finally, our study extends the application of ethical leadership to the domain of creativity, highlighting its potential to drive innovative behaviors in the workplace. These findings have significant implications for both researchers and practitioners seeking to foster ethical and creative work environments.

Literature review and hypothesis development

Ethical leadership is distinguished by the leader's demonstration of normatively appropriate behavior, influencing followers through personal conduct and two-way communication (Brown et al., 2005). This leadership style focuses on promoting ethics and integrity, contrasting it with other leadership approaches such as servant, authentic, or transformational leadership (Avolio et al., 1999; Bass and Avolio, 1993). That is why it has been a topic of interest, and leaders play a crucial role in organizational success and establishing ethical standards (Den Hartog, 2015; Grojean et al., 2004). It seems ethical leadership influence on creativity literature is underdeveloped.

Ethical leaders inspire employees to internalize moral values, which motivates them to engage in creative problem-solving (Feng et al., 2018). Miao et al. (2013) stated that ethical leaders empower employees to take initiative, directly linking ethical behavior to innovative outcomes. Ethical leadership creates a 'safe space' for experimentation, a critical precursor to creativity (Liu et al., 2020). Ethical leaders are expected to be fair, caring, and trustworthy, setting an example through their actions (Ko et al., 2018). Ethical leadership has been linked to numerous positive outcomes, including enhanced employee performance, trust, and job satisfaction (Ahn et al., 2018; Gerpott et al., 2019; Tu et al., 2019). Furthermore, ethical leadership can reduce negative behaviors, like staff misconduct, by setting a moral example for employees to follow (Mayer et al., 2010).

Theoretical frameworks such as social exchange theory (SET) and social learning theory have been widely used to explain how ethical leadership influences employee behavior (Fan et al., 2021; Xu et al., 2016). According to Bandura and Walters's (1977) social learning theory, employees imitate the behavior of ethical leaders, while Blau (2017) social exchange theory suggests that individuals reciprocate

ethical treatment with ethical behavior. These theories provide insight into the mechanisms through which ethical leadership positively impacts the workplace, such as employees' creative behavior.

Creativity involves generating innovative and valuable ideas related to products, services, and processes (Madjar et al., 2002; Zhou and Shalley, 2003). It seeks innovative approaches and innovative concepts to create new opportunities (Amabile, 1983). Employees pursuing creative tasks often have disagreements with supervisors, making leadership assistance essential for fostering creativity in non-routine work (Amabile and Gryskiewicz, 1987; Cheung and Wong, 2011). Creativity challenges conventional thinking, it encourages calculated risk-taking, constructive conflict, and questioning authority (Baucus et al., 2008). Ethical leaders do not shy away from giving recognition, regulation, punishment, and judging without personal bias (Feng et al., 2018).

Ethical leadership is recognized for its ability to foster environments that encourage openness and innovation, where employees feel secure expressing novel ideas and take calculated risks without fear of negative repercussions (Edmondson and Lei, 2014), which are essential to enhance employee creativity. This empowerment to think creatively, coupled with a clear moral framework, propels employees to move away from conventional boundaries and experiment with new ways of solving problems (Amabile, 1983). As such, ethical leadership stimulates the creativity of employees, encouraging them to create unique and valuable solutions within the workplace. So we hypothesize that:

H1: Ethical leadership has a positive effect on creativity.

Belongingness, psychological safety, and creativity

Human beings are inherently social, driven by a need to form relationships that support adaptation and survival (Baumeister and Leary, 2017; Hogg, 2009). This "need to belong" reflects the fundamental desire to form close bonds, and failure to satisfy this need can have significant implications for both mental and physical health (Pillow et al., 2015). However, simply having relationships is not enough; individuals seek a deeper sense of belongingness, which involves feeling a fit and acceptance within their social environment (Allen et al., 2022). Literature lacks an understanding of how this need can be fulfilled at the workplace with the assistance of ethical leadership.

Belongingness extends beyond surface-level relationships. It's about feeling integral to a system or group that provides symbolic meaning and continuity (Leary and Gabriel, 2022). This need for social connection can be linked to various psychological frameworks, such as sociometer theory, which explains the link between relational value and self-esteem (Leary and Baumeister, 2000). Belongingness thus serves as a metric for how individuals perceive their value and place in the social world, offering both stability and a shared identity (Baumeister and Leary, 2017).

Moreover, strong social bonds and a sense of belonging can help individuals navigate uncertainties and give life a broader meaning (Hogg, 2009; Lambert et al., 2013). The ability to feel valued within a group, whether it be personal or organizational, plays a crucial role in personal well-being and collective

achievement (Hagerty et al., 1992). Ethical leadership "walk the talk" and always into "what is the right thing?" It is not just maintaining ethicality, it also delegates responsibility their followers, which makes them feel respected and valued (Tu et al., 2019).

In today's dynamic business world, organizations increasingly rely on employees to improve processes and practices by voicing new ideas, collaborating, and experimenting with innovative methods (Edmondson, 1999; Nembhard and Edmondson, 2011). These activities can pose risks to employees, such as challenging established norms or facing disapproval from colleagues (Tyagi et al., 2017). Employees may hesitate to contribute to learning processes, which can slow both individual and organizational learning (Padmantlyo, 2023; Lisetyaningrum and Padmantlyo, 2024). Creating a psychologically safe work environment, where employees feel safe to voice ideas, seek feedback, and take risks, is crucial to overcoming these barriers (Edmondson, 1999).

Recent studies emphasize that psychological safety is a key trait of high-performing teams, particularly in safety-critical industries such as healthcare and aviation, where it has been shown to reduce errors and enhance safety (Agarwal and Farndale, 2017; Leroy et al., 2012). Moreover, psychological safety increases team and individual learning across various organizational contexts (Liu and Ge, 2020; Ortega et al., 2014). In this study, we explore psychological safety to better understand its role in fostering effective learning and performance in the workplace.

Employees in the workplace want their managers to display exemplary ethical behavior (Ko et al., 2018). Employers and employees equally want them/themselves to be more fully integrated into the company (Jasinta, 2022). Ethical leadership enhances organizational identification, related to belongingness (Zhang et al., 2023). Therefore this helps them to perceive being embedded in the organization. Belongingness through inclusion and acceptance may facilitate the freedom to express oneself at work. Zimmerman et al. (2025), also suggested that employees have desires to express their authentic selves at work and feel accepted for it. Leaders help them seek out opportunities and support and encourage followers to feel safe in fulfilling rules (Feng et al., 2018). Safety is important because creativity needs to be risky sometimes, ethical leadership makes this possible with fairness and respect for employees. In such an environment, employees may be valued and connected. These feelings can develop psychologically safer thoughts and may be willing to engage in risky activities. It is beneficial for employees to not be worried about failures, which can facilitate creativity.

It is essential to understand how ethical leadership influences employee creativity. Belonging, the fundamental human need to be part of a society, ensures employees feel valued and connected to their organization (Baumeister and Leary, 2017). When employees feel a sense of belonging, they are more likely to engage with others, share ideas, and collaborate effectively. Furthermore, psychological safety allows employees to express their thoughts and ideas without the fear of being judged or ridiculed (Edmondson, 1999). Together, these factors create an atmosphere where creativity can flourish. In an ethically-led organization, leaders promote this environment by promoting inclusivity and ensuring fair treatment, which enhances both the sense of belonging and psychological safety, resulting in heightened creativity. Therefore, belonging and psychological safety are essential components of ethical leadership, which leads to creative outcomes.

H2: Belongingness and psychological safety serially mediate the positive effect of ethical leadership on creativity.

The moderating role of ethical climate

The ethical climate refers to “the prevailing perceptions of typical organizational practices and procedures that have ethical content” (Victor and Cullen, 1988, p. 101). It shares similarities with moral norms, which guide decisions on right and wrong within organizations (Ellemers et al., 2008; Pagliaro et al., 2011). Different organizations cultivate unique subcultures that shape how individuals interact and behave. Research on ethical climate has shown that workplaces with strong ethical climates are linked to higher levels of employee ethics (Verbeke et al., 1996; Treviño et al., 1998) and positive workplace attitudes, such as job satisfaction and loyalty (Newman et al., 2017).

The multidimensional nature of ethical climate has been widely studied. While some view ethical climate as a singular concept (Arnaud, 2010), the more prevalent perspective is that it consists of several interrelated dimensions (Victor and Cullen, 1988; DeConinck, 2011). Victor and Cullen (1987, 1988) proposed a theoretical typology of ethical climates, including nine categories based on two dimensions: the criteria for ethical judgments (egoism, kindness, principles) and the locus of analysis (individual, local, cosmopolitan). This typology has influenced further categorization of ethical climates, distinguishing between climates of self-interest, which emphasize individualistic approaches, and friendship, which emphasize collective approaches to ethical issues (Cullen et al., 1993). These studies also suggested that there is a need to move beyond categorization and observe how it can influence employees at the workplace.

Ethical climate is conceptualized as an organizational-level construct that reflects employees' shared perceptions of ethical norms and expected behaviors within the organization (Victor and Cullen, 1988). While ethical leadership can influence ethical climate over time, the two constructs remain distinct in that ethical climate emerges from broader organizational systems and shared perceptions beyond any single leader's influence. Leadership does not operate in a vacuum but is embedded within a larger organizational and cultural context that can either enhance or constrain its effectiveness (Treviño et al., 1998). The extent to which cultural and organizational systems provide ethical conduct determines how strongly ethical leadership influences follower behavior. Porter and McLaughlin (2006) critique the notion of leadership as an isolated phenomenon, arguing that leaders function within complex systems that shape their ability to influence. Leaders face constraints from certain factors, such as structural goals, policies, and competing priorities (Lord et al., 2001). Ethical culture, as a contextual factor, interacts with ethical leadership by shaping how employees interpret and respond to a leader's ethical behaviors (Argyropoulou and Lintzerakou, 2025). In organizations with a strong ethical climate, ethical leadership is likely to have a stronger influence, as employees perceive ethical norms as both expected and reinforced at multiple levels. Conversely, in weaker ethical climates, the impact of ethical leadership may be diluted due to conflicting organizational signals. This interaction underscores the fluid and context-sensitive nature of leadership (Lord et al., 2001), where multiple layers of context—ranging from organizational policies to broader cultural values—play a role in shaping leader-follower dynamics (Argyropoulou and Lintzerakou, 2025).

The mechanism by which ethical climate moderates ethical leadership outcomes remains underexplored. This study examines the relationship between these ethical climates and employee behavior, particularly creativity, which encompasses certain discretionary actions beneficial to the organization (Chen and Hou, 2016). Ethical climate encompasses the shared perceptions of what is acceptable ethical behavior within an organization (Victor and Cullen, 1988). When an ethical climate is high, it reinforces the values espoused by ethical leaders, ensuring that these values are not just demonstrated by leadership but embedded in the organization's cultural fabric. This alignment between leadership and organizational values enhances the impact of ethical leadership on employees' sense of belonging, as employees perceive the consistency in ethical standards throughout the organization. In contrast, a low ethical climate may undermine the efforts of ethical leaders, resulting in a weakening of their influence on employees' sense of belonging. Thus, the ethical climate promotes the relationship between ethical leadership and belonging, enhancing it in environments with a high ethical climate.

H3: The relationship between ethical leadership and employee belongingness is moderated by ethical climate, such that the relationship is stronger when the ethical climate is high than low.

Ethical climate also plays a crucial role in altering the indirect effect of ethical leadership on creativity through belonging and psychological safety. In organizations with a strong ethical climate, the influence of ethical leadership on belongingness and psychological safety is enhanced, as employees experience a cohesive ethical framework that guides behavior and decision-making. Therefore, we argue that this heightened sense of ethical consistency enables employees to feel more secure in expressing creative ideas, as they are reassured by both their leaders and the broader organization. In such environments, the indirect path from ethical leadership to creativity, mediated by belongingness and psychological safety, becomes even more powerful. Conversely, in organizations with a weak ethical climate, the disparity between leadership and organizational practices may decrease the effects of ethical leadership, leading to a weaker indirect effects on creativity. Therefore, the ethical climate regulates the entire serial mediation process, enhancing the pathway from ethical leadership to creativity when the ethical climate is robust.

H4: Ethical climate moderates the indirect effect of ethical leadership on creativity via belongingness, such that the indirect effect is stronger when the ethical climate is high rather than low.

Moderating role of value congruence

LMX theory emphasizes that high-quality interactions between leaders and employees are built on mutual trust, respect, and a sense of obligation, which in turn foster stronger relational bonds (Graen and Uhl-Bien, 1995). In this context, value congruence plays a pivotal role in improving the quality of leader-member relationships. Specifically, when leaders and employees share similar ethical values, they experience a deeper sense of connection and mutual understanding, which bolsters employees' trust in their leaders and enhances their identification with the organization (Dey et al., 2022). This alignment of values magnifies the benefits of ethical leadership

by signaling to employees that their values are respected and shared by their leader, thus fostering a heightened sense of belonging.

Belongingness, as the inherent need to feel accepted and valued within a group, is essential for cultivating psychological safety and stimulating creativity in organizational settings (Aboud et al., 2023). Ethical leadership provides a solid foundation for belongingness by fostering an inclusive and supportive work environment (Walumbwa et al., 2011). However, the degree to which employees feel a sense of belonging under ethical leadership is likely influenced by the extent to which their values align with those of their leader. Studies suggest that value congruence strengthens relational bonds by minimizing value-based conflicts and enhancing mutual understanding (Qu et al., 2019). Therefore, employees who perceive greater value congruence with their leader are more inclined to adopt their leader's ethical standards, feel a stronger sense of acceptance, and experience deeper belongingness.

Conversely, when value congruence is low, the positive effects of ethical leadership may be weakened, as conflicting values can lead to relational strain and reduce employees' trust in their leader's ethical direction (Ilies et al., 2007). This highlights that value congruence is not just an ancillary factor but a crucial moderator that enhances the relational influence of ethical leadership on belongingness. Based on this reasoning, the following hypothesis is proposed:

H5a: The relationship between ethical leadership and employees' sense of belongingness is moderated by value congruence, such that the relationship is stronger when value congruence is high.

H5b: Value congruence moderates the indirect effect of ethical leadership on creativity via belongingness, and the indirect effect is stronger when the value congruence is high rather than low.

Methods

Research setting

This study was conducted within the financial sector of Pakistan, specifically focusing on banks and credit unions. Previous leadership research has largely concentrated on Western contexts, which may not

apply to cultures with differing societal norms (Brown and Treviño, 2006). Pakistan, a country with a collectivistic cultural orientation, emphasizes interdependence and the perception of individuals as integral parts of a broader society. This cultural context is particularly relevant for examining ethical leadership, as employees in such environments may be more inclined to work for the benefit of others and align with the ethical standards set by their leaders. The highly competitive nature of the Pakistan financial sector, including credit unions and banks, makes it an ideal setting for exploring leadership behaviors that can influence employees behavior and outcomes (Figure 1).

Population

The population targeted for this research comprised employees from various departments within financial institutions across Pakistan. With assistance from the National Bank of Pakistan, a comprehensive list of participating banking institutions and other financial entities was compiled, ensuring a representative sample from the sector (Figure 2).

Sample and sampling methods

A probability-based stratified sampling technique was employed in a two-step process to select participants for this study, and to ensure sufficient representation. Stratified sampling is particularly effective for research covering a geographically dispersed population, ensuring that all subgroups within the population are adequately represented. In the first step, strata were created based on the type of financial institution, such as banks and credit unions. In the second step, institutions were randomly selected from a compiled list provided by the National Bank of Pakistan, ensuring proportional representation across the population. Inclusion criteria for participants included full-time employees with at least one year of employment, while exclusion criteria included temporary or contract workers. This method allowed for a distinct yet representative sample from the financial sector, resulting in the generalizability of the findings.

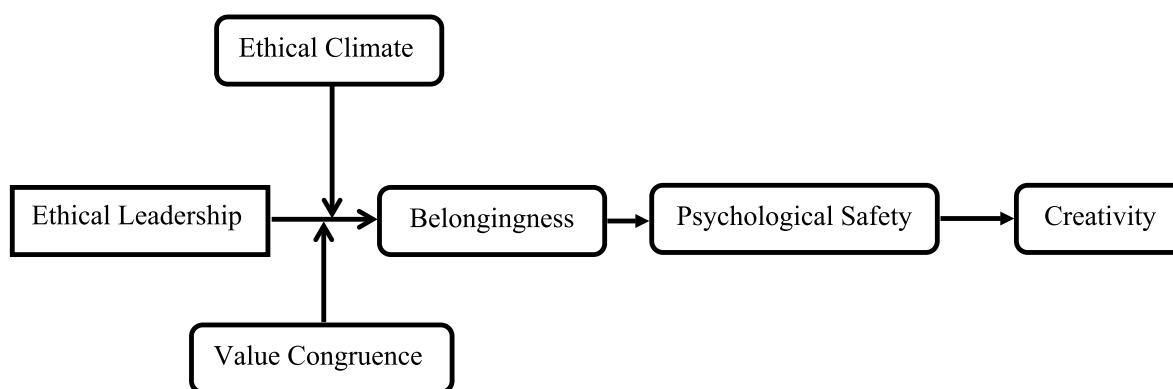


FIGURE 1
Conceptual model.

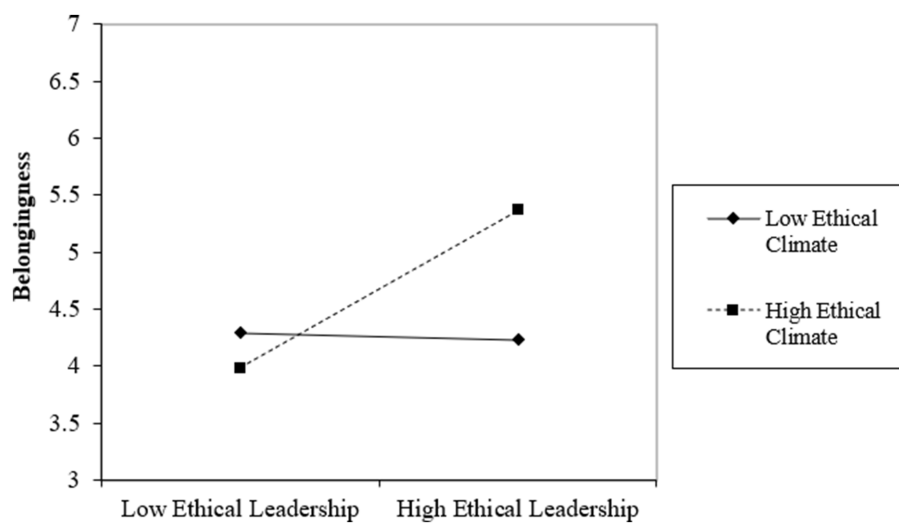


FIGURE 2
Moderation graph.

Data collection methods

Data were collected at three distinct time intervals using carefully designed questionnaires: Time 1 (T1), Time 2 (T2), and Time 3 (T3). Questionnaires were chosen as the primary data collection method due to their efficient collection of data from a large, geographically dispersed sample while ensuring consistency in measuring constructs across participants. Each questionnaire was specifically tailored to identify relevant concepts and variables to understand the relationships between ethical leadership, psychological safety, and creativity within the organizational context. At T1, 485 participants were contacted; they provided information on their demographic characteristics, ethical leadership, and Islamic work ethics. We got 478 responses back; at this stage, we started checking for some incomplete responses and only contacted 471 for T2. During T2, 471 were contacted, and employees were asked to report on additional constructs such as psychological safety, belongingness, and moral identity; in return, we got 436. After cleaning T2, we came up with 413. Finally, at T3 for 413, employees and their immediate supervisors were asked to provide their perspectives through a separate set of questionnaires. Employees reported the ethical climate of the organization and supervisors' response to their employees' creativity. In the end, we had 389 responses. The last four digits of their phone number were used as the identifier. Using time-lagged designs and multisource data helps minimize the risk of common method bias and enhances the ability to infer causal relationships.

After checking for missing values, only 377 responses were valid and complete, making a response rate of 77.7%. This significant response rate enhances the reliability and validity of the findings, providing a solid basis for the subsequent analyses.

To determine the adequacy of the sample size, G*Power software (version 3.1.9.4) was used, following the recommendations of [Faul et al. \(2009\)](#). A *priori* power analysis was conducted using a medium effect size (0.15), an α level of 0.05, and a power of 0.95. This analysis indicated that a minimum sample size of 129 was sufficient for testing our model. Furthermore, a *post hoc* power

analysis with an actual sample size of 377 yielded a power value of 0.99%, exceeding the minimum threshold of 0.80 ([Cohen, 1992](#)). We concluded that our sample size was suitable for testing the hypothesized relationships.

To test the hypotheses of the study, we use PROCESS macro ([Hayes, 2018](#)), model 6 (serial mediation) and 1 (simple moderation). This model allows us to observe the indirect paths through which ethical leadership impacts creativity. PROCESS macro was used because it provides flexible and user-friendly frameworks for testing moderating and mediating effects.

Measurements

Responses were captured on a 7-point Likert scale, ranging from 1 (not at all) to 7 (very much so).

Ethical leadership

Ethical leadership was rated via a 10-item scale from [Brown et al. \(2005\)](#), which is widely recognized for its reliability in measuring ethical leadership behaviors. Participants were advised to rate their immediate supervisors on two key dimensions of ethical leadership: moral person and moral manager. Sample items include "My supervisor listens to what employees have to say" for the moral manager dimension and "My supervisor conducts his/her personal life in an ethical manner" for the moral person dimension. Ethical leadership was self-reported by employees.

Belongingness

Belongingness at work was rated using a 3-item scale derived from [Godard \(2001\)](#). An example item is, "When at work, I really feel like I belong." Belongingness was self-reported by employees.

Psychological safety

To assess psychological safety, we used Edmondson (1999) 7-item scale. A sample item was, “The work I do is very important to me.” Psychological safety was self-reported by employees.

Creativity

Employee creativity was assessed using the 4-item scale from Farmer et al. (2003), which has been adapted for use in a Chinese context. A sample item is “This employee: Tries new ideas or methods first.” Supervisors responded to employee creativity.

Ethical climate

Ethical climate was assessed using the scale of Cullen et al. (1993). A sample item is, “Everyone in this organization is willing to seek common solutions at the workplace.” Employee-rated ethical climate.

Control variables

This study considered several control variables to account for their potential influence on the research findings. Demographic factors, such as age, education level, and job tenure, were checked for. Prior research suggests that older employees may experience higher levels of job exhaustion (Brienza and Bobocel, 2017), which could reduce the positive impact of ethical leadership. Additionally, educational attainment may influence the generalizability of results, as more educated employees might display more favorable outcomes compared to their less educated counterparts. Job tenure was also controlled, as existing literature (Denton and Kleiman, 2001) has demonstrated its potential effects on employee outcomes.

Furthermore, we considered Islamic work ethics (IWE) and moral identity as control variables to account for their potential impact on employees’ creativity, which could influence the effectiveness of ethical leadership. IWE emphasizes dedication, responsibility, and social relations, which can significantly shape employee behavior and attitudes (Qasim et al., 2022). Moral identity, reflecting to what extent being moral is central to an individual’s self-concept, can also play a crucial role in guiding ethical behavior and fostering creativity (Vitell et al., 2009). Given that the data was collected from Pakistan, a

predominantly Muslim country, it is essential to consider these cultural and ethical dimensions, as they might influence work ethics and, consequently, employee creativity (Alqhaiwi et al., 2024; Usman et al., 2015).

Confirmatory factor analysis and common method bias

In above Table 1, the model fitness indices indicate that the Main 5-Factor Model demonstrates the best fit to the data. With a χ^2/df ratio of 2.11, which is within the acceptable range (≤ 3), and fit indices such as CFI (0.91), TLI (0.90), IFI (0.91), and RMSEA (0.05), this model shows a better model fitness. While we tested other possible combinations as well, compared with the alternate Model 3 (2 factors: Belongingness + Psychological safety + Ethical climate and ethical leadership combined) and alternate Model 4 (1 factor: all constructs combined) show significantly poor fit, with χ^2/df ratios of 4.82 and 7.11, respectively, and fit indices (CFI, TLI, IFI ≤ 0.70 ; RMSEA ≥ 0.10).

We used time-lagged approaches and multiple source data to reduce the likelihood of common method variance (CMV) (Podsakoff et al., 2012). In our confirmatory factor analysis (CFA), we use the unmeasured latent method construct (ULMC) methodology to verify for CMV (Williams and McGonagle, 2016). We particularly implemented a single-method latent variable into the previously established main model. When we compare our results to the original model, we discovered that including the ULMC made no significant difference in the results. CMV values were far worsen then the main model. As a result, these data suggest that CMV did not significantly damage the reproducibility of our study.

Assessment of measurement model

In Table 2, AVE values for all constructs exceed the threshold of 0.50, indicating strong convergent validity. The square root of the AVE for each construct (shown in parentheses on the diagonal) is greater than the correlations between that construct and all other constructs. This satisfies the Fornell-Larcker Criterion, confirming discriminant validity. The HTMT values (below the diagonal) represent the ratio of between-construct correlations to within-construct correlations. All HTMT values are well below the conservative threshold of 0.85, further supporting discriminant validity.

TABLE 1 Model fitness.

Model	χ^2	Df	χ^2 / df	CFI	TLI	IFI	RMSEA
Main 5 Factors Model	1799.5	850	2.11	0.91	0.90	0.91	0.05
Alternate Model 1: 4 Factors combine (BE+PS)	2031.6	854	2.37	0.89	0.88	0.89	0.06
Alternate Model 2: 3 Factors combine (BE+PS + EL)	3169.9	857	3.69	0.79	0.78	0.79	0.08
Alternate Model 3: 2 Factors combine (BE+PS + EL + EC)	4144.6	859	4.82	0.70	0.68	0.70	0.10
Alternate Model 4: One Factor Model	6122.3	861	7.11	0.52	0.50	0.52	0.12
Common method variance	6822.9	860	7.93	0.50	0.48	0.51	0.14

BE, belongingness; PS, psychological safety; EL, ethical leadership; EC, ethical climate.

TABLE 2 Average variance extracted (AVE), Fornell-Larcker Criterion, and Heterotrait-Monotrait ratio (HTMT).

Order	Variables	AVE	1	2	3	4	5
1	Belongingness	0.578	(0.760)				
2	Creativity	0.543	0.668	(0.737)			
3	Ethical climate	0.607	0.229	0.225	(0.779)		
4	Ethical leadership	0.590	0.381	0.371	0.259	(0.768)	
5	Psychological safety	0.644	0.516	0.464	0.355	0.522	(0.803)

Fornell-Larcker Criterion values shown in parentheses on the diagonal.

TABLE 3 Descriptive statistics, correlations, and reliability values.

Variables	Mean	S. D	1	2	3	4	5
Ethical leadership	5.19	0.93	(0.91)				
Ethical climate	5.17	0.93	0.246**	(0.73)			
Belongingness	4.94	1.18	0.331**	0.207**	(0.92)		
Psychological safety	5.34	1.03	0.480**	0.326**	0.441**	(0.94)	
Creativity	4.83	1.19	0.326**	0.201**	0.544**	0.403**	(0.82)
IWE	4.07	0.92	−0.034	0.203**	0.130*	0.089	0.213
Moral identity	4.95	0.97	0.164**	0.233**	0.059	0.205**	0.007
Age	39.7	9.41	−0.031	0.040	0.083	0.033	0.017
Gender	-	-	−0.081	−0.010	−0.081	−0.07	−0.103*
Position	-	-	0.072	0.066	0.069	0.089	0.078
Education	-	-	0.027	0.046	−0.122*	−0.025	−0.08
Tenure	-	-	−0.070	0.010	0.013	0.070	0.03

N = 377; p** < 0.01; p* < 0.05; IWE, Islamic work ethics *Reliability values are presented in parentheses*.

Results

The study examines the relationships among ethical leadership, ethical climate, belongingness, psychological safety, and creativity. Ethical leadership was significantly positively correlated with belongingness ($r = 0.331, p < 0.01$), psychological safety ($r = 0.480, p < 0.01$), and creativity ($r = 0.326, p < 0.01$) (see Table 3). Ethical climate was also positively associated with belongingness ($r = 0.207, p < 0.01$), psychological safety ($r = 0.326, p < 0.01$), and creativity ($r = 0.201, p < 0.01$). Regarding the control variables Islamic Work Ethics (IWE), IWE was positively correlated with creativity ($r = 0.213, p < 0.01$). A weaker positive relationship was seen between IWE and belongingness ($r = 0.130, p < 0.05$). Moral identity was significantly associated with psychological safety ($r = 0.205, p < 0.01$).

Hypothesis testing

For regression, models 6 (serial mediation) and 1 (moderation) were used. Results for our control variables showed (refer to Table 4) that IWE had significant positive effects on belongingness ($B = 0.18, p < 0.01$) and creativity ($B = 0.20, p < 0.01$). However, no significant effect was found for IWE on psychological safety. For Moral Identity, there was a significant positive relationship with belongingness ($B = 0.14, p < 0.01$). Regarding the study variables, Ethical Leadership had a strong positive effect on belongingness ($B = 0.42, p < 0.01$),

psychological safety ($B = 0.40, p < 0.01$), and creativity ($B = 0.17, p < 0.01$).

Additionally, belongingness significantly predicted psychological safety ($B = 0.26, p < 0.01$) and creativity ($B = 0.41, p < 0.01$), while psychological safety was also positively related to creativity ($B = 0.18, p < 0.01$). The moderation analysis revealed that the interaction between Ethical Leadership and Ethical Climate (EL x EC) was significant in predicting belongingness ($B = 0.19, p < 0.01$), indicating that a strong ethical climate enhances the positive effect of ethical leadership on belongingness (Figure 2).

Process and Hayes model 6 mediation analysis demonstrated (Table 5) that Ethical Leadership (EL) positively influences creativity through several mediating pathways. The total indirect effect was significant [$Effect = 0.265, 95\% \text{ BootCI } (0.153, 0.395)$]. Belongingness significantly mediated the relationship between ethical leadership and creativity [$Effect = 0.173, 95\% \text{ BootCI } (0.097, 0.271)$], while the pathway through both belongingness and psychological safety had a smaller yet significant effect [$Effect = 0.020, 95\% \text{ BootCI } (0.004, 0.053)$]. Additionally, psychological safety alone also mediated the relationship between ethical leadership and creativity [$Effect = 0.072, 95\% \text{ BootCI } (0.021, 0.137)$].

Study 1 discussion

Study 1 provided evidence supporting our hypothesis that ethical leadership plays a significant role in enhancing employees' creativity,

TABLE 4 Regression analysis.

Predictors	Belongingness			Psychological safety			Creativity		
	Coefficient	SE	t	Coefficient	SE	t	Coefficient	SE	t
Control variables									
IWE	0.18**	0.06	2.92	0.06	0.05	1.27	0.20**	0.05	3.59
Moral identity	0.14**	0.05	2.90	−0.00	0.04	−0.05	−0.10	0.05	−1.91
Age	0.00	0.01	0.05	0.00	0.01	0.16	−0.01	0.01	−1.26
Gender	−0.15	0.12	−1.30	0.01	0.01	0.31	−0.13	0.10	−1.25
Position	0.03	0.05	0.54	0.04	0.04	1.00	0.02	0.05	0.36
Education	−0.14*	0.07	−1.92	0.01	0.06	0.18	−0.10	0.07	−1.46
Tenure	0.02	0.04	0.49	0.07*	0.03	2.09	0.03	0.04	0.87
Study variables									
Ethical leadership	0.42**	0.06	6.79	0.40**	0.05	7.96	0.17**	0.06	2.72
Belongingness				0.26**	0.04	6.62	0.41**	0.05	8.54
Psychological Safety							0.18**	0.06	3.04
Ethical climate	0.20**	0.07	3.07						
EL x EC	0.19**	0.06	3.26						

N = 377; p** < 0.01; p* < 0.05; EL, ethical leadership; EC, ethical climate.

TABLE 5 Mediation analysis.

Paths	Effect	Boot SE	Boot LLCI	Boot ULCI
Total	0.265	0.063	0.153	0.395
EL → BE → Creativity	0.173	0.043	0.097	0.271
EL → BE → PS → Creativity	0.02	0.012	0.004	0.053
EL → PS → Creativity	0.072	0.03	0.021	0.137

N = 377; EL, ethical leadership; BE, belongingness; PS, psychological safety.

both directly and indirectly, through factors such as belongingness and psychological safety. Results indicated that ethical leadership positively influences these mediators, ultimately fostering a creative environment. The findings highlight the critical role of psychological safety and a sense of belonging in enhancing creativity, affirming the social capital and self-determination theories that underscore the influence of these relational and psychological factors on individual performance outcomes.

However, some limitations were identified in Study 1, which we aimed to address in Study 2. First, due to the model’s complexity, it was tested in segments rather than as an integrated whole. Second, despite our effort to obtain accurate measures by using time-lagged data collection from multiple sources, the complexity of the model may limit our ability to draw causal inferences (Kenny and Judd, 2014; Podsakoff et al., 2012).

Study 2 addressed these limitations by manipulating ethical leadership, ethical climate, and value congruence to capture a broader and more objective measure of these constructs. By integrating these manipulations and employing a more controlled, scenario-based methodology, the aim was to isolate and examine the effects of ethical leadership, ethical climate, and value congruence on employee belongingness. This approach was helpful in capturing participants’ sense of belonging under varying leadership conditions, enhancing

the capacity to interpret causal mechanisms in alignment with the theoretical framework.

Study 2 methods

Procedure

220 participants were recruited from the same credit unions and banks as in the previous study. To show appreciation, small gift boxes were distributed to maintain their motivation level. One of the exclusion criteria was prior participation in Study 1. The experiment began with an introductory note, informing participants that they would read a job-related scenario focusing on leadership behavior, ethical climate, and value congruence. Afterward, they were asked to answer questions based on their judgment of the situation. The scenario content highlighted the leader’s work ethic and the organization’s climate. Ethical leadership was manipulated by describing the leader as either highly “ethical or unethical,” following the approach from van Gils et al. (2015). In Study 1, the ethical climate was assessed by the leaders themselves, which is part of top management. Ethical climate questions are mostly about the top management. However, study 2 manipulates the ethical climate (see

Supplementary Appendix A). A 2x2x2 factorial design was employed. Participants were randomly selected for these conditions. After reviewing the scenarios, participants completed questions to check the effectiveness of the manipulation, rated their creativity in handling the work situations, evaluated their belongingness and value congruency, and provided demographic details. Participants also rate the scenario realism questions.

A total of 220 took part; 4 were incomplete, and 8 participants failed the attention check. We ended up with 208 participants. There were 66.3% men and an average age of 38.04 (SD = 9.70) years in the sample. The majority of the participants (47%) hold a bachelor's degree and (16.3%) a master's, with only 4% holding a doctorate. The mean for experience was 8.92 (SD = 6.37).

For the realism check, responses for the ethical leadership scenario were 5.83, for the ethical climate scenario 5.65, and for value congruence 4.92, which shows that participants understand the scenario well and can relate to it.

Manipulations check

We checked the manipulations using an independent sample t-test for ethical leadership and ethical climate to see whether they were successful or not. The results for ethical leadership values were (Mean = 5.99, S. D = 1.01) and for no ethical leadership [*Mean* = 2.62, S. D = 1.79, 95% CI (UL = 2.97, LL = 3.77)], with Cohen's d 2.31. Checking manipulations for ethical climate, the results for high ethical climate (Mean = 5.90, S. D = 1.25) and low ethical climate [*Mean* = 2.03, S. D = 1.18, 95% CI (UL = 3.54, LL = 4.21)] showed that manipulations were successful. Cohen's d was 3.18. Value Congruence manipulation check was also confirmed for high (Mean = 4.72, S. D = 1.41) and low [*Mean* = 3.02, S. D = 1.27, 95% CI (UL = 1.34, LL = 2.21)] Cohen's d was 1.27.

Measures

For the realism of the scenario, they responded on 1–7 from highly unrealistic to highly realistic (Mattila and Cho, 2011). Following van Gils et al. (2015), we used one item “to what extent do you believe that your team leader is an ethical leader?” as manipulation check of the scenario manipulations (1 = not ethical at all, 7 = very ethical).

The 10-item ethical climate scale was developed by (Cullen et al., 1993) to measure the overall ethical environment within an organization. The same scale was used for belongingness, ethical

leadership, and creativity. In this study, we deliberately excluded psychological safety as it acts as a following mediator after belongingness in the causal chain. This would prevent a cohesive analysis of the entire model in one step, as seen in Study 1, where testing the model in parts may have obscured key relationships (Bollen, 1989; Kline, 2023). By focusing solely on belongingness as the mediator between ethical leadership and employee creativity while incorporating ethical climate as the moderator, we can test the full model at once. This approach allows for a more robust and comprehensive examination of the interaction effects and overall model dynamics, providing clearer and potentially more significant results (MacCallum and Austin, 2000). While value congruence was measured using the 3-item scale of Cable and DeRue, 2002.

Hypothesis testing

Table 6 shows that ethical leadership is positively related to belongingness ($r = 0.42, p < 0.01$) and creativity ($r = 0.39, p < 0.01$). Belongingness also showed a positive correlation with creativity ($r = 0.51, p < 0.01$). Ethical climate was positively related to belongingness ($r = 0.56, p < 0.01$) and creativity ($r = 0.46, p < 0.01$). Value congruence was also positively related to belongingness ($r = 0.40, p < 0.01$) and creativity ($r = 0.20, p < 0.01$).

Table 7 results shows that ethical leadership has a positive effect on belongingness ($B = 0.19; p < 0.01$) and creativity ($B = 0.18; p < 0.01$). Belongingness also showed a positive significant effect on creativity ($B = 0.41; p < 0.01$). Interaction of ethical leadership and value congruence was seen positive significant ($B = 0.115; p < 0.01$), so hypothesis 5 was supported. Moderation of ethical climate ($B = 0.068; p < 0.01$) was also confirmed. These results are replicated here in Study 2 as well. In Study 1, hypotheses 1 and 3 were also supported. Hypothesis 2 results were also confirmed here as well, as seen in Table 7 (PROCESS and Hayes model 4), which shows that belongingness mediates the relationship between ethical leadership and creativity (*Effect* = 0.180, 95% CI, LL = 0.104, UL = 0.267) (please see Table 8).

Conditional indirect effect of ethical leadership

Table 9 presents significant moderation results, tested using Model 9 of PROCESS by Andrew Hayes. These results support Hypothesis 4 and 5b, indicating that ethical leadership indirectly

TABLE 6 Study 2 Mean, S.D., and correlations analysis.

Order	Variables	Mean	S. D	1	2	3	4	5
1	Ethical leadership	4.24	2.23	-				
2	Ethical climate	3.89	2.28	0.44**	(0.89)			
3	Belongingness	3.98	1.92	0.42**	0.56**	(0.96)		
4	Creativity	3.31	1.87	0.39**	0.46**	0.51**	(0.95)	
5	Value congruence	3.92	1.59	0.31**	0.27**	0.40**	0.20**	(0.92)

N = 208; ** = $p < 0.05$; * = $P < 0.01$, “Values in parenthesis are the reliability values”.
Note: Ethical leadership has only one item.

TABLE 7 Study 2 direct and moderating effects.

Predictors	Belongingness				Employee creativity			
	Coefficient	SE	t	P	Coefficient	SE	t	P
Direct effects								
Ethical leadership	0.19	0.05	3.80	0.000	0.18	0.05	3.32	0.001
Belongingness					0.41	0.06	6.59	0.000
Ethical climate	0.31	0.05	6.22	0.000				
Value congruence	0.31	0.07	4.51	0.000				
Moderating effect								
Ethical leadership x Ethical climate	0.068	0.021	3.24	0.001				
Ethical leadership x Value congruence	0.115	0.030	3.82	0.000				
Ethical climate R2-change		0.027						
Value congruence R2-change		0.037						

N = 208.

TABLE 8 Study 2 indirect effects.

(95% bias-corrected confidence interval method)				
Indirect effect	Effect	SE	LL	UL
Ethical leadership → belongingness → creativity	0.180	0.042	0.104	0.267

N = 208; LL, lower limit; UL, upper limit; SE, standard error.

TABLE 9 Conditional indirect effect of ethical leadership on creativity at the values of moderators.

Paths	Moderators: ethical climate and value congruence					
	EC	VC	Effect	S.E	LLCI	ULCI
Belongingness on creativity	−2.89	−1.92	−0.092	0.036	−0.171	−0.031
	−0.144	0.077	0.080	0.024	0.037	0.129
	2.71	1.74	0.238	0.055	0.139	0.350

N = 208; LL, lower limit; UL, upper limit; SE, standard error.
EC, ethical climate.

influences creativity through a sense of belonging, with this relationship being stronger in a high ethical climate. Specifically, the findings confirm that an increase in ethical climate amplifies this effect. For negative values of ethical climate and value congruence, the effect was negatively significant (*Effect* = −0.092, *LL* = −0.171, *UL* = −0.031). In contrast, for a high ethical climate and value congruence, the effect was substantial (*Effect* = 0.238, *LL* = 0.139, *UL* = 0.350). Table 10 depicts the index of moderated mediation results.

Study 2 discussion

Stud 1 hypothesis was confirmed here as well; we found the conditional indirect effect of ethical leadership on creativity as well. Value congruence was tested on the high and low levels to see whether employees’ sense of belongingness can be varied or not, which confirmed that it varies between high and low levels of value

congruence. Findings underscore that employees with high congruence experience a stronger sense of belonging in organizations led by ethical leaders. Ethical leadership cultivates a culture of trust, respect, and integrity, which resonates with the values of morally conscious employees (Mayer et al., 2012; Peng and Kim, 2020). Such leaders actively promote inclusivity and reinforce ethical standards, which encourages employees to identify with the organizational values and feel a greater connection to their workplace. As a result, employees with high congruence are more likely to perceive themselves as integral members of the organization, enhancing their sense of belonging and commitment (Bojanowska and Piotrowski, 2020; Edwards and Cable, 2009). Conversely, employees with lower congruence may struggle to relate to the ethical framework established by their leaders, leading to feelings of disconnection and reduced engagement with the organizational culture (Van Knippenberg et al., 2004). This misalignment diminishes their sense of belonging, ultimately affecting their job satisfaction and loyalty. Therefore, the congruence between ethical leadership and the values of employees is crucial for fostering a profound sense of belonging.

General discussion

The main objective of this study was to gain a better understanding of ethical leadership in regulating creativity, through Belongingness and psychological safety. Even though the antecedents and outcomes of ethical leadership has been studied, but only few studies focused on the ethical leadership and creativity (e.g., Asif et al., 2019; Chen and Hou, 2016). Specifically, considering the crucial role of belonging was missing. This study considers belongingness and psychological safety as a serial mediator for employees’ creativity. The findings of Study 1 demonstrate that ethical leadership plays a crucial role in shaping a work environment characterized by belongingness, psychological safety, and creativity. These findings were confirmed in study 2 as well. Similarly, previous research emphasizes that leaders who exhibit fairness, integrity, and care contribute to fostering an inclusive environment where employees feel valued and connected (Nishii, 2013). Ethical leadership fosters a sense of belonging by addressing employees’ emotional needs and

TABLE 10 Index of moderated mediation.

Paths	Index	SE (Boot)	BootLLCI	BootULCI
With EC	0.028	0.009	0.011	0.048
With VC	0.047	0.015	0.022	0.081

EC, ethical climate; VC, value congruence.

facilitating shared decision-making, which can enhance organizational cohesion and commitment. This research differs significantly from prior studies by introducing a serial mediation pathway (belongingness → psychological safety) and positioning ethical climate as a moderator rather than a predictor of trust or compliance (Mayer et al., 2010). Additionally, it uncovers the critical role of value congruence in fostering belongingness, an idea supported by Stouten et al. (2012), who argue that individuals are more likely to align with leaders whose actions resonate with their personal and societal values.

Furthermore, the study highlights the significant relationship between belongingness and psychological safety, reinforcing the idea that employees who feel included are more likely to take risks and express their ideas without fear of negative consequences (Edmondson and Bransby, 2023; Frazier et al., 2017). This is based on established research on the importance of trust and openness in promoting innovation and employee engagement (Baumeister and Leary, 2017). Ethical leaders foster inclusivity, which builds trust, essential for psychological safety. This safety, in turn, liberates employees to engage in creative risk-taking. This finding emphasizes that ethical leadership's impact on creativity is not just a result of additiveness, but a result of social belonging and cognitive safety, requiring both social belonging and cognitive safety to fully manifest.

Additionally, our findings suggest that employees who perceive a high level of ethical ties with their supervisors are more likely to experience a profound sense of belonging. Baumeister and Leary (2017) notion of the 'need to belong,' which is not just about forming relationships, but about feeling embedded and valued within a society. Such belongingness provides employees with symbolic meaning and a shared identity within the organization, enhancing both personal fulfillment and social integration (Lambert et al., 2013; Hogg, 2009). Belonging is to go beyond simple interpersonal connection; it embodies an individual's desire to be a part of an organization that supports their identity and values. This deeper connection rooted in ethical congruence between leaders and employees reinforces the individual's perception of relational value, which is crucial for self-esteem and psychological well-being (Leary and Baumeister, 2000; Hagerty et al., 1992). As stated by Leary and Kelly (2008), belonging is a critical factor for individuals to engage in collaborative and innovative activities. This study exhibited that ethical leadership plays a crucial role in cultivating belonging, which ultimately creates a psychologically safe environment conducive to creativity.

Additionally, the moderating role of ethical climate further emphasizes the importance of organizational context in enhancing the effects of ethical leadership. A strong ethical climate ensures that the ethical behaviors modeled by leaders are reinforced throughout the organization, encouraging open communication and employee voice (Demirtas and Akdogan, 2015; Al Halbusi et al., 2021). This connection between ethical climate and leadership further enhances the understanding of how leadership behaviors contribute to tangible organizational outcomes such as creativity. Value congruence was

found to show how employees will feel more belonging if they share values with the leader; the high congruence will make employees feel more inclusive. These findings facilitate a more precise understanding of leadership in organizations. Furthermore, conditional indirect effect for both ethical climate and value congruence is crucial, which further extends piecemeal approaches that were limited to only direct effect or mediation.

This study's two-study design enhances the robustness and generalization of the findings. Study 1 results were confirmed in Study 2 by using a 2x2x2 factorial design to enhance causal inferences. In Study 1 IWE and moral identity were controlled, this is based on potential cultural and religious influences, providing a more comprehensive understanding of ethical leadership's effects. Study 2 methodological advancements, as prior studies on ethical leadership and creativity primarily rely on survey-based, cross-sectional designs. Study 2 methods can reduce common method bias and allow for causal interpretations, providing a more empirical basis for understanding potential interactions.

Theoretical implications

This study makes a significant contribution to the growing body of literature on ethical leadership, particularly by integrating the concepts of belongingness and psychological safety. Unlike prior studies that often viewed ethical leadership in isolation (Nembarth and Edmondson, 2011), this research demonstrates that belongingness serves as a critical mediator between leadership and positive employee outcomes such as creativity and safety. The relationship is not solely mediated by moral identity or psychological safety (e.g., Miao et al., 2013; Al Halbusi et al., 2023). By highlighting these relationships, this study adds a new layer to our understanding of how leaders' ethical conduct influences individual belongingness and their creativity.

Moreover, this research advances social exchange theory by providing empirical evidence that ethical leadership creates reciprocal relationships built on trust and equity, which ultimately promote creativity and psychological safety (Brown et al., 2005). The study's findings offer a multi-dimensional view of leadership, where employees' social and emotional needs are crucial to driving innovation and organizational effectiveness (Kim et al., 2022). This challenges the conventional leadership discourse that prioritizes performance and productivity, emphasizing instead the ethical and emotional dynamics that shape workplace interactions.

This research contributes to the understanding of belongingness as a nuanced concept within organizational psychology. By demonstrating that alignment (congruence) with ethical leadership enhances employees' intrinsic need for symbolic meaning and continuity, our findings extend Baumeister and Leary (2017) foundational 'need to belong' theory into workplace contexts, showing how ethical climates foster stable, identity-affirming spaces. Our study enhances the literature on belongingness by integrating ethical congruence as a mechanism that fulfills individuals' psychological needs for group continuity and personal significance within organizations. This need for deeper, value-based connections in the workplace underscores the sociometer theory's perspective that social bonds serve as indicators of self-worth, providing stability and fostering commitment (Lambert et al., 2013; Leary and Baumeister, 2000).

The study also introduces the moderating effect of ethical climate, showing how the broader organizational context can amplify or diminish the impact of ethical leadership on belongingness and creativity (Den Hartog, 2015). This extends the literature on ethical leadership by recognizing the importance of organizational structures in reinforcing ethical practices, creating an integrated framework for understanding leadership's far-reaching implications. An ethical climate promotes psychological safety by promoting fairness, transparency, and trust. When employees perceive that their organization prioritizes ethical behavior, they feel confident in expressing their ideas, taking risks, and experimenting without fear of negative consequences (Al Halbusi et al., 2021). This psychological safety is a crucial element of creativity, as it encourages employees to think innovatively and share unconventional ideas.

The study extends the contributions further by making highly congruent employees feel more like they belong. When employees feel my values are aligned with the leader's, those values are very dear to them. These inclusive feelings help them try things creatively. These findings suggest that value congruence is the necessary contingency that can satisfy the need to belong. In such highly strengthened environments, ethical leadership reinforces shared values that also foster mutual respect (Edwards and Cable, 2009). Employees may attribute certain values to be ethical and if they are referring to it, it will have much better effect (Stouten et al., 2012). For instance, when employees perceive that their leader's values align with their own, they experience less cognitive dissonance and are more likely to internalize the leader's ethical standards. This alignment fosters a shared purpose, which motivates employees to contribute creatively to organizational goals.

Lastly, by situating these findings within diverse organizational and cultural contexts, this study highlights the universality of ethical leadership principles, suggesting that they are applicable across both developed and underdeveloped economies (Men et al., 2020). This expansion into cross-cultural leadership studies opens new avenues for exploring ethical leadership in non-Western settings, offering valuable insights into its global relevance. The fundamental concepts of this study (ethical leadership, belongingness, psychological safety, and creativity) are relevant in every field. By controlling IWE and Moral identity, we can minimize the culture-specific factors. This framework can be adopted and tested in other cultural and organizational settings. Ethical leadership and a strong ethical climate extend beyond organizational benefits and have a greater impact on society by shaping ethical norms, fostering a culture of integrity, and promoting responsible business practices. Furthermore, ethical leadership encourages innovation and creativity by fostering a psychologically safe environment where employees feel empowered to take risks and create new ideas. This, in turn, drives socially responsible innovation, a workplace culture rooted in ethics can lead to a wider adoption of ethical decisions.

Practical implications

From a practical perspective, this study provides several actionable insights for organizations seeking to foster creativity, engagement, and psychological safety in the workplace. First, by emphasizing the role of ethical leadership in promoting a sense of belonging, organizations are encouraged to invest in leadership development programs that not only teach ethical decision-making but also cultivate empathy,

inclusiveness, and justice in leadership behaviors (Grigoropoulos, 2020). This approach has the potential to transform workplaces by promoting higher levels of employee engagement and loyalty, which in turn drives innovation and organizational success.

Second, the study demonstrates that belongingness is a key driver of both psychological safety and creativity, meaning that organizations should prioritize fostering an inclusive culture where employees feel connected, valued, and involved (Chen et al., 2023). Practical steps include implementing inclusive decision-making processes, establishing recognition programs, and creating spaces for open communication and employee voice (Shafique et al., 2020). These practices not only enhance employee job satisfaction but also strengthen the organization's capacity to innovate and solve complex problems.

Additionally, the study highlights the critical role of ethical climate in enhancing the positive effects of ethical leadership, suggesting that organizations must create a culture of integrity that supports ethical behavior at all levels (Grigoropoulos, 2020). This can be achieved by establishing ethical guidelines, ensuring transparency in leadership practices, and holding leaders accountable for fostering a fair and respectful work environment (De Cremer and Van Knippenberg, 2003). These organizational practices help create a harmonious and supportive work environment, where employees feel empowered to share their ideas and engage in collaborative problem-solving.

Organizations can enhance employee belongingness by promoting an ethical climate that aligns with employees' personal values. This sense of being an integral part of an ethically grounded system can contribute to greater workplace satisfaction and retention, as employees find both symbolic and relational value within the organization. The practical value of ethical leadership lies in its potential to support employees' inherent need for belonging by creating an environment that offers not only surface-level inclusion but also deeper meaning and continuity. For HR leaders, prioritizing value alignment in recruitment and leadership practices could prove essential in building a cohesive, engaged workforce.

Furthermore, this study offers valuable insights for global organizations operating in diverse cultural contexts. The universal applicability of ethical leadership principles suggests that leaders in multinational organizations can benefit from adopting context-sensitive ethical practices that are consistent with local values while maintaining a strong commitment to global ethical standards (Brown et al., 2005). This is particularly relevant in underdeveloped economies, where ethical leadership can drive both organizational growth and employee development.

In conclusion, this study's practical implications underscore the transformational potential of ethical leadership in creating psychologically safe, innovative, and inclusive workplaces. By embedding ethical leadership within the broader organizational culture, companies can unlock creative potential, improve employee well-being, and ensure sustainable growth in today's dynamic and competitive business environments (Nishii, 2013; Roberson, 2006).

Limitations and future research directions

Without any doubt, this study has some limitations that are beneficial to observe. First, the three-time-lagged, dual-source design, while offering stronger temporal inferences than a cross-sectional

approach, still does not fully address causality concerns. A longitudinal or experimental approach could assist in addressing causation more rigorously, allowing for the tracking of changes over a longer period and across various conditions. Because literature lacks whether ethical leadership's caring effects persist for some time or not. Do supervisors maintain their ethical focus under prolonged pressure, or does their commitment wane? Do employees become used to ethical leadership over the past? The ups and downs in leadership and employee methods can only be observed in a longitudinal study. Future research could build on this by adopting such longitudinal methods to provide clearer insights into cause-and-effect relationships. Stouten et al. (2012) suggested that aligning (or diverging) from broader social norms can contribute to creativity and organizational performance. The contents of the box named ethics might have been completely different. Research can also study that ethical leadership might inspire employees by the leader's ethical behavior, but also employees feel pressure to meet the standards. How ethical follower will respond to ethical leadership, can also be in an interesting field to study.

Second, the scenario-based nature of our second study, self-rated responses may have introduced biases. Although supervisor ratings are appreciated in organizational research, further studies can look at longitudinal and peer/supervisor-rated sourced data. Future research could complement these subjective ratings with objective measures, such as the experience sampling method, to see variations and understandings of value congruence, belongingness, and willingness to be creative. Future research could examine how varying degrees of moral values alignment between employees and leadership influence feelings of belongingness across diverse organizational settings. Recently, research suggested that moral values might play a crucial role in high congruence (Seggewiss et al., 2019).

Conclusion

Throughout two studies, we show that leaders' belief in ethics is a crucial factor in the workplace that enhances a sense of belongingness and safety. People exchange relationships or try to learn and imitate their leaders. We use values to see the congruence between ethical leadership and followers, which also affects a sense of belongingness. We use this as a springboard to get the attention of the researchers toward this understudied phenomenon. While it looks very important how employees think about the ethics in an organization and how they value these conducts, it will be based on their value congruence. Different employees will value these conducts in different ways and can relate to themselves; in the words of Dunford et al. (2015: 319), "Your employees are watching." Different eyes, different perceptions.

Data availability statement

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

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Aboud, K., Xiongying, N., and Qasim, M. (2023). Impact of ethical leadership on employees' psychological safety and voice behavior; with mediating role of belongingness. *Int. J. Sci. Busi.* 20, 42–57. doi: 10.58970/IJSB.2055

Ethics statement

The studies involving human participants were reviewed and approved by the Departmental Ethics Approval Committee at The University of International Business and Economics (UIBE). Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

Author contributions

MQ: Methodology, Software, Writing – original draft, Writing – review & editing, Data curation, Formal analysis, Investigation, Validation. AL: Funding acquisition, Project administration, Resources, Supervision, Visualization, Conceptualization, Writing – review & editing.

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Generative AI statement

The authors declare that no Gen AI was used in the creation of this 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.2025.1559427/full#supplementary-material>

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Exploring the impact of platform leadership on employee innovative behavior: a sequential explanatory mixed method

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This study uses the Ability—Motivation—Opportunity framework to explore the influence mechanism of platform leadership on employees' innovation behavior. This study examines organizational learning, knowledge sharing, coworker support, and psychological empowerment as mediating variables, employee innovation behavior as the dependent variable. This study constructs a multi-mediated model to analyze the impact of platform leadership on employee innovative behavior, which includes 13 hypotheses. The study primarily focuses on data collected from China's Shanxi and Guangxi regions, encompassing manufacturing, software and information services, internet companies, and enterprises establishing digital platforms, with individual employees as the subjects of investigation. This research employed a mixed-method approach, following a standardized research process in a sequential explained process. Research one involved the analysis of questionnaires from 518 employees, which applies to a structural equation model. The model's multiple mediation effects are confirmed using the bootstrap method. Research two comprised semi-structured interviews with 24 enterprise employees. Text data mining is conducted using Python and the open-source Chinese tool "Weiciyun" to explore the underlying mechanisms between platform leadership and innovation behavior. This study underscores the practical contributions of platform leadership to organizational development by demonstrating its positive impact on organizational learning, knowledge sharing, coworker support, and psychological empowerment, all of which significantly enhance employee innovation behavior. Organizational learning emerges as the most critical mediator. The findings provide actionable insights for leadership policies, emphasizing the importance of cultivating a learning-oriented culture, fostering knowledge sharing, and empowering employees psychologically. By implementing these strategies, leaders can effectively drive innovation and improve organizational performance, offering a clear pathway for leadership practices to enhance adaptability and innovation within organizations.

KEYWORDS

platform leadership, organizational learning, knowledge sharing, coworker support, psychological empowerment, employee innovative behavior

1 Introduction

The digital transformation of the economy has spurred the growth of platform—based economies, characterized by data—driven operations, platform support, and networked collaboration. To meet personalized market demands, enterprises are increasingly adopting flatter, decentralized, and platform—oriented organizational structures (Xie, 2022). In 2014, scholar Hao Xuguang introduced the concept of “platform leadership,” a novel model combining platform thinking and leadership practices. This leadership involves leaders creating internal platforms to empower employees, fostering mutual growth and a dynamic, spiraling synergy between the organization and its employees.

In today’s volatile market, innovation is critical for survival and competitive advantage, making employee innovation behavior a key focus. Recent studies indicate that platform leadership positively impacts various forms of employee innovation, including proactive, deviant, and breakthrough innovation behaviors (Ma et al., 2024; Yang and Xiao, 2024; Min and Kim, 2021). However, research on the mechanisms through which platform leadership influences employee innovation remains limited, with issues such as inconsistent definitions, narrow perspectives, and methodological constraints. The exploration of mediating variables is particularly scarce, and the internal dynamics of platform leadership’s impact on innovation behaviors are yet to be fully understood (Xu, 2022; Zhou et al., 2023). Further research is needed to address these gaps and deepen our understanding of this emerging leadership paradigm.

This study aims to explore the factors influencing employees’ performance behaviors, and its research framework is based on the AMO model of performance. This model was proposed by Vroom in the framework of the expectancy theory in 1964 and later refined by Blumberg. It posits that employees’ performance behaviors are comprehensively influenced by ability, motivation, and opportunity, and it is an important theoretical framework from the “behavioral perspective” (Vroom, 1964; Pringle and Blumberg, 1986). In this study, psychological empowerment is classified as an ability factor. It enhances employees’ confidence and self-efficacy when performing innovative tasks, thus laying a foundation for innovation. Knowledge sharing serves as a motivation factor. When employees share knowledge, they can be exposed to new ideas, form a positive feedback loop, and strengthen their motivation for innovation. Platform leadership, organizational learning, and coworker support are considered opportunity factors. Platform leaders create an innovative culture and build platforms for resource sharing. Organizational learning disseminates new knowledge and technologies, and coworker support alleviates psychological pressure. Together, these three factors provide employees with opportunities for innovation and increase the likelihood of innovation. Therefore, the AMO theory is suitable for exploring the relationships between these factors and the innovative behaviors of employees in platform enterprises.

This study employs a sequential explanatory design to analyze the internal mechanisms through which platform leadership influences employee innovation behavior. This design aims to contrast and interpret the findings of quantitative analysis with qualitative data. Initially, the research framework is established through quantitative data, followed by the collection of qualitative

data to aid in explaining the results of the quantitative analysis. Two reasons justify the use of a mixed-methods approach: first, the variables and model in this study are synthesized from existing literature, known variables, and current theories. Following Remenyi et al. (1998), who suggest quantitative research for such purposes, this study begins with a quantitative approach. Second, platform leadership is a novel concept rooted in Chinese context, with many uncertainties and unknown internal mechanisms requiring in-depth and open-ended exploration. Using only quantitative or qualitative methods alone cannot capture descriptive details of the internal mechanisms, nor can they fully describe the developmental trends of the issue. Therefore, combining both quantitative and qualitative data is essential for a comprehensive analysis of the internal mechanisms through which platform leadership influences employee innovation behavior.

In summary, this study, based on the ability-motivation-opportunity theory, introduces organizational learning, knowledge sharing, coworker support, and psychological empowerment as mediating variables to construct an integrated, multiple-mediator model of platform leadership’s impact on employee innovation behavior. The study has three primary objectives: first, to investigate whether platform leadership influences employee innovation behavior; second, to explore the mechanisms of this influence; and third, to examine whether organizational learning, knowledge sharing, psychological empowerment, and coworker support serve as mediators in this process.

2 Literature review and hypotheses

2.1 Platform leadership and employee innovative behavior

Platform leadership, emphasizes equality and sharing in a dynamic organizational environment (Zhao, 2018). This leadership style encourages resource sharing and common goal development, activating potential and enhancing motivation (Wang et al., 2022). It is characterized by mutual fulfillment and growth. The theoretical foundation of platform leadership is rooted in the third wave of Maslow’s humanistic psychology. Hao (2014) posits that individuals have the potential for self-actualization, and leaders should provide a platform for this. Platform leadership differs from traditional styles by fostering a collaborative, interactive, and growth-oriented environment. Transform Charismatic leadership relies on personal influence and top-down motivation, neglecting employee development (Xu, 2022). Service leadership emphasizes altruistic service but is one-sided and less interactive (Russell, 2001; Lu et al., 2021). Authoritative leadership focuses on top-down empowerment for performance, whereas platform leadership promotes mutual influence and growth. Inclusive leadership creates a supportive environment but overlooks leader development (Xiong et al., 2024). Platform leadership integrates elements from these styles, emphasizing mutual growth, equal interaction, and continuous learning (Yang and Zhang, 2023).

Platform leadership effectively stimulates employees’ innovative behavior as an opportunity factor by creating an environment, building platforms, and providing resources (Hao, 2014). Firstly, leaders with inclusive traits create a relaxed

environment for employees' innovation (Li, 2019). They accept the diverse contributions and differences of employees and tolerate mistakes (He, 2020). This inclusiveness gives employees a sense of psychological security, so they don't have to worry about the negative consequences of innovation failure (Zhou and Cheng, 2018). As a result, they are more willing to participate in creative activities and gain innovation opportunities (Cropanzano and Mitchell, 2005; Javed et al., 2018). Secondly, leaders capable of building and optimizing growth platforms are crucial. In an era when employees aspire to realize their self—worth, platform—based leaders pay attention to employees' needs and build platforms for them, enabling employees to unleash their creativity and tap into their innovation potential (Chen, 2016). Meanwhile, the created innovative atmosphere also promotes the generation and application of innovative ideas, providing employees with opportunities to put their innovative ideas into practice. Moreover, leaders who encourage change provide resource support for employees' innovation (Li et al., 2019), ensuring the implementation of employees' innovation opportunities at the practical level and enabling employees to carry out innovation activities with resource support (Hao et al., 2021; Fan et al., 2021).

H1: Platform leadership significantly positively influences employee innovative behavior.

2.2 Hypothetical development of organizational learning

Most scholars have affirmed the influence of leadership behavior on organizational learning (Shu, 2018; Ahsan, 2021; He, 2020; Wei, 2020). Aragón-Correa (2007) views it as knowledge acquisition and sharing to elevate internal knowledge levels. Platform leadership emphasizes mutual growth with subordinates. Leaders learn continuously and share knowledge with employees, promoting their learning and knowledge—sharing (Hao et al., 2021). This helps create a learning culture, facilitating organizational learning. Moreover, it plans long—term for the enterprise, integrates employee and enterprise development, encourages decision—making participation, and shares a vision (Hao, 2014; Yang X. et al., 2022). Hence, this study proposes the following hypothesis:

H2: Platform leadership significantly positively influences organizational learning.

Organizations and individuals can enhance competitiveness through learning driven innovation (Schon, 1997). Studies show organizational learning positively impacts employee innovative behavior and performance (Zhao and Wang, 2021; Han, 2017). As enterprises merge with digital economies, learning is crucial. This article posits organizational learning has three dimensions: learning commitment, vision sharing, and open—mindedness. Strong organizational learning will encourage employees within the organization to learn from each other, stimulate their learning interest, and promote the emergence of their innovation awareness (Cohen and Caner, 2016). On the contrary, weak organizational

learning will lead to employees' lack of learning interest and ability, insufficient communication and interaction, and a tendency to choose conservative behaviors. Thus, the following hypothesis is proposed:

H6: Organizational learning significantly positively impacts employees' innovative behavior.

Leadership style is vital as it guides employees' behavior (Wang and Chen, 2012). Scholars suggest organizational learning mediates between leadership and performance (Wang, 2021; Slater and Narver, 1995). Higher organizational—learning perception promotes knowledge—sharing and boosts performance (Lv, 2013). Platform leaders can enhance team learning and innovation (Li et al., 2022; Xu, 2022). Combining Hypothesis 2 and Hypothesis 6, this study proposes that platform leadership will affect the level of organizational learning, and the level of organizational learning will stimulate employees' innovative behavior. Therefore, the following hypothesis is proposed:

H10: Organizational learning mediates the relationship between platform leadership and employee innovative behavior.

2.3 Hypothetical development of knowledge sharing

According to the AMO theory, as an opportunity factor, platform—type leaders influence employees' knowledge sharing through the following approaches. Leaders create opportunities for knowledge exchange and promote knowledge transfer by building online knowledge management platforms, organizing cross—departmental projects, and holding sharing sessions (Appelbaum et al., 2000). Meanwhile, they construct an ecological environment for the career platform, align the organizational goals with employees' goals, create a favorable environment, enhance employees' intrinsic motivation to share knowledge, and eliminate their concerns (Yang and Xu, 2016; Russell and Marie, 2005). They also meet employees' needs through interaction and weaken employees' perception of loss. In this way, it can improve employees' willingness and ability to share knowledge, and promote knowledge sharing and innovation within the organization (Xu, 2022; Wang and Hao, 2023). Therefore, the following hypothesis is proposed:

H3: Platform leadership exerts a significant positive influence on knowledge sharing.

Antonacopoulou and Gabriel (2001) emphasized the importance of knowledge for innovation. They posited that an organization's knowledge assets are directly proportional to its innovation level, and the creative process follows the knowledge spiral. The core of knowledge management is to promote the dissemination of knowledge sharing (Jielin et al., 2020). The employees' willingness to share knowledge determines the knowledge—sharing behavior within the organization

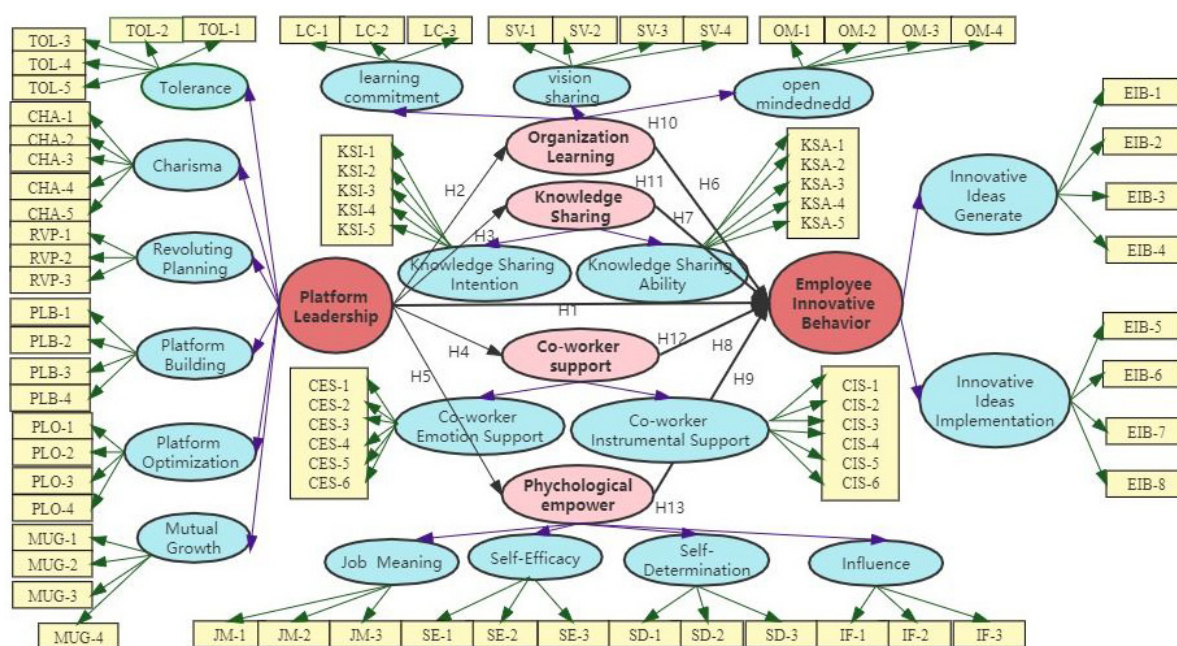


FIGURE 1
Research framework.

(Christopher and Ken, 2006). Xu (2022) found that the willingness to share knowledge mediates the relationship between platform—type leadership and employees' innovative behavior. Chen et al. (2018) pointed out that internal knowledge sharing is the key to improving individual innovation ability. Knowledge sharing can promote communication, cooperation, reduce conflicts, and foster the emergence of creativity (Yang et al., 2017). Numerous studies support the positive impact of knowledge sharing on employees' innovative behavior (Ye, 2021; Tang Y., 2021; Zhang et al., 2014). Therefore, the following hypothesis is proposed:

H7: Knowledge sharing significantly enhances employee innovative behavior.

Platform leaders create and develop a shared vision with employees, redirecting employees' focus from self-interest to the overall interests of the organization, thereby enhancing the willingness of team members to cooperate. In an organizational culture that is unanimously recognized by all employees, employees are more proactive. When their self-actualization needs are met, they actively communicate to acquire experiences and skills beyond the existing knowledge and explore diverse solution paths, which helps both individuals and the organization achieve innovation goals (Xin et al., 2020; Hao et al., 2021). Meanwhile, knowledge sharing, as a crucial part, reduces employees' sense of uncertainty during the creative process (Mittal and Dhar, 2015), enabling them to be more innovative. In recent years, knowledge sharing is often regarded as a mediating variable in the impact of other factors on employees' innovative behavior (Rao Jada et al., 2019). Du et al. (2018) found that social interaction can encourage employees' innovative behavior by influencing the degree of knowledge sharing in the organization. Studies by Zhou and Cheng (2018) confirmed the mediating role of knowledge sharing in the

impact of shared leadership on employees' innovative behavior. Ma (2020) demonstrated that knowledge sharing plays a mediating role between the diverse work atmosphere and the innovative behavior of knowledge-based employees. Therefore, the following hypothesis is proposed:

H11: Knowledge sharing mediates the relationship between platform leadership and employee innovative behavior.

2.4 Hypothetical development of coworker supported

Platform leaders emphasize the shared career platform, help achieve common goals, and are good at establishing a collaborative and inclusive culture (Zhang, 2022; Tang R., 2021). Research has found that leadership behaviors focusing on emotional intelligence and interpersonal skills can create an inclusive and empathetic culture in the organization, which helps establish a supportive work environment, increases peer support, and enhances employees' well-being and work engagement (Xue and Zhao, 2016). The study by Yang and Li (2013) shows that the level of coworker support is influenced by ethical leadership. Positive information such as relational help and normative, appropriate behaviors demonstrated by leaders can promote mutual trust and support among employees, creating a positive atmosphere and raising the level of coworker support (Ding, 2019). Their research also found that leaders' inclusive traits contribute to building an inclusive culture and a supportive work environment, increasing communication, help, and support among colleagues. Platform leaders positively impact coworker support by creating

a collaborative, supportive, and inclusive work environment that promotes trust, communication, and interdependence. Therefore, the following hypothesis is proposed:

H4: Platform leadership positively influences coworker support.

According to the AMO theory, coworker support, as an opportunity factor, influences employees' innovative behavior. In the organization, coworker support provides opportunities for information exchange and knowledge sharing. Coworker instrumental support can make up for employees' lack of knowledge and skills, facilitating the implementation of innovation tasks (Yan, 2019; Shi, 2020). Moreover, coworker support can create a favorable innovation atmosphere and communication opportunities. Emotional support can relieve psychological fatigue, strengthen motivation, and stimulate willingness (Deng et al., 2020). Given the risk of innovation, coworker emotional support and responsibility—sharing can buffer negative impacts, enabling employees to have the courage to continue innovating and increasing the likelihood of innovation success (Subrahmaniam and Rangaraj, 2008; Schumpeter, 1934). Existing studies have found that coworker support has a positive impact on employees' innovative behavior and creativity (Zakarya, 2019; Deng et al., 2020). Therefore, the following hypothesis is proposed:

H8: Coworker support positively affects employee innovative behavior.

In summary, platform leaders create a supportive work environment through measures such as empowerment and communicating the corporate vision. This environment influences the cognition of organizational members, allowing employees to receive emotional and self—esteem support. Guo and Du (2013) pointed out that coworker support can help employees cope with stressful events. As a result, employees recognize their own importance and are motivated to innovate (Deng et al., 2020). Meanwhile, in a supportive environment, colleagues' suggestions, knowledge sharing, etc. can enrich employees' knowledge and skills, enabling them to meet the requirements of innovation tasks and increasing the likelihood of innovative behaviors (Rhoades and Eisenberger, 2002). Thus, the following hypothesis is proposed:

H12: Coworker support mediates the relationship between platform leadership and employee innovative behavior.

2.5 The mediating role of psychological empowerment between platform leadership and employee innovative behavior

Psychological empowerment focuses on employees' internal perceptions and represents an intrinsic motivation process (Menon, 2001). Spreitzer (1995) posited that psychological empowerment refers to the extent to which employees perceive the delegation of authority from their leaders. According to

TABLE 1 Hypothesis list.

Hypothesis no.	Contents of hypothesis
H1	Platform leaders have a positive and significant influence on employee innovative behavior
H2	Platform leaders have a significant positive impact on organization learning
H3	Platform leaders have a significant positive impact on Knowledge sharing
H4	Platform leaders have a significant positive impact on the coworker support
H5	Platform leaders have a significant positive impact on the employee's psychological empower
H6	Organization learning have a significant positive impact on employee innovative behavior
H7	knowledge sharing have a significant positive impact on employee innovative behavior
H8	Coworker support have a significant positive impact on employee innovative behavior
H9	Psychological empowerment have a significant positive impact on employee innovative behavior
H10	Organization learning mediate the relationship between Platform leaders and employee innovative behavior. (mediator)
H11	Knowledge sharing mediate the relationship between Platform leaders and employee innovative behavior. (mediator)
H12	Coworker support mediate the relationship between Platform leaders and employee innovative behavior. (mediator)
H13	Psychological empower mediate the relationship between Platform leaders and employee innovative behavior. (mediator)

the AMO theory, the relationship between platform leadership and psychological empowerment is one between the external opportunity environment and the internal motivational cognition. The positive impact of platform leadership is manifested in employees' perception level of psychological empowerment. Platform leadership empowers employees, thereby fulfilling their need for work autonomy. Leaders' equal and inclusive treatment of employees satisfies their need for a sense of belonging. Moreover, platform leadership, which emphasizes interactive collaboration, provides support to employees, meeting their need for competence. Platform leadership influences employees' proactive innovation behavior by affecting their creative self—efficacy, which is also one of the dimensions of psychological empowerment. Xie (2022) found that platform leadership affects employees' voice behavior by influencing their level of psychological empowerment. Therefore, this study argues that platform leadership can effectively enhance employees' perception of psychological empowerment.

H5: Platform leadership exerts a significant positive influence on psychological empowerment.

According to the AMO theory, psychological empowerment promotes employees' innovative behavior in two aspects. In terms

TABLE 2 The reliability and validity test of the first order constructs.

First order constructs	Items	Loadings	Cronbach's alpha	CR	AVE
TOL	TOL-1	0.791	0.830	0.886	0.662
	TOL-3	0.839			
	TOL-4	0.768			
	TOL-5	0.853			
CHA	CHA-1	0.89	0.933	0.949	0.790
	CHA-2	0.866			
	CHA-3	0.87			
	CHA-4	0.908			
	CHA-5	0.909			
PLB	PLB-1	0.855	0.835	0.901	0.752
	PLB-3	0.898			
	PLB-4	0.849			
RVP	RVP-1	0.936	0.929	0.954	0.875
	RVP-2	0.931			
	RVP-3	0.939			
PLO	PLO-1	0.914	0.917	0.947	0.857
	PLO-2	0.935			
	PLO-3	0.93			
MUG	MUG-1	0.93	0.944	0.960	0.857
	MUG-2	0.917			
	MUG-3	0.922			
	MUG-4	0.933			
CL	CL-1	0.7	0.825	0.884	0.656
	CL-2	0.859			
	CL-3	0.84			
	CL-4	0.842			
SV	SV-1	0.776	0.826	0.829	0.742
	SV-2	0.849			
	SV-3	0.905			
	SV-4	0.828			
OM	OM-1	0.81	0.830	0.887	0.664
	OM-2	0.854			
	OM-3	0.757			
	OM-4	0.835			
KSA	KSA-1	0.834	0.854	0.895	0.632
	KSA-2	0.77			
	KSA-3	0.741			
	KSA-4	0.776			
	KSA-5	0.848			
KSI	KSI-1	0.871	0.919	0.939	0.755
	KSI-2	0.822			
	KSI-3	0.902			
	KSI-4	0.889			
	KSI-5	0.86			

(Continued)

TABLE 2 (Continued)

First order constructs	Items	Loadings	Cronbach's alpha	CR	AVE
CES	CES-1	0.747	0.879	0.908	0.624
	CES-2	0.812			
	CES-3	0.767			
	CES-4	0.824			
	CES-5	0.751			
	CES-6	0.835			
CIS	CIS-1	0.819	0.818	0.863	0.525
	CIS-2	0.804			
	CIS-3	0.766			
	CIS-4	0.652			
	CIS-5	0.641			
	CIS-6	0.639			
WM	WM-1	0.919	0.877	0.924	0.804
	WM-2	0.927			
	WM-3	0.842			
SE	SE-1	0.914	0.898	0.937	0.831
	SE-2	0.942			
	SE-3	0.877			
SD	SD-1	0.918	0.920	0.949	0.862
	SD-2	0.933			
	SD-3	0.934			
IF	IF-1	0.88	0.862	0.915	0.783
	IF-2	0.885			
	IF-3	0.89			
EIBG	EIBG-1	0.823	0.917	0.942	0.802
	EIBG-2	0.926			
	EIBG-3	0.892			
	EIBG-4	0.937			
EIBI	EIBI-1	0.871	0.875	0.942	0.724
	EIBI-2	0.866			
	EIBI-3	0.877			
	EIBI-4	0.793			

of ability, psychological empowerment enhances employees' self—efficacy. Individuals control their own behaviors through subjective beliefs and self—efficacy, acquire and utilize knowledge, and regulate their self—behaviors (Bandura, 1986). Employees with a high level of perceived psychological empowerment are energetic and show a more positive work attitude. They are confident in facing challenges, expanding knowledge and skills, which provides support for innovation (Yang Q. et al., 2022). In terms of motivation, psychological empowerment awakens employees' intrinsic motivation. The consistent goals make employees love their work more due to its meaning and autonomy. The personal goals are highly consistent with the organization's innovation goals. Additionally, the increase in employees' participation in decision—making and access to resources facilitates knowledge integration

and innovation. Under the mutual promotion of psychological perception and behavior, innovative ideas are transformed into actions (Bandura, 1986). Relevant studies have pointed out that psychological empowerment has a certain impact on employees' work performance and proactive innovative work behavior, and it plays a positive role (Shi and Yang, 2015; Zhao et al., 2021). Employees with a higher level of perceived psychological empowerment at work are more likely to show proactive innovative behaviors (Chen, 2015; Yang Q. et al., 2022). Thus, the following hypothesis is proposed:

H9: Psychological empowerment significantly and positively impacts employee innovative behavior.

TABLE 3 The reliability and validity test of the second order constructs.

Second order constructs	Items	Loadings	Cronbach's alpha	CR (rho_a)	AVE
PL	TOL	0.797	0.921	0.938	0.718
	CHA	0.931			
	RVP	0.811			
	PLB	0.88			
	PLO	0.757			
	MUG	0.889			
OL	CL	0.863	0.88	0.926	0.807
	SV	0.881			
	OM	0.910			
KS	KSI	0.944	0.85	0.93	0.87
	KSA	0.917			
CS	CIS	0.927	0.867	0.938	0.883
	CES	0.950			
PE	WM	0.942	0.711	0.795	0.629
	SE	0.874			
	SD	0.887			
	IF	−0.287			
EIB	EIBG	0.898	0.761	0.853	0.744
	EIBI	0.822			

Platform leadership adheres to the concept of mutual fulfillment, emphasizing common growth and joint decision-making. It is more tolerant of employees, triggering positive psychological and behavioral factors. It supports employees in cognition, emotion, and morality, and grants sufficient work autonomy and decision-making power, strengthening employees' perceived empowerment (Hao et al., 2021). Keller et al. (1995) found that trusting employees' abilities and caring about and supporting their ideas and behaviors contribute to enhancing employees' perceived empowerment. Thus, platform leadership helps improve employees' psychological empowerment perception. Thomas and Velthouse (1990) and Spreitzer (1995) found that psychological empowerment is highly correlated with employees' resilience and work autonomy. Psychological empowerment can mobilize employees' innovation enthusiasm, enabling them to engage in risky work and stimulate creativity. Spreitzer (1995) argued that employees with high psychological empowerment can receive more leadership support. When the level of psychological empowerment is high, employees will generate more positive emotions at work, strengthen their intrinsic motivation, and be more willing to engage in creative work. Combining Hypothesis 4 and Hypothesis 8, this study argues that platform leadership will enhance subordinates' psychological empowerment perception, which in turn will stimulate employees' innovative behavior. Therefore, the following hypothesis is proposed:

H13: Psychological empowerment acts as a mediating factor in the relationship between platform leadership and employee innovative behavior.

Based on Vroom's (1964) AMO performance model and previous research, it is posited that employees' effort levels

determine their job performance, and the extent of task completion effort is influenced by their abilities and motivation. This study views employee innovative behavior as a complex system and incorporates it as a capability factor, psychological empowerment as a motivational factor, and platform leadership, organizational learning, and coworker support as opportunity factors. By examining the interplay among individuals, contexts, and opportunities, this study seeks to elucidate the impact mechanism of platform leadership, organizational learning, knowledge sharing, coworker support, and psychological empowerment on employee innovative behavior, within the framework of the AMO theory model. This article proposes the following framework as Figure 1.

The theoretical framework includes 13 main hypothesis as Table 1. Hypothesis H1 tests the relationship between platform leadership and employee innovation behavior, H2, H3, H4, H5 test the relationship between platform leadership on organizational learning, knowledge sharing, coworker support and psychological empowerment. H6, H7, H8, H9 examine whether organizational learning, knowledge sharing, coworker support and psychological empowerment have an impact on employee innovation behavior. Finally, we examine whether organizational learning, knowledge sharing, coworker support, and psychological empowerment (H10, H11, H12, H13) play a mediating role between platform leadership and employee innovative behavior.

3 Research methodology

3.1 Research design

In alignment with the sequential explanatory design approach, this study initially employed quantitative methods to validate the

TABLE 4 The square root of the AVE value of variables and the correlation coefficient.

	CES	CHA	CIS	CL	CS	EIB	EIBG	EIBI	IF	KS	KSA	KSI	MUG	OL	OM	PE	PL	PLB	PLO	RVP	SD	SE	SV	TOL	WM
CES	0.790																								
CHA	0.511	0.889																							
CIS	0.763	0.548	0.724																						
CL	0.517	0.498	0.453	0.813																					
CS	0.950	0.565	0.927	0.521	0.712																				
EIB	0.532	0.487	0.482	0.678	0.543	0.754																			
EIBG	0.480	0.488	0.464	0.644	0.504	0.898	0.895																		
EIBI	0.429	0.333	0.352	0.510	0.421	0.822	0.489	0.852																	
IF	−0.353	−0.180	−0.471	−0.131	−0.428	−0.179	−0.185	−0.114	0.885																
KS	0.637	0.534	0.548	0.718	0.635	0.726	0.705	0.525	−0.226	0.775															
KSA	0.626	0.491	0.508	0.670	0.609	0.679	0.659	0.494	−0.262	0.917	0.795														
KSI	0.565	0.501	0.511	0.668	0.577	0.673	0.655	0.484	−0.169	0.944	0.735	0.869													
MUG	0.470	0.779	0.499	0.438	0.518	0.447	0.433	0.327	−0.167	0.483	0.442	0.455	0.926												
OL	0.645	0.632	0.633	0.863	0.683	0.770	0.742	0.564	−0.213	0.832	0.773	0.775	0.592	0.735											
OM	0.592	0.499	0.577	0.678	0.623	0.707	0.694	0.502	−0.227	0.781	0.727	0.727	0.500	0.910	0.815										
PE	0.553	0.627	0.618	0.484	0.623	0.555	0.526	0.418	−0.287	0.598	0.571	0.544	0.580	0.648	0.582	0.723									
PL	0.515	0.931	0.551	0.500	0.569	0.503	0.494	0.358	−0.181	0.540	0.490	0.513	0.889	0.654	0.532	0.642	0.761								
PLB	0.480	0.782	0.501	0.430	0.524	0.446	0.419	0.341	−0.150	0.475	0.445	0.440	0.746	0.591	0.488	0.555	0.880	0.867							
PLO	0.338	0.574	0.378	0.372	0.382	0.332	0.322	0.240	−0.066	0.371	0.288	0.391	0.629	0.471	0.377	0.415	0.757	0.752	0.926						
RVP	0.396	0.720	0.439	0.392	0.444	0.401	0.388	0.290	−0.160	0.416	0.385	0.388	0.657	0.524	0.428	0.511	0.811	0.648	0.557	0.935					
SD	0.431	0.531	0.496	0.369	0.494	0.435	0.409	0.331	−0.142	0.500	0.451	0.477	0.490	0.520	0.475	0.887	0.534	0.436	0.338	0.412	0.928				
SE	0.479	0.570	0.521	0.462	0.532	0.531	0.514	0.389	−0.169	0.544	0.529	0.488	0.530	0.598	0.528	0.874	0.596	0.539	0.386	0.486	0.626	0.912			
SV	0.591	0.651	0.632	0.633	0.652	0.643	0.616	0.475	−0.200	0.711	0.649	0.673	0.609	0.881	0.737	0.624	0.671	0.628	0.485	0.531	0.509	0.561	0.862		
TOL	0.379	0.771	0.393	0.376	0.412	0.418	0.427	0.276	−0.174	0.427	0.393	0.402	0.633	0.477	0.385	0.532	0.797	0.587	0.476	0.572	0.460	0.492	0.471	0.814	
WM	0.526	0.594	0.564	0.478	0.581	0.526	0.488	0.411	−0.186	0.555	0.533	0.503	0.546	0.625	0.552	0.942	0.606	0.528	0.414	0.478	0.804	0.766	0.609	0.480	0.897

The bold numbers represent the square roots of the average variance extracted (AVE) values for each variable, while the non - bold numbers are the correlation coefficients between this variable and other variables.

TABLE 5 Discriminant validity—Heterotrait-monotrait ratio (HTMT).

	CES	CHA	CIS	CL	EIBG	EIBI	IF	KSA	KSI	MUG	OM	PLB	PLO	RVP	SD	SE	SV	TOL	WM
CES																			
CHA	0.561																		
CIS	0.888	0.602																	
CL	0.603	0.565	0.536																
EIBG	0.532	0.526	0.532	0.737															
EIBI	0.48	0.362	0.395	0.593	0.537														
IF	0.405	0.198	0.616	0.154	0.206	0.124													
KSA	0.711	0.544	0.593	0.79	0.735	0.558	0.301												
KSI	0.629	0.542	0.576	0.767	0.713	0.533	0.189	0.819											
MUG	0.514	0.829	0.542	0.494	0.464	0.354	0.181	0.487	0.489										
OM	0.692	0.567	0.689	0.817	0.794	0.578	0.27	0.854	0.833	0.565									
PLB	0.557	0.884	0.582	0.515	0.474	0.392	0.172	0.525	0.502	0.84	0.585								
PLO	0.374	0.62	0.415	0.426	0.347	0.262	0.071	0.322	0.427	0.675	0.432	0.856							
RVP	0.437	0.772	0.487	0.446	0.419	0.315	0.175	0.429	0.421	0.701	0.487	0.735	0.602						
SD	0.479	0.573	0.545	0.422	0.447	0.363	0.155	0.506	0.519	0.525	0.544	0.497	0.367	0.446					
SE	0.538	0.623	0.592	0.535	0.565	0.437	0.191	0.599	0.539	0.576	0.611	0.623	0.425	0.532	0.689				
SV	0.693	0.744	0.747	0.766	0.705	0.55	0.238	0.766	0.774	0.69	0.891	0.757	0.557	0.607	0.586	0.654			
TOL	0.439	0.872	0.46	0.454	0.487	0.32	0.201	0.458	0.458	0.713	0.463	0.702	0.544	0.649	0.522	0.572	0.573		
WM	0.596	0.656	0.644	0.559	0.544	0.46	0.211	0.61	0.562	0.599	0.646	0.616	0.461	0.529	0.898	0.861	0.715	0.561	

proposed model and its 13 hypotheses, utilizing SPSS and Smart-PLS as analytical tools. Data collection was conducted in two phases: a pilot study followed by a formal study. The findings from the quantitative analysis were then used to inform the themes for semi-structured interviews during the qualitative analysis phase, aiming to uncover the factors and underlying mechanisms through which platform leadership influences employee innovative behavior. Finally, the study integrated and compared the quantitative and qualitative results, leading to the formulation of relevant discussions and research contributions.

The sample data for this research were gathered from Guangxi and Shanxi, regions ranked 19th and 20th in China's economic hierarchy, as well as neighboring provinces. The study targeted employees in industries closely associated with digitization, networking, or intelligence, including manufacturing, software and information services, internet-based companies, and enterprises developing digital platforms, as the primary subjects for investigation.

3.2 Study 1: quantitative research, data analysis and hypothesis testing

3.2.1 Sampling and instrument

To determine the sample size, the method by [Wanichbancha \(2006\)](#) was used, targeting 384 participants for reliable data at a 95% confidence level. Established scales were adapted for the Chinese context and validated through preliminary surveys and interviews. A Likert 5-point scale was used. Platform leadership included 6 dimensions and 25 items (Cronbach's $\alpha = 0.947$), with "tolerance," "charisma," "revolution planning," "platform building," "platform optimization," and "mutual growth" as key dimensions ([Hao et al., 2021](#)). Employee innovative behavior comprised 2 dimensions and 8 items (Cronbach's $\alpha = 0.829$) ([Scott and Bruce, 1994](#); [Pamela et al., 1999](#); [Gao, 2015](#)). Organizational learning had 3 dimensions and 12 items (Cronbach's $\alpha = 0.884$) ([Sinkula et al., 1997](#); [Lv, 2013](#)). Knowledge sharing consisted of 2 dimensions and 12 items (Cronbach's $\alpha = 0.768$ – 0.833) ([Tian, 2015](#); [Schepers et al., 2019](#)). Coworker support included 2 dimensions and 12 items (Cronbach's $\alpha = 0.925$) ([Liang and Fang, 2022](#); [Tews et al., 2013](#)). Psychological empowerment was also measured ([Li et al., 2006](#); [Spreitzer, 1995](#)).

3.2.2 Data collection

To validate the research framework, a pilot study was conducted before the formal survey. Based on feedback from colleagues and friends, 60 managers and employees from intelligent manufacturing and online platform companies in Shanxi and Guangxi were invited to complete an online questionnaire, yielding 56 valid responses. After analyzing the pilot data, the researchers used Corrected Item-Total Correlation (CITC) and construct reliability to optimize the scales. Items TOL-2, PLB-2, and PLO-4 in platform leadership were removed due to CITC values below 0.5 (0.458, 0.447, 0.475). This improved the α coefficients to 0.868, 0.889, and 0.909, enhancing scale reliability.

In the formal survey (Study 1), data were collected using a Chinese online questionnaire platform. Of the 550 collected questionnaires, 32 were excluded for response times under 100 s, leaving 518 valid responses, with an effective response rate of 94.2%.

TABLE 6 Collinearity of the latent variable indicators.

ITEMs	DV-EIB
IV-PL	2.326
M1-OL	2.812
M2-KS	2.756
M3-CS	2.048
M4-PE	2.507

TABLE 7 Standardized root mean square residual (SRMR).

	Saturated model	Estimated model
SRMR	0.078	0.081

TABLE 8 PLS-predict.

Variable	Q ² predict	PLS-SEM_RMSE	LM_RMSE	PLS-LM
PL	0.592	0.425	0.605	−0.180
OL	0.224	0.590	0.639	−0.049
KS	0.268	0.587	0.588	−0.001
CS	0.357	0.678	0.679	−0.001
PE	0.312	0.776	0.781	−0.005
EIB	0.276	0.777	0.780	−0.003

Sample characteristics include: 71% from Shanxi, 64% male, 83% aged 26–45, 80% with undergraduate education, 81% as grassroots supervisors and employees, and a majority with 0–5 years of work experience.

3.2.3 Results and findings

3.2.3.1 Test of common method bias

This study employs two methods to test for common method variance (CMV) bias. First, the Harman's one-factor test was conducted using SPSS.21. The results showed that the variance explained by the first factor was only 38.772%, which is below the 40% criterion ([Harman, 1961](#)). Therefore, it indicates that there is no issue of common method bias. Second, referring to the common method factor analysis proposed by [Liang et al. \(2007\)](#), the ratio of the average squared loading of the substantive factors to the average squared loading of the common method variance (CMV) factor was used to determine the presence of common method bias. A larger ratio indicates a smaller problem of common method bias, as shown in [Table 7](#). In this study, the final ratio is 18.7:10, which is relatively large, suggesting that there is no common method bias ([Liang et al., 2007](#)).

3.2.3.2 Test results of reliability and validity

[Tables 2, 3](#) report reliability test results: Cronbach's Alpha (0.711–0.944) and composite reliability (CR) (0.795–0.954) exceed 0.7, indicating good reliability ([Fornell and Larcker, 1981](#)). All factor loadings surpass 0.6 ($p < 0.001$), and AVE values exceed 0.5, confirming convergent validity ([Hair et al., 2011](#)). Discriminant validity is supported as the square root of each AVE exceeds inter-variable correlations ([Tables 4, 5](#)), most HTMT values are below

TABLE 9 Hypothesis testing direct effects.

Hypothesis	Relationship	Original sample	Standard deviation	T statistics	P-values	Result
H1	PL -> EIB	0.287	0.071	4.024	0.000	Strongly supported
H2	PL -> OL	0.654	0.033	20.064	0.000	Strongly supported
H3	PL -> KS	0.540	0.038	14.074	0.000	Strongly supported
H4	PL -> CS	0.569	0.033	17.304	0.000	Strongly supported
H5	PL -> PE	0.642	0.029	22.379	0.000	Strongly supported
H6	OL -> EIB	0.526	0.060	8.733	0.000	Strongly supported
H7	KS -> EIB	0.267	0.055	4.815	0.000	Strongly supported
H8	CS -> EIB	-0.024	0.040	0.608	0.543	Rejected
H9	PE -> EIB	0.086	0.038	2.229	0.026	Weaker supported

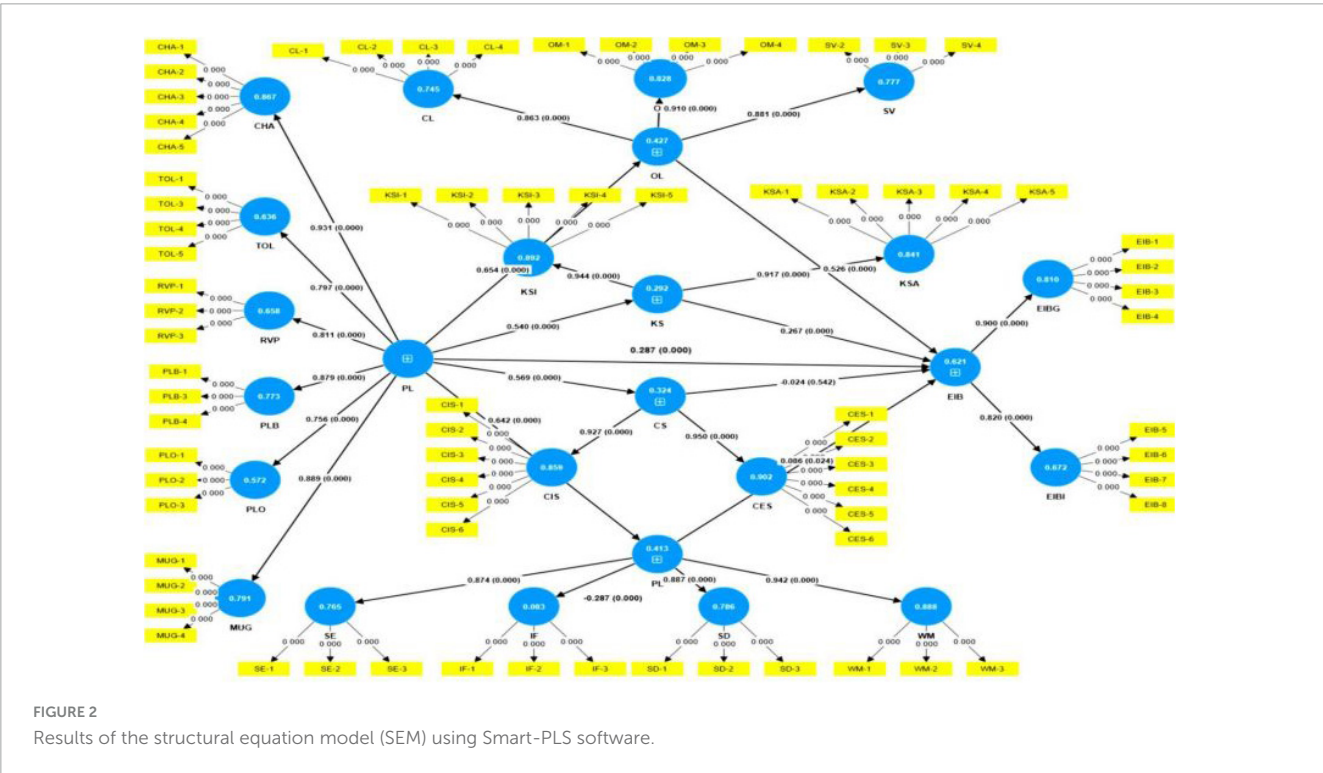


TABLE 10 Hypothesis testing indirect effects.

Hypothesis	Relationship	Indirect effect-β	Standard deviation	T statistics	P-values	Result
H10	PL -> OL -> EIB	0.344	0.043	7.950	0.000	Strongly supported
H11	PL -> KS -> EIB	0.144	0.031	4.680	0.000	Strongly supported
H12	PL -> CS -> EIB	-0.014	0.023	0.602	0.547	Rejected
H13	PL -> PE -> EIB	0.055	0.025	2.221	0.026	Weak supported

0.85 (< 0.9) (Henseler et al., 2015), and items load more strongly on their respective variables (Hair et al., 2011).

3.2.3.3 Multicollinearity test

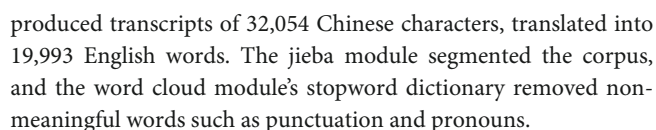
In this study, the VIF values of each latent variable are all below Table 6. The data indicate that there is no severe multicollinearity problem among these variables.

3.2.3.4 Structural equation model evaluation

To measure the goodness—of—fit and predictive ability of the model, according to the model prediction method proposed by Shmueli et al. (2019), Tables 7, 8 are obtained. All the errors of the PLS model were lower than those of the LM model. Thus, we can conclude that our model has strong predictive power. Combining the model evaluation index SRMR (Standardized Root

No.	Words	Occurrence	No.	Words	Occurrence	No.	Words	Occurrence
1	Employees	670	11	Coworkers	152	21	Members	82
2	Platform	309	12	Team	151	22	Feel	76
3	Innovative	498	13	Ideas	136	23	Promote	72
4	Leadership	283	14	Encourage	135	24	Collaboration	71
5	Knowledge	270	15	Impact	132	25	Development	67
6	Support	246	16	Work	123	26	Environment	67
7	Behavior	198	17	Positive	115	27	Culture	64
8	Organizational	180	18	Share	95	28	Leaders	58
9	Sharing	182	19	Empowerment	94	29	Resources	58
10	Learning	175	20	Psychological	88	30	Autonomy	48





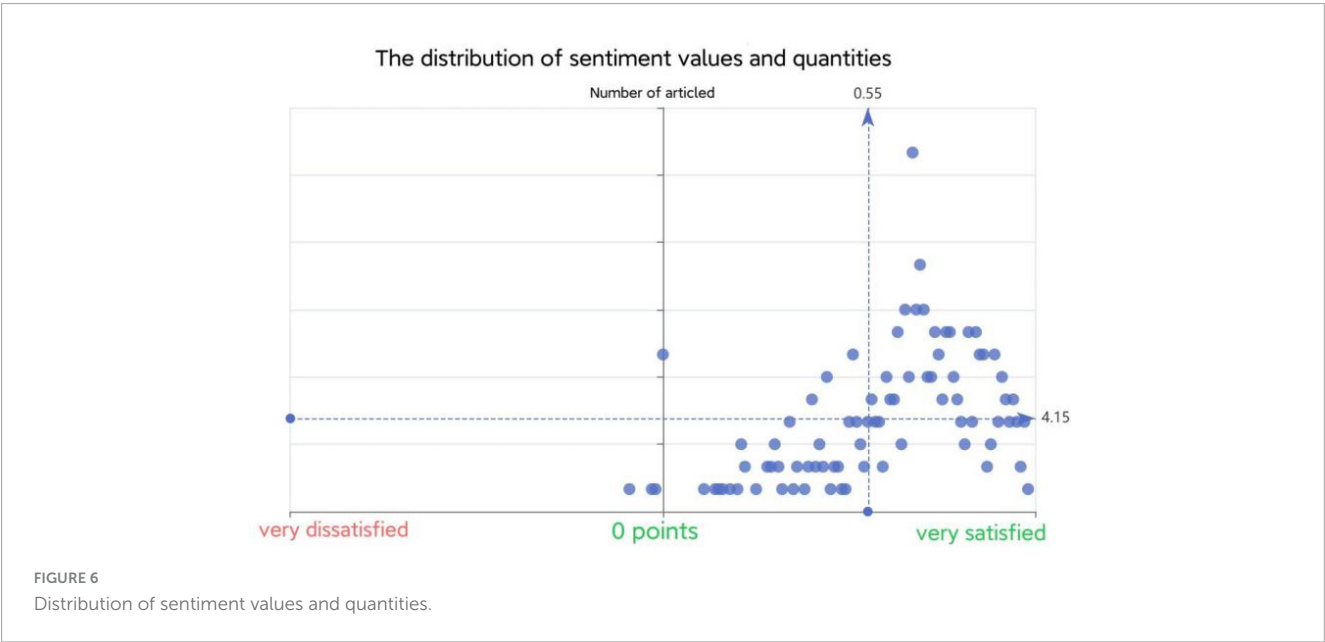
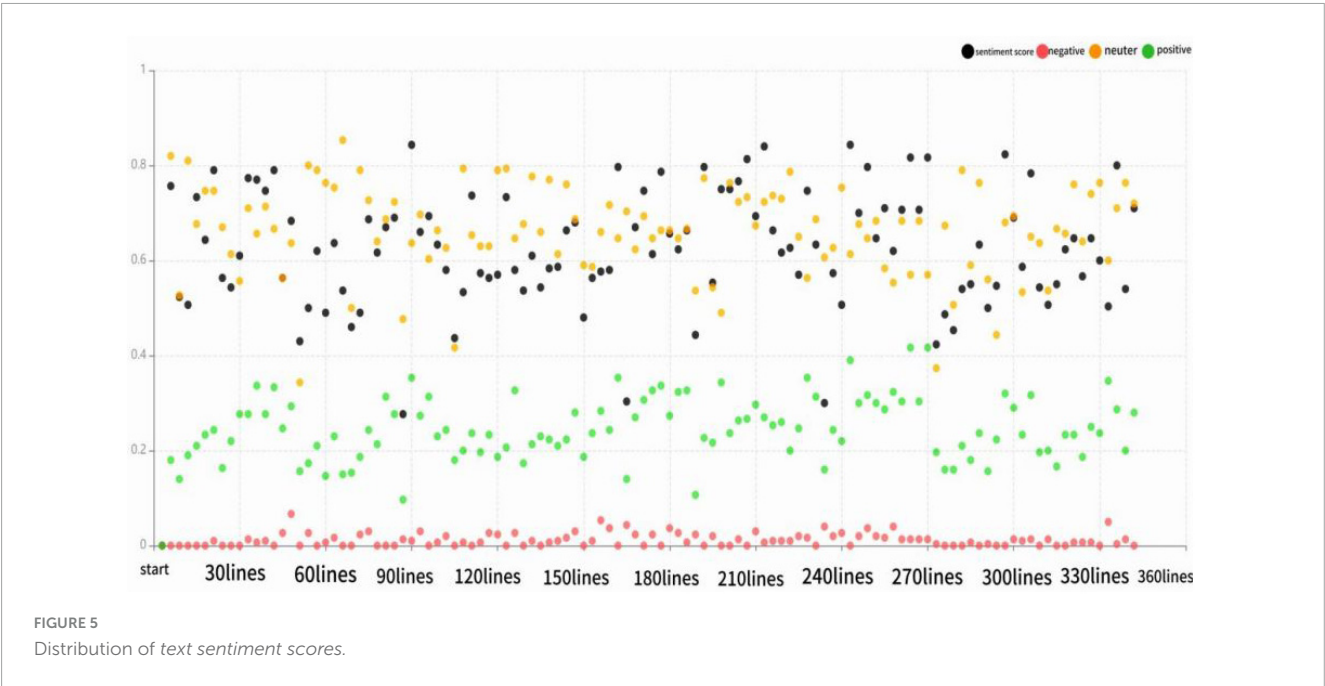
Utilizing sentiment polarity classification, researcher generated a word cloud (Figure 7) featuring high-frequency words indicative of two emotional tones. Central to the internal mechanism linking platform leadership to innovative behavior are positive terms like

TABLE 12 Basic information table for sentiment analysis.

Paragraph Sentiment classification	Number of positive paragraph	Number of negative paragraph	Number of neutral paragraph
Quantity	330	1	9
Sentence sentiment classification	Number of positive sentences	Number of negative sentences	Number of neutral sentences
Quantity	925	22	74

“innovative,” “encourage,” “support,” “share,” “trust,” “improve,” “confident,” “growth,” and “motivation.” These elements foster employee innovation. Nevertheless, the presence of negative

and neutral words is significant. Among 24 interviewees, 19 affirmed the positive influence of coworker support on innovation, while 4 expressed uncertainty and 1 saw no impact. Five interviews indicated no relevance between coworker support and innovation, highlighting high-frequency words such as “COVID-19,” “competitive,” and a Chinese proverb translating to “Teaching the disciple, starving the master.” The pandemic and remote work have decreased coworker intimacy, fostering competition over cooperation and withholding of knowledge. Automation and specialized labor divisions have also curtailed communication, leading some young employees to miss the supportive environment and its potential positive impact on innovation.



trust and support with pro-organizational behaviors, laying the groundwork for innovation. These findings enrich the understanding of platform leadership's impact on employee innovation.

Secondly, organizational learning and knowledge sharing significantly promote employee innovation behaviors, with organizational learning having the greatest individual mediation effect, followed by knowledge sharing, and psychological empowerment having the least impact. According to social learning theory and AMO models, Personal beliefs and motivations are thought to have a greater influence on behavior than external factors. However, in this study, psychological empowerment showed a negative correlation in AVE values and related analyses, reducing its mediation effect. Therefore, the quantitative analysis indicates that organizational learning and knowledge sharing have larger effects than psychological empowerment. Qualitative interviews confirmed the positive relationships between these variables and platform leadership and employee innovation behaviors. The differences in mediation effects may be related to the timing of variable development and the characteristics of the study group, requiring further research for confirmation.

Thirdly, although platform leadership can significantly enhance organizational coworker support, the impact of coworker support on employee innovation behaviors requires further research, as does its mediating role between platform leadership and employee innovation. Qualitative interviews suggest three reasons for the weak mediating effect of coworker support: In the digital economy era, employees tend to seek work-related information through digital networks, thereby reducing the need for colleague support; most surveyed enterprises are closely integrated with platform-based economies and intelligent technologies. Clear divisions of labor among employees limit the need for information sharing and emotional support among colleagues. Additionally, the study was conducted post-COVID-19, during which isolation policies and remote online working arrangements further reduced colleague interactions, leading to a decline in coworker's connectedness and a rise in individualism, thereby diminishing the effect of colleague support; The survey focused mainly on young and middle-aged employees, with 83% aged 26–45 and over 50% having 0–3 years of experience. This demographic often shoulders heavy workloads and long hours, which reduces opportunities for emotional interactions among colleagues, thereby affecting the impact of emotional support on innovation behavior.

4.3 Theoretical implications

This study adopts a sequential explanatory mixed-methods approach, combining quantitative structural equation modeling with qualitative content analysis of semi-structured interviews, utilizing techniques such as word frequency visualization, semantic network analysis, and sentiment analysis, based on a multi-perspective theoretical framework. It proposes a multiple mediation model more aligned with the complexities of real-world dynamic scenarios, not only validating the roles of these mediators but also elucidating their interactive effects, thereby expanding the theoretical research on platform leadership.

The study confirms the mediating roles of organizational learning and knowledge sharing, filling the gap in discussions about these influencing factors in platform leadership.

Furthermore, this study confirms the relationship between platform leadership and coworker support but also finds that the impact of coworker support on employee innovative behavior requires further verification, enriching the theoretical research on coworker support.

The study validates the mediating role of psychological empowerment, though its effect is not as strong as organizational learning and knowledge sharing, indicating that while internal motivational factors are crucial in motivating employee innovation, environmental opportunities and capabilities may play a larger role.

4.4 Managerial implications

Emphasize the selection and development of platform leaders to accelerate the construction of platform-oriented organizations where the organization, leadership, and employees can develop together. Focus on the mutual growth of leaders and employees, fully stimulate employees' self-fulfillment needs, and achieve leadership self-fulfillment through the achievement of employees. Pay attention to cultivating organizational learning within the company, creating an inclusive and accepting learning atmosphere. Emphasize knowledge sharing by conducting regular training meetings, establishing internal knowledge sharing websites or platforms, and promoting personal development to enhance knowledge and emotional exchange among members within the organization. Prioritize employees' perception of psychological empowerment feedback, strengthen the emotional connection between employees and the organization, support employee development and career planning, and inspire employee innovation behavior.

4.5 Limitations and future directions

Firstly, the study employed a one-time questionnaire, producing static cross-sectional data. Future research could adopt tracking surveys to capture temporal dynamics and enhance persuasiveness.

Secondly, the sample primarily came from Shanxi and Guangxi, limiting geographical diversity and affecting generalizability. Future studies can choose to include sample data from countries with different cultural backgrounds (such as Europe, America, Southeast Asia, Africa, etc.) to verify the cross-cultural applicability of platform leadership.

Lastly, self-reported data may introduce common method bias. Future studies should incorporate multi-source data for cross-validation and enhance conclusion credibility.

Fourthly, the study is empirical and set within a Chinese context. While the scales for measuring platform leadership are based on Chinese research, their theoretical underpinnings stem from Western studies. This blend may constrain the cross-cultural applicability of the scales used. Future research could consider

adapting or developing scales that are more culturally resonant across different societies.

Lastly, the relationship between platform leadership and employee innovation behavior might involve various mediating and moderating influences, including possible chain mediation effects. This study did not account for certain potential mediators such as organizational self-esteem, organizational culture, team psychological safety, and perceptions of insider status. Additionally, internal and external environmental factors were not factored into the analysis.

Data availability statement

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

Ethics statement

Written informed consent from the patients/participants or patients/participants legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

YL: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. XZ: Conceptualization, Funding acquisition, Methodology, Project administration, Resources,

Software, Supervision, Writing – review & editing. MS: Project administration, Software, Supervision, Validation, Writing – review & editing. MY: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing.

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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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The “double-edged sword” effect of shared leadership on employee voice behavior

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Introduction: This study investigates the dual-path effects of shared leadership on employee voice behavior through the Empowerment-Servitude Model, with a focus on uncovering the underlying psychological mechanisms. Additionally, it identifies key organizational and individual factors influencing employee voice behavior, offering theoretical insights for strategies aimed at behavioral enhancement.

Methods: This study adopted a multi-method approach, integrating online questionnaires and on-site enterprise visits across two time phases. Data collection yielded 624 valid responses from 13 corporations in Dalian, which were subsequently analyzed statistically.

Results: The results suggest that, on the one hand, shared leadership, as an empowerment mechanism, positively influences employee voice behaviors through the empowerment pathway associated with organizational status perception. On the other hand, shared leadership, as a depletion mechanism, negatively impacts employee voice behaviors via the servitude pathway, characterized by emotional exhaustion. Employee empowerment expectations play a critical role in triggering these contrasting mechanisms. Specifically, higher levels of employee empowerment expectations mitigate the negative impact of the depletion mechanism while enhancing the positive effects of the empowerment mechanism.

Discussion: This study makes three key contributions to the literature: first, it advances a nuanced understanding of the relationship between shared leadership and employee voice behavior. Second, by examining the moderating role of employee empowerment expectations, it elucidates boundary conditions influencing this relationship. Third, the findings underscore the criticality of empowerment expectations in organizational practice, suggesting that managers implementing shared leadership should systematically assess employees' subjective empowerment expectations, and leverage these expectations to enhance the model's positive effects on voice behaviors.

KEYWORDS

shared leadership, voice behavior, double-edged sword, empowerment pathway, disempowerment pathway

1 Introduction

Voice behavior refers to employees' proactive and spontaneous efforts to express work-related opinions or suggestions in order to solve problems within the organization. Scholars have identified this behavior as key to improving decision-making quality, reducing organizational risks and enhancing organizational performance (Detert and Burris, 2007). It has also become a prominent topic in organizational behavior research in

recent years. Related studies have shown that employees' willingness to offer suggestions largely depends on the leadership style (Xin et al., 2021). Compared to vertical leadership, which focuses on formal delegation, the shared leadership model—emphasizing the rotation and sharing of leadership roles within teams and informal delegation—more effectively stimulates employees' sense of participation, promotes knowledge exchange within the organization and supports the achievement of organizational goals (Klasmeier and Rowold, 2022). A substantial body of research has concluded that shared leadership profoundly influences employees' constructive behaviors. For instance, Zhang et al. (2020) argued that shared leadership enhances employees' perception of power, which positively affects both facilitative and inhibitory behaviors. Yang and Chen (2020) suggested that shared leadership positively influences constructive employee behavior through psychological ownership. However, some studies have shown that shared leadership may negatively impact employees' constructive behavior. Liu (2017) contended that high levels of shared leadership increase employees' perception of interpersonal risk, thereby reducing organizational citizenship behaviors, such as voice. Zhao (2022) further argued that shared leadership inhibits employees' desire to express themselves due to fear of negative evaluation, leading to silence. Based on the Demands-Resources (JD-R) theory (Bakker and Demerouti, 2007), shared leadership plays a dual role of job resources and job demands, and has a differentiated impact on employees. On one hand, it provides employees with resources such as greater decision-making autonomy and opportunities for authentic self-expression; on the other hand, it imposes additional demands through heightened responsibilities and task burdens.

This study constructs a dual-mediation model, based on the Empowerment Enslavement Paradox and the Conservation of Resources Theory, to integrate the positive and negative impacts of shared leadership on employees' voice behaviors. The model consists of two paths: an "empowerment" path, where power-sharing by leaders increases employees' perceived organizational support, and an "enslavement" path, where power rotation and responsibility-sharing by leaders lead to emotional exhaustion. In the empowerment path, leadership roles under the shared leadership model are assumed by employees who hold heterogeneous resources. Employees granted power due to their specific resources influence the organization and experience support and respect from both the organization and other members, which fosters a positive perception of shared leadership and stimulates voice behavior. In the enslavement path, the shared leadership model emphasizes the selection of employees as leaders based on specific tasks and situations. Individuals with heterogeneous knowledge within the organization have the potential to become leaders, and the rotation of power brings additional responsibilities and work pressure, resulting in emotional exhaustion. This negative perception of shared leadership leads to a reduction in constructive behaviors.

As organizations face increasing uncertainty and pressure from industrial transformation and upgrading, leaders can no longer independently address all challenges. It is crucial for organizations to leverage employees' proactive perspectives and ideas to continuously improve (Li et al., 2024). Conversely, employee

silence on work-related issues often stifles organizational vitality and leads to missed opportunities. Thus, exploring the conditions under which employees are motivated to speak up is essential (Morrison and Milliken, 2000). Previous studies have mainly explored how organizational-level factors motivate employees to offer advice, while overlooking the role of "expectation," which reflects individual self-motivation (Yin et al., 2021; Wang and Duan, 2021). Employee empowerment expectations are an extension of the concept of expectations in the empowerment framework, affecting how employees assume leadership roles within the organization (Labianca et al., 2000). Therefore, it is argued that individual employees with different levels of empowerment expectations have varying perceptions of the shared leadership model, which in turn impacts their constructive behaviors. This paper introduces "employee empowerment expectancy," a trait variable reflecting self-motivation, to explore its moderating role in the "empowerment" and "enslavement" paths of shared leadership's influence on voice behavior.

2 Theoretical background and hypothesis development

2.1 The relationship between shared leadership and employee voice behavior

The shared leadership model emphasizes the distribution of leadership roles within a team, where team members engage in mutual leadership and influence through power sharing, ultimately contributing to team achievements and organizational goals (Pearce and Conger, 2002). This model not only improves the formal authority found in vertical leadership by moving away from the hierarchical superior-subordinate relationship but also fosters a cooperative, win-win team environment (Zhao et al., 2018). According to Liu (2012), the core features of shared leadership include leadership power sharing, interdependence of leadership behaviors, and the opening of leadership boundaries. Specifically, the shared leadership model represents a dynamic process in which leadership roles are continuously rotated among team members based on the demands of the task at hand. In this model, power, leadership responsibilities, and decision-making are shared across the team.

After Dyne and LePine (1998) pioneered the conceptualization of constructive behavior within organizational behavior research, defining it as a prototypical form of organizational citizenship behavior characterized by cooperative-motivated expressions of work-related information, ideas, and opinions, this construct has garnered increasing scholarly attention. Extant literature generally addresses three key aspects of voice behavior: first, scholars conceptualize voice behavior as intentional, change-oriented organizational behaviors that enhance organizational effectiveness while mitigating systemic risks (Morrison, 2011; Ng and Feldman, 2012). Second, constructive voice may target task-related or interpersonal issues, often entailing interpersonal risks due to its challenging nature (Morrison, 2011). Third, such behavior frequently transcends prescribed job duties, reflecting discretionary extra-role contributions (Lu et al., 2020; Xin et al., 2021). The shared

leadership model, by flattening hierarchical boundaries, enables employees to perceive greater voice and leadership authority in their domains of expertise. This structural empowerment fosters problem identification and facilitates constructive voice behaviors (Zhao et al., 2018; Yang and Chen, 2020).

However, the effectiveness of shared leadership is contingent upon specific team contexts (Jian and Chen, 2023). Employees' technical maturity and knowledge are crucial factors for the successful implementation of shared leadership (Hoch and Dulebohn, 2017; Scott-Young et al., 2019). The empowerment-slavery paradox suggests that workplace technology embodies both "empowerment" and "enslavement" (Jarvenpaa and Lang, 2005). On the one hand, technological maturity and knowledge ownership empower employees to equally share leadership responsibilities. This empowerment fosters a sense of ownership, encouraging employees to take responsibility as part of their organizational identity or work content and actively engage in contribution. On the other hand, in teams with shared leadership, employees—especially those with high levels of technical expertise or knowledge—may face additional work and leadership responsibilities, creating the paradox of "the more capable you are, the more work you are assigned." According to the theory of resource conservation, when employees take on more work and leadership responsibilities and are under pressure from both work demands and interpersonal relationships, they may reduce their input into innovative thinking and work. This leads to a decrease in out-of-role behaviors to conserve their limited time and energy, thus inhibiting their constructive behaviors. In summary, the shared leadership model acts as a double-edged sword, triggering different employee behaviors. From an empowerment perspective, shared leadership's power-sharing positively influences employee voice behaviors. However, from the perspective of "enslavement," the increased responsibility imposed by shared leadership can create burdens that negatively affect voice behaviors. Given the dual influence of shared leadership on employee voice, this study does not assume a simple one-way relationship.

2.2 Empowerment pathways: the mediating role of perceived organizational status

Perceived organizational status reflects employees' subjective evaluation and cognitive judgment of their positional standing within an organization (Seeman and Berkman, 1988). Empirical evidence suggests that leadership serves as a critical source of status-related information, with leader behaviors enhancing employees' perceived insider status and organization-based self-esteem (Wu and Zheng, 2018). Diverging from conventional leadership paradigms, shared leadership embodies a bottom-up emergent process that grants team members substantial autonomy. Within this framework, individuals may assume leadership roles by leveraging their unique resource advantages, including specialized knowledge, technical expertise, or social competencies. Particularly in knowledge-intensive teams, members possessing superior technical skills and task-relevant capabilities naturally

accrue leadership authority and responsibilities, enabling them to autonomously address challenges through their knowledge and potential. Research demonstrates that increased decision-making autonomy and organizational influence positively correlate with enhanced perceived organizational status (Eisenberger et al., 2002). The distinctive empowerment characteristic of shared leadership fulfills employees' psychological needs for self-worth and activates self-efficacy mechanisms, thereby cultivating elevated status perceptions. As a relational asset rooted in interpersonal dynamics (Yin et al., 2021), status perception flourishes within shared leadership contexts through their inherent emphasis on fostering harmonious, egalitarian relationships characterized by mutual support and care (Liao et al., 2016). Employees perceive these high-quality relationships as valuable resources. Grounded in social exchange theory, when individuals experience trust, support, understanding, encouragement, and respect from team members, their psychological ownership becomes activated, subsequently augmenting organizational status perceptions. This study proposed that shared leadership promotes perceived organizational status.

Hypothesis 1: Shared leadership promotes perceived organizational status.

In previous studies, scholars generally agree that perceived organizational status affects employees' psychological, emotional, and social cognition, and directly influences their work styles and attitudes (Fuller et al., 2007). Moreover, the motivation and behavior of employees depend on how valid and secure they perceive these constructs (Morrison, 2011). On one hand, when employees perceive higher organizational support and prestige, they are more likely to believe they hold a higher position within the organization. This belief fosters a sense of responsibility and obligation, which, in turn, enhances their motivation and ability to exert influence. In return, employees are more likely to respond to organizational issues and offer advice and suggestions for improvement (Amabile, 1988; Luo et al., 2017). On the other hand, according to the theory of resource conservation, employees with a high perception of organizational status—who are respected, supported, and praised—tend to exhibit greater self-confidence, optimism, and positivity, enhancing their psychological capital. This boosts their belief that they will continue to be treated favorably, fostering greater trust in the organization (Berger et al., 2014). As a result, employees become less focused on the risks and resource losses associated with constructive behavior, thereby contributing more effectively to the organization's development. In summary, while voice is an extra-role behavior not explicitly required by the job, it involves multiple uncertainties, such as interpersonal challenges. Moreover, influenced by the traditional Chinese concept of "mediocrity," many individuals possess a lower appetite for risk and are reluctant to advocate in the workplace (Zhou and Liao, 2012). However, from the perspective of the empowerment pathway in empowerment-slavery theory, teams that implement shared leadership no longer rely solely on the command of a single leader. Through empowerment, team members gain more autonomy in decision-making and perceive a higher status within the organization. This, in turn, reduces concerns about being blamed by colleagues when proposing new solutions, thereby stimulating a stronger sense of service to the organization and a greater willingness to challenge the status quo.

This empowerment mechanism, triggered by the shared leadership model, leads to more proactive and constructive behavior aimed at organizational change. So, the following hypothesis is predicted:

Hypothesis 2: the promotion of perceived organizational status by shared leadership can affect employee voice behavior, thus perceived organizational status positively mediating the link between Shared leadership and employee voice behavior.

2.3 Disempowerment pathways: the mediating role of emotional exhaustion

Emotional exhaustion refers to a state of fatigue resulting from the overuse of mental and emotional resources caused by workplace stressors, and is considered an outcome of stress responses (Maslach et al., 2001). Previous studies have indicated that leadership models, such as transformational leadership (Green et al., 2013) and authentic leadership (Kampa et al., 2017), which involve care, encouragement, and support, can effectively alleviate emotional exhaustion in employees. However, some studies have suggested that positive leadership models, such as ethical leadership (Lee et al., 2021), transformational leadership (Zwingmann et al., 2016), and empowering leadership (Wang Z. et al., 2019), can, paradoxically, exacerbate emotional exhaustion in employees. Advising employees can be seen as a strategic process, where employees weigh the potential benefits and risks before offering advice (Wang et al., 2020). According to resource conservation theory, individuals are motivated to “conserve resources” and “acquire resources.” When employees face threats to their resources, experience mismatches between input and reward, or suffer from overconsumption, they are likely to have stress reactions, which in turn lead to emotional changes (Hobfoll, 1989, 2001). The shared leadership model promotes high levels of empowerment, but when this empowerment reaches its limits, it can create workplace stress, depleting individual resources and leading to emotional exhaustion.

In teams implementing the shared leadership model, members with higher skill levels and knowledge necessary for solving team tasks are empowered to take on leadership roles. As a result, they assume greater leadership responsibilities and work tasks. However, the increasing workload and task complexity not only encroach upon the employees’ attention resources, which should be devoted to their own tasks, but also introduce additional cognitive labor, resulting in cognitive overload. Furthermore, in the shared leadership model, employees alternate between roles as both “followers” and “leaders.” This constant role-switching depletes their energy, time, and other resources. The shared leadership model places a strong emphasis on team members’ ability to collaborate effectively to achieve shared goals. Additionally, the model encourages interactions between team members to enhance collective intelligence and achieve organizational objectives through group discussions or team interactions (Yang and Chen, 2020). Employees in leadership roles are also entrusted with the responsibility of assisting other members, facilitating team exchanges, and mediating opposing viewpoints when necessary (Zhang et al., 2020). These interactions may impact the vested interests of other team members, leading

to a depletion of the individual’s interpersonal resources. Based on the above analysis, this study concludes that the shared leadership model triggers the depletion of employees’ resources, including attention, personal energy, and time, which ultimately leads to emotional exhaustion. So, the following hypothesis is predicted:

Hypothesis 3: shared leadership increases employee emotional exhaustion.

Emotional exhaustion refers to a state in which an individual lacks vitality and their emotional resources are near depletion. This condition can trigger negative work behaviors in employees, such as job neglect (Greenbaum et al., 2014), turnover (Wright and Cropanzano, 1998), silence (Yi et al., 2018), and service disruptions (Edmondson et al., 2019), among others. Emotional state directly influences employees’ constructive behaviors at work. Positive emotions facilitate constructive behaviors (Fu et al., 2012), while negative emotions inhibit them (Ng and Feldman, 2012). According to resource conservation theory, because individuals have limited resources, they adopt protective mechanisms to preserve or conceal the resources they value in order to prevent damage (Lee et al., 2021; Guo et al., 2024). In situations where interpersonal, cognitive, and psychological resources are overly depleted due to emotional exhaustion, employees tend to adopt defensive measures to safeguard their remaining resources and maintain necessary work status (Van Jaarsveld et al., 2021). The core features of the shared leadership model, such as shared responsibility, joint decision-making, and high empowerment, can lead to excessive stress and perceived resource depletion among employees, which can trigger emotional exhaustion. Therefore, under the shared leadership model, employees may focus more on their own tasks, adopt conservative strategies to ensure their “safety”, and reduce out-of-role behaviors to avoid interpersonal risks. As a result, the degree of employee voice may decrease. So, the following hypothesis is predicted:

Hypothesis 4: emotional exhaustion, as a consequence of shared leadership, could reduce employee voice behavior, with Emotional exhaustion serving as negative mediator in the shared leadership-employee voice behavior nexus.

2.4 The moderating role of empowerment expectations

Voice behavior is an out-of-role interpersonal communication behavior where employees attempt to change the status quo of their work or organization. It is inherently challenging, and if unsuccessful, may face opposition or rejection from others within the team (Wang S. H. et al., 2019). Given its challenging nature, voice requires strong motivation. Previous studies have primarily explored the motivation behind voice in terms of external factors such as personality traits (Yin et al., 2021), organizational climate (Frazier and Bowler, 2012), and job/task characteristics (Dedahanov et al., 2019). However, the positive role of an individual’s self-concept in the context of voice has often been overlooked, as has the fundamental psychological function of “expectations” (Zhang et al., 2016).

Employee empowerment expectations refer to the normative perceptions employees form regarding the duties and obligations of

leaders in delegating authority within organizations (Humborstad and Kuvaas, 2013). Wong and Giessner (2018) stated that employee empowerment expectations, as cognitive schemas, define the behaviors leaders should exhibit in their relationships with employees and influence how subordinates assume their job roles relative to their superiors. In team tasks, employees construct different degrees of expectations about the team's empowerment behaviors (Hinkin and Schriesheim, 2008; Yin et al., 2021). The alignment between these expectations and the actual empowerment behaviors of the team affects how employees evaluate their leaders' empowerment behaviors, which in turn influences leadership effectiveness.

When employees' empowerment expectations are high and aligned with the team's empowerment practices, the shared leadership model's features—such as power sharing, responsibility sharing, and joint decision-making—stimulate employees' self-worth and initiative. Moreover, when formal leaders recognize high employee empowerment expectations, they are more likely to grant employees greater autonomy and influence, which enhances their perception of organizational status and encourages them to express work-related ideas freely. In this way, employee empowerment expectations strengthen the shared leadership model's effect on perceptions of organizational status. So, the following hypothesis is predicted:

Hypothesis 5: the presence of Employee empowerment expectations intensifies the beneficial link between shared leadership and perceived organizational status. As Employee empowerment expectations escalates, so does the strength of this positive interconnection.

This study suggests that employee empowerment expectations mitigate the attrition mechanism of shared leadership for emotional exhaustion. According to resource conservation theory, employees with high empowerment expectations have a strong willingness to engage in organizational activities. They view “empowerment” as a valuable resource and reciprocate by exhibiting extra-role behaviors and positive performance, which benefit the organization. These employees aim to secure higher levels of empowerment by contributing behaviors that are advantageous to the organization while minimizing behaviors that may harm organizational objectives. Additionally, the acquisition of the valuable resource of “empowerment” reduces their fear of interpersonal and cognitive

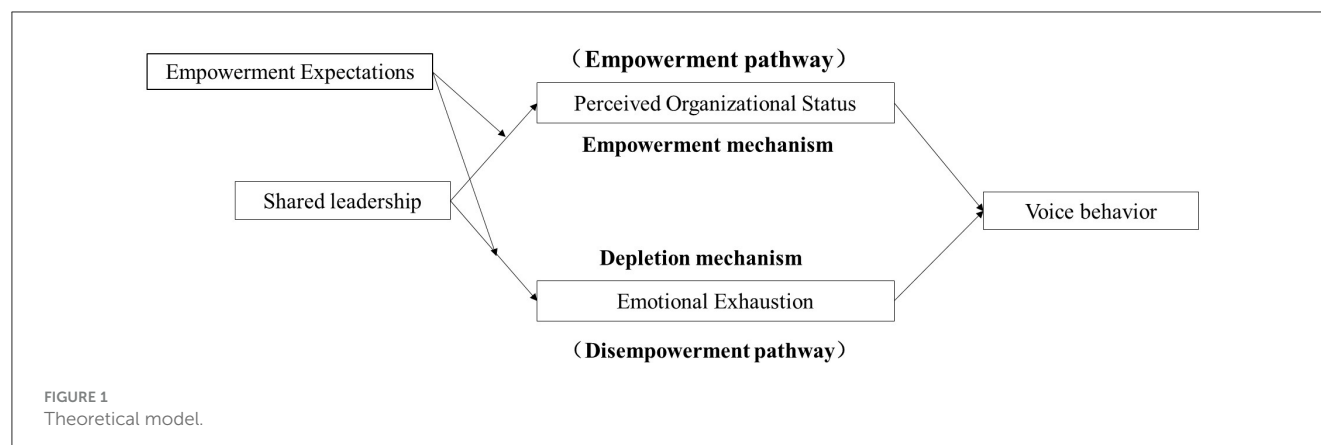
resource depletion, encouraging them to overlook resource depletion and actively offer positive suggestions. In contrast, employees with low empowerment expectations are likely to resist leadership empowerment, negatively evaluate overloaded tasks, and perceive extra-role behaviors as resource-draining. These employees believe that engaging in such behaviors not only depletes their resources but also limits their ability to acquire and accumulate new resources, placing them in a state of resource loss. When these concerns intensify or when employees lack confidence in managing these challenges, they are more likely to adopt a passive approach, such as waiting or remaining silent (Zhang et al., 2016). So, the following hypothesis is predicted;

Hypothesis 6: empowerment expectations negatively moderates the adversarial interaction between shared leadership and employee emotional exhaustion. As Empowerment expectations escalates, the unfavorable link between these elements diminishes.

2.5 An integrative moderated mediation model

Building upon the aforementioned hypotheses, we propose an integrated moderated mediation model (See Figure 1). The increased levels of SL are expected to enhance employees' FWA, consequently benefiting their voice Behavior. However, SL may simultaneously contribute to elevated emotional exhaustion (EE), potentially undermining employees' proactive suggestion-making. When employees' authorization expectations align with leaders' empowering behaviors, they demonstrate greater willingness to internalize decision-making responsibilities, incorporate these into their work routines, and consequently strengthen the positive association between SL and POR (Labianca et al., 2000). Furthermore, employees' expected level of authorization serves as a positive moderator in the relationship between SL and emotional exhaustion, ultimately enhancing their sense of organizational participation. Consequently, we propose the following integrated moderated mediation model:

Hypothesis 7: SLP have positive effects on employee voice behavior through increased POS, while SL also have potential negative effects on employee Voice behavior through increased



employee emotional exhaustion. The first link of this mediation process will be moderated by Empowerment expectations, such that under conditions of high Empowerment expectations, the positive indirect effects will be stronger, and the negative indirect effect of SLP on employee emotional exhaustion will be mitigated. These combined effects ultimately contribute to improved employee Voice behavior.

3 Methodology

3.1 Participants and procedure

To ensure that the survey sample matches the shared leadership model, we confirmed that the selected companies and their members met the following three criteria: (1) Participants' work content is interdependent among team members; (2) Participants can assume leadership roles in various areas based on work dimensions; and (3) Participants have a leader responsible for team performance (Chiu et al., 2016; Lyndon et al., 2020).

To ensure sample randomness and representativeness, this study employed a qualified convenience sampling approach within Dalian, China. Among the thirteen selected companies, five were state-owned enterprises, three were European or American multinational corporations, and the remaining four were privately owned. These firms spanned six distinct industries: internet technology, finance, consulting, food processing, real estate, and garment manufacturing. The decision to conduct this survey in Dalian was based on two key considerations. First, as a major port city in Northeast China, Dalian exhibits a high level of economic openness. It hosts not only large state-owned manufacturing enterprises but also a significant presence of foreign-owned firms specializing in international trade, logistics, and production, resulting in considerable diversity in leadership styles. Second, Dalian's industrial structure encompasses a broad spectrum of sectors, including equipment manufacturing, software and information technology, petrochemicals, and fisheries. Consequently, leadership demands vary substantially across these industries, making the city an ideal setting for examining contextual differences in leadership practices.

The survey was conducted in three sequential phases. In the initial phase, the research team identified potential target enterprises through multiple channels, including MBA program networks, professional training seminars, alumni associations, and personal connections. Researchers then engaged in comprehensive consultations with human resource managers or team leaders (e.g., project or department heads) from these enterprises via either on-site visits or telephone interviews. During these interactions, the study's objectives and significance were clearly communicated, and organizational support was secured to facilitate project implementation. In the second stage, we visited the surveyed enterprises and distributed questionnaires to 800 employees who met the above conditions in the form of on-site questionnaires. To ensure anonymity and minimize potential common method biases, we collected the last four digits of each subject's mobile phone number as its unique code in the study to facilitate data collection over two distinct intervals. The survey

instrument comprised two key components: (1) demographic information (including age, gender, and educational attainment), and (2) standardized measures assessing shared leadership, organizational status perception, emotional exhaustion, and employee empowerment expectations. A total of 720 employees completed the questionnaire. Approximately 1 month after the initial data collection, we administered a follow-up survey to the same participants to evaluate their perceived voice behavior. From the original sample of 720 respondents, we obtained 624 completed questionnaires at second questionnaire survey, representing an 78% response rate. The final sample consisted of 54.2% male and 45.8% female participants. In terms of age distribution: 4% were under 25 years, 28.4% were 25–34 years, 59.1% were 35–44 years, and 6.1% were 45 years or older. Regarding educational attainment, 49.7% of respondents held a bachelor's degree or higher qualification.

3.2 Measurements

This study operationalized the key constructs—including shared leadership, perceived organizational status, emotional exhaustion, empowerment expectations, and employee voice behavior—using validated measurement scales. The original English versions of these instruments underwent rigorous translation procedures, including forward-translation and back-translation, to ensure conceptual equivalence in Chinese. All measures, with the exception of control variables, employed a 5-point Likert-type response format ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Reliability analyses confirmed that all scales demonstrated satisfactory internal consistency, with Cronbach's alpha coefficients exceeding conventional thresholds for scale reliability.

Shared leadership (SL): the four-dimensional shared leadership scale, which includes "performance expectations, mutual collaboration, power and responsibility sharing, and team learning," was developed by Liu (2009) and Zhao and Zhao (2012) and used as the foundation for this study. Seventeen items were selected for measurement, including "Our team (department) members and leaders can share power," which aligns with the characteristics of the knowledge-based teams in this study. The Cronbach's alpha coefficient for this scale was 0.934.

Perceived organizational status (POR): this variable was measured using a one-dimensional scale developed by Eisenberger et al. (2002). Four items from this scale were selected to match the present study, including "My organization has a high level of respect for me as an individual," "My organization consults me when making decisions," and "My organization asks for my opinions and suggestions." The Cronbach's alpha coefficient for this scale was 0.892.

Emotional exhaustion (EE): This was measured using five items from the revised burnout scale, MBI-GS, developed by Li and Shi (2003). Example items include "Work makes me feel physically and mentally exhausted" and "Working all day long is very stressful for me." The Cronbach's alpha coefficient for this scale was 0.905.

Empowerment expectations (E): since there is no standardized scale specifically for employee empowerment expectations, this variable was adapted from previous studies. Drawing on the

methodological approaches of Humborstad and Kuvaas (2013) and Yin et al. (2022), we adapted the Leadership Empowerment Behavior Scale (Ahearne et al., 2005) by reframing the subject as “I expect” to assess employees’ empowerment expectations. The psychometric properties of this adapted scale have been empirically validated in Chinese organizational contexts (Zhang and Bartol, 2010). Accordingly, the present study employs this established measurement approach to operationalize employees’ empowerment expectations. The four dimensions of the scale are: “Enhancing meaning at work, facilitating participation in decision-making, conveying a message of high performance, and providing autonomy from bureaucracy.” The Cronbach’s alpha coefficient for this scale was 0.875.

Voice behavior (EB): voice behavior in this study is defined as behavior that helps improve the effectiveness of decision-making and changes the status quo within the organization. The unidimensional voice behavior scale developed by LePine and Van Dyne (1998) was used to measure this variable. Six items, such as “Our team members often offer constructive ideas,” were included. The Cronbach’s alpha coefficient for this scale was 0.925.

Control variables: control variables included employees’ gender, age, education, team size, and firm size. These variables were used to more rigorously examine the relationships between shared leadership, perceived organizational status, emotional exhaustion, and other employee-related constructs.

4 Results

4.1 Common method variance

Regarding the analytical approach, we first performed Harman’s single-factor test using SPSS 25.0 to examine potential common method bias in our measurement instruments. Subsequently, we employed AMOS 24.0 to conduct confirmatory factor analysis (CFA) for assessing the construct validity of the measurement model. Consistent with established practices in leadership research (Mui Hung Kee et al., 2020), we computed descriptive statistics and examined inter-variable correlations using SPSS 25.0. To test our hypothesized mediation, moderation, and conditional indirect effects, we conducted hierarchical regression analyses with the PROCESS macro (Version 4.0) for SPSS, applying bootstrapping procedures with 5,000 resamples to generate bias-corrected confidence intervals.

Utilizing AMOS24.0, a confirmatory factor analysis was undertaken on variables including SL, Perceived Organizational Status, Emotional Exhaustion, Empowerment Expectations, and Employee Voice Behavior in Table 1. As seen in Table 1 the hypothesized five-factor model exhibited the most robust fit ($\chi^2/df = 1.028$, CFI = 0.999, TLI = 0.999, RMSEA = 0.027), outperforming other models including one-factor model ($\Delta\chi^2 = 11,099.44$, $\Delta df = 18$, $p < 0.001$), and demonstrating sound discriminant validity for each factor examined.

This research relied on self-reported data, which may introduce biases such as social desirability bias or recall bias. To mitigate these potential biases, we employed anonymous survey methods,

assigning each participant a unique identifier across the two time points to ensure anonymity and match responses over time. Furthermore, we utilized scales with high reliability and validity from top journals to further reduce potential common method biases arising from self-reporting. Previous research indicated that the common method bias is not a major concern if the result of Harman single-factor test were below 40% (Podsakoff et al., 2003). This study’s Harman single-factor test indicated that the cumulative variance explanation of the first factor in this research is 28.87%, below the rule of thumb threshold of 40%, indicated that common method bias is not a major concern in this study.

4.2 Descriptive statistics

As shown in Table 2, SL is significantly positively correlated with POS ($r = 0.523$, $p < 0.01$), and POS is positively related to employees’ voice behavior ($r = 0.528$, $p < 0.01$). Furthermore, SLP is significantly positively correlated with emotional exhaustion ($r = 0.580$, $p < 0.01$), while emotional exhaustion is negatively correlated with employees’ voice behavior ($r = -0.043$). These results provide preliminary support for Hypotheses 1–4 of this study.

4.3 Hypothesis testing

To examine the proposed mediation model, we employed the PROCESS macro developed by Hayes (2012), which has been widely validated for testing mediation and moderation effects in psychological research. Consistent with our theoretical framework, we utilized PROCESS Model 4 to analyze the mediation effects, and PROCESS Model 7 to examine the moderation effects. All analyses incorporated bias-corrected bootstrapping with 5,000 resamples to generate robust 95% confidence intervals (CI: confidence intervals) for the indirect effects, following current best practices in statistical mediation analysis. The outcomes of our regression analysis confirm that the direct effect of SL on employee voice behavior is indeed positive, with an effect size of 0.3496 ($p < 0.01$, 95% CI [0.3142, 0.4822]).

As shown in Table 3, Hypothesis 1 proposed that SL have a positive effect on POR results of model 1 indicate that SL positively contribute to a higher level of POR ($\beta = 0.5228$, $p < 0.001$, 95% CI = [0.5294, 0.6854]), supported hypothesis 1. POR is positive related to employees voice behavior (Model 3, $\beta = 0.4578$, $p < 0.001$, 95% CI = [0.3858, 0.5297]), and showed in Table 4 the positive mediating effect of POR on the link between SL and employee voice behavior was also confirmed (indirect effect = 0.2441, 95% CI = [0.2225, 0.3380]), supported hypothesis 2. Hypothesis 3 believed that SL may lead to employee emotional exhaustion. Results of model 2 indicate that SL is positively related to employee emotional exhaustion (Model 2, $\beta = 0.5802$, $p < 0.001$, 95% CI = [0.5732, 0.7152]), supported hypothesis 3. Model 3 showed when added emotional exhaustion as another mediator that emotional exhaustion is negative related to employees voice behavior (Model 3, $\beta = -0.3673$, $p < 0.001$, 95% CI = [-0.4460, -0.2886]), and the negative mediating effect of emotional exhaustion on the link between SL and employee voice

TABLE 1 Confirmatory factor analysis result.

Model	χ^2	df	χ^2/df	RMSEA	CSI	TLI	SRMR
Five-factor model	909.145	884	1.028	0.007	0.999	0.999	0.027
Four-factor model	2,432.419	888	2.739	0.053	0.916	0.911	0.089
Three-factor model	4,094.893	891	4.596	0.076	0.826	0.815	0.134
Two-factor model	4,391.157	893	4.917	0.079	0.810	0.799	0.142
One-way model	11,918.585	902	13.214	0.140	0.401	0.372	0.137

N, 624; SL, shared leadership; POR, perceived organizational status; EE, emotional exhaustion; E, empowerment expectations; VB, employee voice behavior. Five factor model = SL, POR, EE, E, VB, Four factor model = SL, POR + EE, E, VB, Three factor model = SL, POR + EE + VB, E, Two factor model = SL + E, POR + EE + VB, one-factor model = SL + POR + EE + E + VB.

TABLE 2 Means, standard deviations, and correlations between variable.

Variant	1	2	3	4	5	6	7	8	9	10	11	12
1. Gender	1											
2. Age	−0.056	1										
3. Education	−0.038	0.030	1									
4. Type of industry	0.042	−0.021	−0.010	1								
5. Type of business	0.078	0.057	0.007	−0.044	1							
6. Enterprise size	−0.001	−0.009	−0.019	−0.105**	−0.060	1						
7. Team size	−0.016	0.008	0.032	0.062	−0.139***	0.135**	1					
8. Shared leadership	0.033	0.068	0.033	0.011	−0.060	0.131**	0.360***	1				
9. Perceived organizational status	−0.013	0.029	−0.027	0.045	−0.074	0.107**	0.236***	0.523***	1			
10. Emotional exhaustion	0.056	0.102*	0.054	−0.012	−0.030	0.168***	0.292***	0.580***	0.286***	1		
11. Empowerment expectations	−0.007	0.062	0.045	−0.038	−0.073	0.150***	0.166***	0.338***	0.259***	0.269***	1	
12. Voice behavior	0.133	0.073	0.025	−0.032	0.026	−0.003	0.301*	0.350**	0.528**	−0.043	0.175**	1
13. M	1.46	2.96	2.49	2.24	2.36	2.45	2.97	3.40	3.48	3.54	3.37	3.39
14. SD	0.50	1.02	0.91	1.19	0.78	1.30	1.23	0.87	1.02	0.97	0.81	0.99

N = 624, * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.01$).

TABLE 3 Regression results for main, mediation effects.

Predictor	Model1: POR				Model 2: EE				MODEL 2: VB			
	β	SE	LLCI	ULCI	β	SE	LLCI	ULCI	β	SE	LLCI	ULCI
SL	0.5228***	0.397	0.5294	0.6854	0.5802***	0.363	0.5732	0.7152	0.3568***	0.501	0.2585	0.4551
POR									0.4578	0.366	0.3858	0.5297
EE									−0.3673	0.401	−0.4460	−0.2886
R2	0.2733				0.3366				0.3717			
F	233.9658				315.5793				12.2433			

*** ($p < 0.01$).

behavior was also confirmed (indirect effect = −0.2078, 95% CI = [−0.2899, −0.1879]), supported hypothesis 4. This study investigated the conditional influence of Empowerment Expectations on the dynamics between SL and employee voice behavior. As show in Table 4, the analysis unveiled that a fusion of SL and high Empowerment Expectations markedly enhanced POR, denoted by a significant moderation

effect (moderation effect = 0.3210, $\beta = 0.6222$, $p < 0.001$, 95% CI = [0.5409, 0.7036]), suggesting that a higher level of Empowerment Expectations amplifies the beneficial link between SL and POR. As depicted in Figure 2, the facilitative impact of SL on POR was notably pronounced at an elevated level of empowerment expectations (1 SD above the mean, $\beta = 0.8811$, 95% CI = [0.7584, 1.0038], $p < 0.001$). While the effect remains significant

TABLE 4 Decomposition of total, direct, and mediation effects.

Path	Std. Coeff	SE	t	p	95% Bootstrap CI
SL→ VB	0.3496	0.0428	9.3072	<0.001	[0.3142, 0.4822]
SL→ VB (controlling POR, EE)	0.3133	0.0501	7.1292	<0.001	[0.2585, 0.4551]
Indirect effects					
SL→ POR→ EE	0.2441	0.0294	–		[0.2225, 0.3380]
SL→ EE→ VB	–0.2078	0.0261	–		[–0.2899, –0.1879]

at low Empowerment Expectations, its magnitude is substantially smaller compared to high empowerment expectations (1 SD below the mean, $\beta = 0.3634$, 95%CI = [0.2621, 0.4648], $p < 0.001$). Hypothesis 5 garnered empirical support.

As show in Table 5, Hypothesis 6 posited a negative moderation by Empowerment Expectations on the link between SL and employee voice behavior. The interaction between SL and Empowerment Expectations was found to significantly reduce employee emotional exhaustion (moderation effect = -0.2807 , $\beta = 0.5688$, $p < 0.001$, 95% CI = $[-0.3692, -0.1923]$). As depicted in Figure 2, the impact of SL on emotional exhaustion was not pronounced at an elevated level of empowerment expectations (1 SD above the mean, $\beta = 0.3424$, 95% CI = [0.2299, 0.4549], $p < 0.001$) yet this association was strengthen when empowerment expectations was diminished (1 SD below the mean, $\beta = 0.7952$, 95%CI = [0.7023, 0.8881], $p < 0.001$), supported hypothesis 6.

When under a high level of Empowerment Expectations, the result showed a significantly positive conditional indirect effect of SL on employees voice behavior through POR(1 SD above the mean, indirect effect = 0.4033 , 95%CI= $[0.3286, 0.4813]$), however it was not significantly at a lower level of empowerment expectations (1 SD below the mean, indirect effect = 0.1664 , 95%CI= $[0.1098, 0.2282]$). As shown in Figure 3, the moderated mediation index of the POR was 0.1469 (95% CI = $[0.1022, 0.1949]$). Meanwhile, the conditional indirect effect of emotional exhaustion was negatively and significant in the full moderated mediation model under a lower level of Empowerment Expectations (1 SD below the mean, indirect effect = -0.2921 , 95%CI = $[-0.3579, -0.2277]$), whereas it was not significant under a higher level of empowerment expectations (1 SD above the mean, indirect effect = -0.1258 , 95%CI = $[-0.1756, -0.0802]$). The moderated mediation index of emotional exhaustion was 0.1031 (95% CI = $[0.0697, 0.1397]$). As shown in Figure 3, When ZE outside the interval $[-3.42, -1.83]$, the slope of is $p < 0.05$.When ZE is outside the interval $[1.80, 3.82]$, the slope of ZSL is $p < 0.05$. Hypothesis 7 was supported.

5 Discussion

Based on the Resource Conservation Theory and the Empowerment Slavery Model, this study examines the “double-edged sword” effects of shared leadership on employees’ voice behaviors, the mediating roles of perceived organizational status and emotional exhaustion, and the moderating role of employees’ empowerment expectations. The results reveal that the shared

leadership model influences employee voice behavior, with the effects and underlying mechanisms varying based on employees’ perceptions of the model. Specifically, employees who perceive themselves as holding an important position in the organization due to power sharing within the shared leadership model are more likely to advocate for the organization. In other words, shared leadership positively influences employees’ voice behaviors through the mediating effect of perceived organizational status. Conversely, employees who experience work pressure and emotional exhaustion due to power rotation within the shared leadership model tend to inhibit their voice behaviors. Thus, shared leadership negatively affects employees’ voice behaviors through the mediating effect of emotional exhaustion. Furthermore, employee empowerment expectations moderate the relationship between the shared leadership model and employees’ voice behaviors. Specifically, employee empowerment expectations positively moderate the indirect effect of the shared leadership model on voice behaviors via perceived organizational status, while negatively moderating the indirect effect of shared leadership on voice behaviors via emotional exhaustion.

5.1 Theoretical implications

First, most previous studies have examined the facilitating or inhibiting effects of shared leadership from a single perspective, often overlooking the potential “double-edged sword” effect on employee voice behavior. Based on resource conservation theory and empowerment slavery theory, this study addresses the controversial issue of whether shared leadership can simultaneously promote and inhibit employees’ constructive behaviors within the same framework. The findings confirm that the shared leadership model can both foster and hinder employees’ constructive behaviors, effectively addressing previous disagreements and contradictions in the literature. This provides a theoretical foundation for a comprehensive understanding of the effectiveness, complexity, and bi-directionality of shared leadership.

Second, the impact of a leadership model is not solely determined by the team environment and leadership characteristics but also by subordinates’ perceptions of the leadership model, which is a perceptual process. Employees’ subjective perceptions of the leadership model can directly influence their work attitudes and behavioral outcomes. Particularly in the collectivist organizational context of China, employees tend to categorize themselves

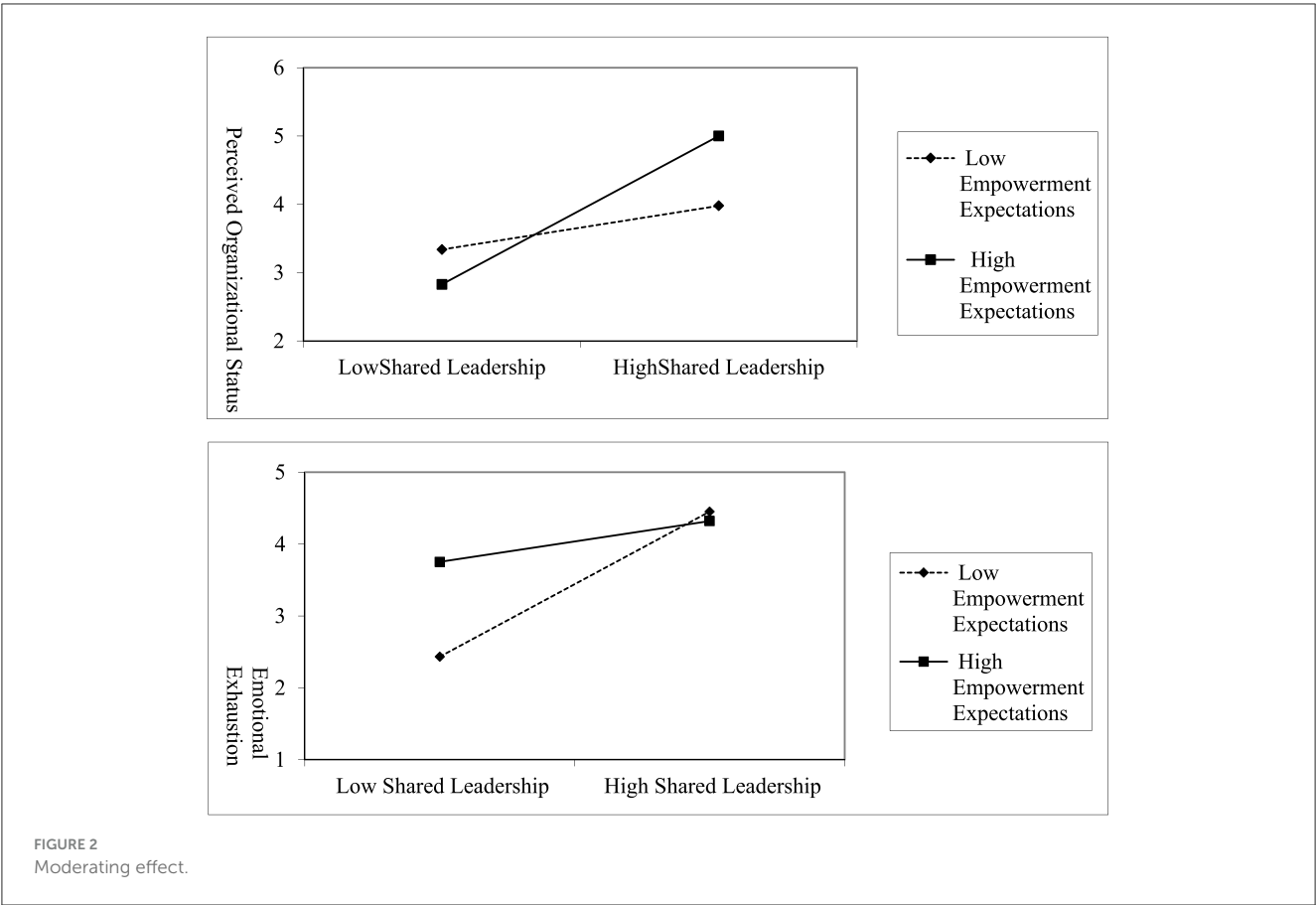


TABLE 5 Analysis of moderating effects.

MODEL5 (POR)						MODEL6 (EE)				
	Coeff	SE	p	LLCI	ULCI	Coeff	SE	p	LLCI	ULCI
SL	0.6222	0.0414	0	0.5409	0.7036	0.5688	0.038	0	0.4943	0.6434
E	0.1306	0.0441	0.0032	0.044	0.2172	0.0867	0.0404	0.0324	0.0073	0.1661
Int_1	0.3210	0.0491	0	0.2245	0.4175	−0.2807	0.045	0	−0.3692	−0.1923
R ²	0.327					0.381				
F	100.5					127.4				

based on their perceptions of organizational status, which then induces varying behaviors. Drawing on empowerment-slavery theory, this study incorporates employees' subjective perceptions into the research framework, uncovering the "black box" of the mechanism between shared leadership and employee voice behaviors. Specifically, it highlights how employees' perceptions of organizational status and emotional depletion, triggered by the empowerment and slavery dimensions of the shared leadership model, affect voice behavior. This research expands the intermediary mechanisms through which shared leadership influences employee behavior, broadening the applicability of empowerment-slavery theory and offering new insights into the relationship between shared leadership and employee voice.

Third, while previous studies have primarily focused on shared leadership from the perspective of empowerment, there has been less emphasis on the dual perspectives of power-sharing and subordinate expectations, as well as on the effectiveness of the shared leadership model. This study focuses on how varying levels of employee empowerment expectations differentially impact shared leadership outcomes. By constructing a mediated model, we argue that employee empowerment expectations are critical to unlocking the effectiveness of shared leadership, thereby refining the boundary conditions for its success. The findings suggest that organizations can adopt the shared leadership model more rationally and scientifically, enabling them to garner more constructive advice from employees.

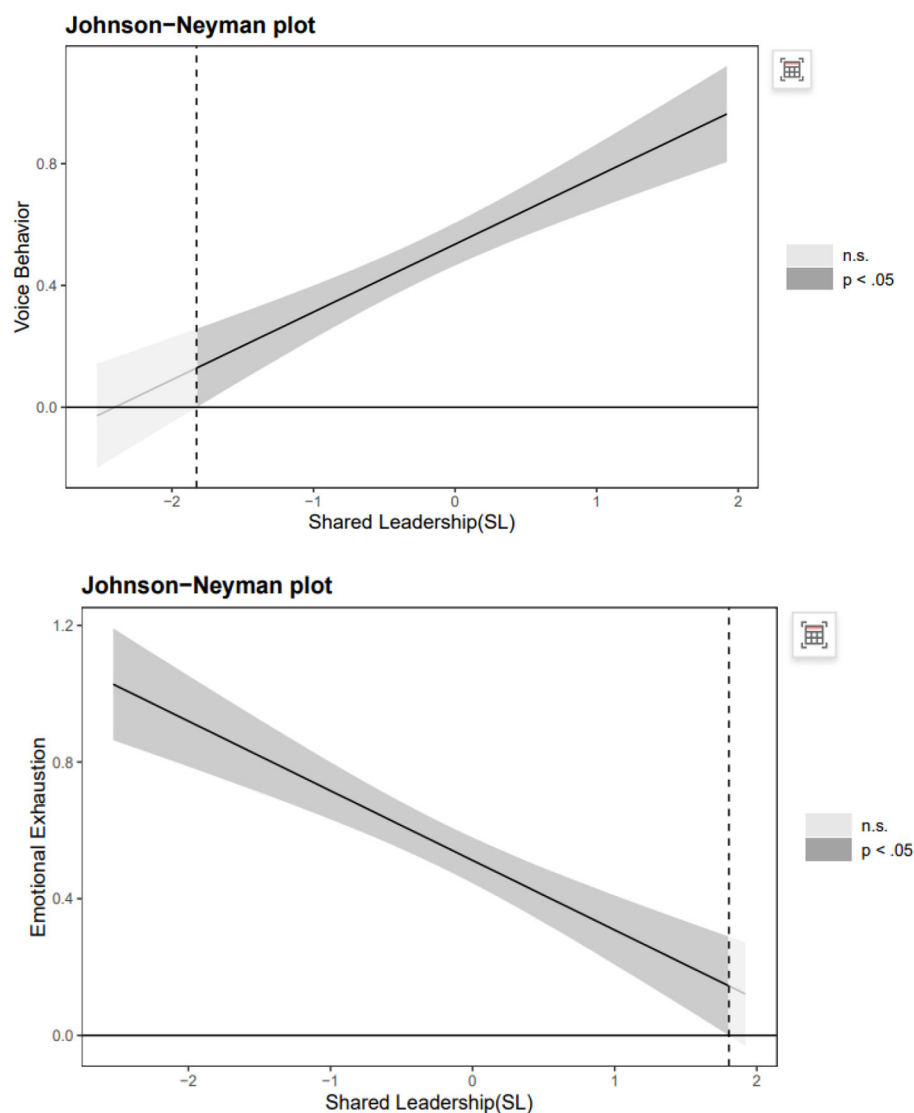


FIGURE 3
Adjustment effect simple slope plot.

5.2 Management insights

First, this study highlights a critical phenomenon: influenced by Confucian hierarchical culture, hierarchical leadership remains deeply entrenched in Chinese enterprise management. Breaking through hierarchical norms to achieve genuine power sharing in team management is challenging. Many companies, under the guise of “shared leadership,” delegate tasks that should be collaboratively completed by the team to a select few high-performing employees. In essence, while the shared leadership model distributes more workloads and responsibilities among members, decision-making authority continues to reside with formal leaders. This imbalance inevitably increases work pressure and emotional exhaustion for some employees, ultimately undermining organizational participation.

Second, Base on the leader-member exchange (LMX) theory (Green and Uhl-Bien, 1995), high-quality hierarchical relationships may mitigate the negative effects of shared leadership. To support employees under this model, organizations could implement interventions such as regular psychological counseling, company-sponsored social activities, formal grievance channels, and optimized job design. These measures may alleviate role stress and prevent the adverse consequences of resource depletion on employee wellbeing. Therefore, the implementation of shared leadership in China should be adapted dialectically to align with local management practices.

Third, the effectiveness of the shared leadership model also depends on the level of employees’ empowerment expectations. Managers must address these varying empowerment expectations to mobilize and stimulate employee motivation, thus promoting constructive behaviors. If there are many employees with high

empowerment expectations in the team, leaders can leverage the shared leadership model to engage and empower these employees. Conversely, if there are more employees with low empowerment expectations, leaders should adopt a nurturing approach and apply the shared leadership model cautiously, to mitigate the negative attitudes that may arise from resistance to empowerment behaviors.

5.3 Shortcomings and prospects

Although this study provides valuable theoretical insights and empirical evidence, there are still some limitations. First, while the data in this study were collected from different time periods, the research relied solely on data from Dalian enterprises due to limited social resources. Additionally, the data were based on the self-reported judgments of leaders or employees, which could not fully eliminate the influence of common method bias. Future research could improve the accuracy of results by incorporating data from multiple sources, time points, and subjects.

Second, this study defines employee advising behavior as facilitative advising that proposes innovative ideas to solve current organizational problems, focusing on the frequency and number of advising behaviors. Future studies could differentiate between various types of advising behavior and explore the mechanisms through which the shared leadership model affects different types of advising behavior, as well as persistent advising behavior over time.

Finally, the dynamics of employee empowerment expectations is a topic of growing importance in organizational behavior research. This study only measured employee empowerment expectations at a single point in time. Future research should focus on the dynamic changes in employee empowerment expectations by conducting longitudinal case studies with multiple measurements, to investigate how these changes affect the effectiveness of the shared leadership model over time.

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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How do family firms balance economic and non-economic goals: from symbiosis to competition

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Introduction: The coexistence of non-economic and economic goals is a prominent feature of family firms. However, does the pursuit of non-economic goals necessarily imply that the economic goals should be sacrificed? Our research addresses this question by exploring the symbiotic or competitive relationship between non-economic goals and economic goals in Chinese family firms, and the moderating effect of firm size and firm age.

Methods: Based on 2877 firm-year observations of Chinese listed family firms from year 2009 to 2019, this paper examines the relationship between non-economic goals (measured by family management) and economic goals (measured by firm performance). A panel data fixed-effects regression model was employed for the primary analysis. To further ensure the credibility of our conclusions, we performed several robustness tests, such as utilizing alternative variable measurement and conducting an endogeneity test.

Results: The empirical analysis revealed an inverted U-shaped relationship between family management and firm performance, where the extent to which non-economic goals are positively related to economic goals up to a point, after the turning point it becomes negative, which shows the trend from symbiosis to competition. Furthermore, as firm age increases and firm size expands, the inverted U-shaped curve flattens, and the turning point shifts to the right.

Discussion: Employing a willingness and ability perspective, this research contributes to the socioemotional wealth (SEW) framework by offering insights into the dynamic interplay between economic and non-economic goals in Chinese family firms. Moreover, by examining Chinese family firms influenced by Confucian values, our study highlights the importance of cultural context for generalizability, while simultaneously enriching SEW discourse and fostering avenues for cross-regional comparative analysis.

KEYWORDS

family firms, non-economic goals, economic goals, socioemotional wealth, family managers

1 Introduction

Entrepreneurs often face the dilemma of balancing multiple goals in daily business practices. However, in academic research, the majority of economic and management studies typically assume the maximization of economic goals for theory construction (Vazquez and Rocha, 2018), as seen in agency theory (Jensen and Meckling, 1976) and resource-based view

(Teece et al., 1997). Although stewardship theory (Davis et al., 1997) and stakeholder theory (Parmar et al., 2010) emphasize that different individuals have different triggers and goals, they do not explain how these goals interact. This gap remained until the emergence of socioemotional wealth (SEW) (Gómez-Mejía et al., 2023). SEW is defined as the nonfinancial value embedded in family firms, highlighting their tendency to prioritize non-economic goals over economic ones in decision-making, thereby differentiating family firms from nonfamily firms (Gomez-Mejia et al., 2007; Gomez-Mejia et al., 2011; Gomez-Mejia et al., 2018; Gómez-Mejia et al., 2023). It highlights the non-economic nature of family firms and has gradually become the mainstream paradigm in family firm research (Swab et al., 2020).

The coexistence of non-economic and economic goals is a prominent feature of family firms (Dou et al., 2022). However, does the pursuit of non-economic goals necessarily imply that the economic goals should be sacrificed? Due to the popularity of SEW, the primacy of non-economic goals and the perceived antagonism between the economic and non-economic goals are increasingly being taken for granted (Vazquez and Rocha, 2018). Considering the VUCA (volatile, uncertain, complex, ambiguous) environment, and heterogeneity of family firms (Daspit et al., 2021), there is room for adjustment and development in SEW's discourse on the multiple goal relationship (Gómez-Mejía et al., 2023; Gomez-Mejia et al., 2024). Moreover, the pursuit of multiple goals in Chinese family firms is deeply embedded in diverse cultural context (Koellner and Roth, 2024), such as "family relationship" (guanxi), familial bonds (Su et al., 2023) and nepotism, positioning the family not merely as an economic unit but as a cornerstone of non-economic driver. These cultural imperatives fundamentally shape the prioritization of non-economic goals, which operate symbiotically with economic imperatives.

Enterprises typically pursue satisfactory rather than optimal goals, a dynamic further complicated by the cultural context and developmental stages of family firms operating in VUCA environment. Our research integrates these insights into the SEW framework by exploring the symbiotic or competitive relationship between non-economic goals (e.g., family management) and economic goals (e.g., firm performance) in Chinese family firms.

Non-economic goals constitute a multi-dimensional concept, among which maintaining family control is the primary dimension and serves as the foundation for achieving other non-economic goals (Berrone et al., 2012; Dou et al., 2020). According to upper echelons theory, top management teams significantly influence a firm's strategy, behavior, and performance (Hambrick, 2007). Furthermore, the identity of managers, whether family or non-family, profoundly affects firm performance (Zhang et al., 2021; Fang et al., 2022). Therefore, family members serving as managers become the most important manifestation of maintaining family control. In this study, we use family members serving as managers to represent non-economic goals, while firm performance represents economic goals.

We adopt a goal-goal perspective to examine the relationship between the two goals, yielding distinct research results compared to the traditional means-goal perspective. According to the means-goal perspective, the relationship between family involvement and firm performance is widely debated. When firm performance is viewed as the goal pursued by family firms, and family involvement is considered the means to achieve this goal, scholars have identified various results

(Patel and Cooper, 2014). Shifting from the means-goal perspective to a goal-goal perspective offers a more compelling explanation. A single goal can be approached with maximization logic, while multiple goals involve subjective weighting and can only be addressed using satisfying or optimization algorithms, which rely on the decision-maker's subjective value standards (Meng et al., 2023). According to this logic, there may not be a simple optimal relationship between family management and firm performance. Instead, there may be trade-offs from a goal-goal perspective, reflecting differences in decision-makers' value standards. Adopting a willingness-ability perspective, we propose a model demonstrating a shift from "symbiosis" to "competition" between the proportion of family management (as a non-economic goal) and firm performance (as an economic goal). Symbiosis occurs when economic goals and non-economic goals increase together, reflecting a synergistic alignment, and competition emerges when further increases in non-economic goals lead to a decline in economic goals, signaling trade-offs, forming a non-differentiated inverted U-shaped curve for the dominant family.

The relationship between economic and non-economic goals also shifts with a firm's internal and external environment. As firms age and grow, they develop more standardized norms and practices, leading to standard organizational roles and control systems. These standardized practices enhance organizational credibility and establish clear accountability (Hannan and Freeman, 1984). Larger and older companies rely more on systematic processes than on individual managers' capabilities, mitigating deficiencies in less capable family managers. Moreover, family managers possess sufficient authority to bypass internal processes and regulations, thereby reducing the impact of structural inertia, which allows the organization to combine the reliability brought by standardization with the flexibility afforded by discretionary power (Ahmad et al., 2021). Consequently, changes in firm age and size will affect the willingness and ability of family managers, consequently influencing the "symbiosis" and "competition" relationships between the economic and non-economic goals of family firms.

Using data from Chinese listed family firms from 2009 to 2019, we selected family management to represent non-economic goals and firm performance to represent economic goals, and explores the relationship between these two types of goals in family firms in long-term stable conditions. The study examines the symbiosis and competition relationships between these goals, as well as the moderating effects of firm size and firm age. This research provides new insights into the field of corporate goals and socio-emotional wealth, and clarifies misconceptions regarding the professionalization of family firms.

2 Theoretical background

Family firms simultaneously pursue economic and family-centered non-economic goals (Dou et al., 2022). While economic goals, such as profitability and growth, remain central to the survival and competitiveness of family firms. Non-economic goals, particularly those centered on family well-being and SEW, play a pivotal role in shaping their strategic decisions (Chua et al., 2018). Some researches highlight the diversity of family firms' goals, often

classified into binary categories such as economic versus non-economic or financial versus non-financial (Vazquez and Rocha, 2018). While mainstream theories such as agency theory suggests that the goal pursuits of family firms and non-family firms do not exhibit significant differences and primarily diverge in the governance structure (Saleem and Graves, 2024). Similarly, the resource-based view emphasizes that family firms' unique resource advantages can generate greater economic benefits, with these resources serving as tools for realizing economic benefits (Habbershon et al., 2003). Stewardship theory changes the foundational assumptions of human nature but retains the basic premise that a firm's stakeholders primarily seek economic benefits (Fox and Hamilton, 1994). Stakeholder theory, while acknowledging diverse goal pursuits among stakeholders lacks a practical framework for analyzing these differences (Donaldson and Preston, 1995). Scholars have gradually recognized that family and non-family firms differ not only in governance structures but also in non-economic goals that influence corporate behavior (Chrisman et al., 2012).

Gomez-Mejia et al. (2007) developed the SEW framework, systematically explaining non-economic goals and distinguishing family firms from their non-family counterparts. Furthermore, Berrone et al. (2012) developed a multi dimensional SEW model identifies five non-economic values (FIBER) that family owners prioritize: (a) Family control and influence, (b) Family members' identification with the firm, (c) Binding social ties, (d) Emotional attachment and (e) Renewal of family bonds to the firm through dynastic succession. This model represents a significant advancement in understanding the intrinsic structural composition of SEW (Schulze and Kellermanns, 2015). Furthermore, using FIBER as an overarching framework, Gomez-Mejia et al. (2024) distinguish between SEW-intensive—where firms give high priority to the FIBER dimensions—and SEW-sensitive—where family owners are more willing and capable of adapting their SEW endowment to respond to external factors. In the Chinese context, family firms also exemplify both traits: their SEW-intensive nature is driven by cultural imperatives such as “guanxi,” familial bonds, and nepotism (Su et al., 2023), while their SEW sensitivity emerges from navigating a VUCA environment shaped by rapid economic and institutional transitions (Koellner and Roth, 2024). This dual characters enrich our understanding of how Chinese family firms navigate the interplay between economic and non-economic goals. Leveraging its strength in explaining non-financial motivations of family firms, SEW exerted extensive influence across organizational and management studies, including corporate governance (Mahto et al., 2023), internationalization (Hafner and Pidun, 2022), innovation and entrepreneurship (Hu et al., 2023), and social ethics (Kabbach de Castro et al., 2017). This has led to the assumption that the pursuit of SEW often comes at the expense of economic interests, reinforcing the notion of a trade-off between economic and non-economic goals (Vazquez and Rocha, 2018). However, considering a dynamic further complicated by the cultural context and developmental stages of family firms operating in China, the relationship between economic and non-economic goals becomes more nuanced, leaving room for further adjustment and development.

Examining the relationship between family management and firm performance through a goal-goal perspective offers a distinct analytical framework compared to the means-goal perspective. Existing research, which treats SEW as an end goal and family

control as a means to achieve it, has yielded inconsistent findings. Studies utilizing North American samples have identified a positive correlation between the proportion of professional managers and firm performance (Fang et al., 2022), suggesting an inverse relationship between family management and firm performance. Conversely, research based on Italian samples has demonstrated an inverted U-shaped relationship between the presence of family managers and firm performance (Sciascia and Mazzola, 2008). Against this backdrop, and in light of the extensive discourse on non-economic goals in family firms (Gomez-Mejia et al., 2011), a critical question emerges: Given that family control can either facilitate or hinder the attainment of economic goals, how should family firms strategically balance or coordinate the degree of family management versus professionalization? To address this question, this paper proposes a goal-goal perspective to systematically explore the interplay between the pursuit of non-economic goals and the achievement of economic goals in family firms.

3 Hypothesis

3.1 The relationship between non-economic goals and economic goals

We adopt a willingness-ability perspective to analyze the relationship between non-economic goals (family management) and economic goals (firm performance). Family managers possess the willingness to pursue specific goals, which is shaped by their values, beliefs, and family ties. However, their ability to achieve these goals is constrained by factors such as resource availability, market conditions, and managerial expertise. By examining both willingness and ability, we can gain a more nuanced understanding of how family managers navigate the trade-offs between non-economic and economic goals and ultimately influence firm performance.

The attainment of economic goals is essential for firm survival, and family managers possess the willingness to achieve them. First, the tradition of Chinese culture emphasizes familial loyalty, collective responsibility, and long-term orientation (Frerich et al., 2024), which closely aligning firm's survival and development with their own interests. These cultural norms foster a deep sense of commitment and trust (Hennicks et al., 2024) to the firm's success, as family managers also exhibit higher organizational loyalty and commitment (Luo and Chung, 2013), which strengthens their dedication to realizing both economic and non-economic goals. Second, personal connections and “guanxi” based on blood and marriage ties provide family managers with a natural foundation of trust. The long periods of living and working together help family managers develop shared values and understanding (Bettinelli et al., 2022), maintain high visibility in their work, and ensure relatively transparent communication channels, thereby reinforcing their willingness to drive the firm toward its goals. This reduces opportunistic tendencies and lowers agency costs (Fama and Jensen, 1983; Karra et al., 2006), enabling them to focus more on achieving economic goals. In the context of China, which could be considered a highly SEW-intensive environment due to the strong emphasis on family ties and long-term relationships (Gomez-Mejia et al., 2024), the willingness to prioritize goals may be particularly pronounced.

From the willingness perspective, all else being equal, an increase in the proportion of family managers initially benefits the entire top management team by reducing agency costs, primarily due to diminished information asymmetry (Chrisman et al., 2004). However, as this proportion continues to rise, the team may begin to experience escalating agency costs driven by family altruism. Family owners' altruism may manifest as tolerance and generosity towards family managers, potentially leading to shirking and free-riding behaviors (Schulze et al., 2003), thereby increasing agency costs (Chrisman et al., 2004). Thus, considering the overall agency costs, while the willingness of family managers to achieve the firm's economic goals grows with their increasing proportion, it follows a pattern of diminishing marginal utility.

From the ability perspective, family managers may face ability disadvantages. In the early development stage of a family firm, maintaining family control generates "familiness," which enhances the firm's performance by leveraging capabilities and resource advantages (Wu et al., 2024). However, as the proportion of family managers increases, the average ability level within the entire TMTs tends to decline, which is attributed to the higher degree of homogeneity in their acquired knowledge and skills, as well as significant overlap in their social capital (Gómez-Mejía et al., 2023). The homogeneity and overlap imply that the ability of the whole TMT do not increase proportionally with the increase in the proportion of family managers. Moreover, the continuous involvement of family managers often favors kinship over meritocracy, preventing the firm from benefiting from the diverse capabilities and resources brought by professional managers (Chua et al., 2009). Additionally, nepotism, which leads to position protection by the owner, may result in the TMT being filled with incompetent family managers (Schulze et al., 2003). This trend is exacerbated by the increasing presence of underqualified family managers (Stewart and Hitt, 2012), leading to a decline in the firms' competence.

The achievement of economic goals can be seen as a combined effect of ability and willingness of family managers (De massis et al., 2014). When the proportion of family managers is low, they possess the willingness to achieve economic goals and have not yet demonstrated significant ability disadvantages, and may even exhibit slight ability advantages. At this stage, the joint effect of increasing willingness and the maintenance of ability leads to a positive effect on economic performance. As the proportion of family managers increases, the diminishing effect of willingness advantages and the increasing effect of ability disadvantages result in a positive net effect on firm performance that continues to grow but at a diminishing marginal rate. At this stage, family management demonstrates a mutually "symbiotic" relationship with the firms' economic goals. However, constrained by the law of diminishing marginal utility, as the proportion of family managers increases, firm performance will gradually reach a point where the marginal benefit becomes zero, known as the turning point. Subsequently, due to the continuous involvement of family managers, their ability to achieve economic goals continues to decline, while the increasing rate of willingness also diminishes. The combined effect of willingness and ability on firm performance begins to decline, accelerating over time. At this stage, family management shifts from enhancing the firm's economic goals to eroding them, demonstrating a "competition" relationship. This analysis indicates that the relationship between non-economic and

economic goals shifts from symbiotic to competitive. Based on these theoretical arguments, the following hypothesis is proposed:

Hypothesis 1: There will be an inverted U-shaped relationship between family management and firm performance, that is to say, where the extent to which non-economic goals are positively related to economic goals up to a point, after which it becomes negative.

3.2 The moderating effects of firm characteristics

Characteristics such as firm size and firm age influence a firm's survival (Bruderl and Schussler, 1990), innovation (Gimenez-Fernandez et al., 2020), and other strategic decisions. In line with the findings of Gomez-Mejia et al. (2024), larger and older firms in SEW-sensitive contexts are better positioned to preserve socioemotional wealth while pursuing economic goals, as they can allocate resources more effectively and absorb external shocks, and they are better equipped to navigate VUCA environments. As firms grow in size and age, formal and informal norms mature, organizational practices stabilize, and the resource endowment of the firm, along with the emotional endowment of the controlling family, become key elements in determining the firm's strategy. Consequently, the "symbiosis" and "competition" relationship between economic and non-economic goals of family firms are influenced by these characteristics.

3.2.1 The moderating effect of firm size

Firms with larger size are able to amplify the willingness advantage and mitigate the ability disadvantage of family managers through systemic forces. The willingness advantage is further reinforced in larger firms. First, compared to smaller firms, larger firms are more likely to benefit from economies of scale and scope. Their complementary assets and capabilities, higher risk tolerance, and stronger market positions all contribute to improving the internal efficiency of resource conversion. The scale effect amplifies the willingness advantage of family managers, enabling them to generate higher economic returns from the same level of resource endowment. Second, larger family firms are more incentivized to establish standardized operational processes and governance structures, as well as to offer formal and effective compensation incentives to managers (Carlson et al., 2006). In this context, the altruistic tendencies of the owners are naturally diminished, thereby reducing the costs associated with position mismatches due to altruism (Schulze et al., 2003). This decline in agency costs further strengthens the willingness of family managers to dedicate their efforts toward achieving the firm's goals.

Larger firms can also partially compensate for the shortcomings of family managers' insufficient abilities. First, as firms grow in size, they have more resource to establish modern governance and management systems, as well as industry norms (Carlson et al., 2006). These firms can also provide formal training for employees and managers, thereby improving the competence of the entire top management teams, including family managers. Second, larger firms can more easily achieve economies of scale, enhance production efficiency, and implement more detailed labor divisions. This allows the organization ability to substitute for individual ability, partially mitigating the deficiencies of family managers. Since the impact of

family managers' willingness and ability on firm performance changes with firm size, the slope and turning point of the inverted U-shaped curve will also change accordingly.

Larger firms are more conducive to leveraging the willingness advantage of family managers while mitigating their ability disadvantages. Therefore, in larger firms, as the proportion of family managers increases, the combined effect of the increased willingness advantage and the mitigated ability disadvantage leads to a slower approach to the turning point, resulting in a flatter inverted U-shaped curve. Additionally, larger firms can accommodate more family managers to achieve their economic goals. Consequently, the point at which the marginal net effect on firm performance becomes zero shifts to the right, indicating a rightward shift in the turning point of the inverted U-shaped curve. Taken together, these theoretical arguments yield the following hypothesis:

Hypothesis 2: Firm size moderates the inverted U-shaped relationship between family management and firm performance, such that at larger firms, the inverted U-shaped becomes flatter, and the turning point shifts to the right.

3.2.2 The moderating effect of firm age

Firms with older age typically accumulate extensive management experience and organizational routines, resulting in smoother communication mechanisms. For family firms, as the firm ages, the intention for intergenerational succession and maintaining family control gradually emerges (Chua et al., 2004). Thus, firm age can be considered a dynamic representation of the firm's development stage, allowing us to examine changes in the relationship between economic and non-economic goals over different development stage.

In older firms, the willingness advantages of family managers are reinforced for several reasons. First, family managers develop a strong sense of "psychological ownership" due to their long-term involvement with the firm (Lee et al., 2019). Under the influence of stronger emotional endowments, the same proportion of family managers demonstrate a greater willingness to achieve the firm's economic goals (Zellweger et al., 2011). Second, in older firms, family managers establish effective formal or informal communication channels through long-term operations and continuous collaboration. Their "tacit knowledge" facilitates smoother communication, effectively reducing information asymmetry and enhancing self-monitoring capabilities (Karra et al., 2006). Consequently, the willingness of family managers to invest their efforts can yield greater competitive advantage.

Firm age also impacts the ability endowments of family managers in several ways. First, the management experience and practices accumulated over time in older firms make daily operations more dependent on inertia, which inadvertently mitigates or eliminates the potential impact of family managers' ability disadvantages. Second, in long-established family firms, family managers contribute to the development of tacit knowledge suitable for the firm through years of learning, integration, and accumulated experience (Miller et al., 2011). Over time, family managers build corporate reputation, market share, and customer resource, which external professional managers cannot easily replicate. Furthermore, this tacit

knowledge further mitigates the negative impact of family managers' ability deficiencies.

Since the impact of family managers' willingness and ability on firm performance varies with firm age, the slope and turning point of the inverted U-shaped curve change accordingly. Older firms are more conducive to family managers leveraging their willingness advantage and mitigating ability deficiencies. Therefore, in older firms, as the involvement family managers increases, the combined effect of increased willingness and decreased ability deficiencies results in a flatter inverted U-shaped curve. Additionally, older firms can accommodate more family managers to achieve economic goals, leading to a rightward shift in the turning point. Thus, considering the variations in the impact of family managers' willingness and ability endowments on firm performance across different firm age, we propose the following hypothesis:

Hypothesis 3: Firm age moderates the inverted U-shaped relationship between family management and firm performance, such that at larger firms, the inverted U-shaped curve becomes flatter, and the turning point shifts to the right.

4 Methodology

4.1 Data source

The empirical data used in this study were derived from Chinese family firms listed on the Shenzhen and Shanghai stock exchanges between 2009 and 2019. The 2009–2019 time period was selected for the following reasons: This period represents a relatively stable economic phase in China's development, free from the extreme disruptions caused by the COVID-19 pandemic that began in 2020. By focusing on pre-pandemic data, we can examine the fundamental relationships of family firms' goal setting strategies under a long-term normal condition. To avoid the interference of this extreme exogenous event on our research findings and to ensure the robustness and generalizability of our conclusions, we utilized the data range to the pre-pandemic period of 2009–2019.

The primary data source was the China Stock Market and Accounting Research (CSMAR) database. Additionally, we collected data from the firms' annual reports. Information on managers' family or non-family identity, family management, ROE (return on equity), firm size and firm age, among other variables, was obtained from the CSMAR database. The sample firms are all family firms. We define family firms as follows: First, as recommended by La Porta et al. (1999), we adopted a threshold of 20% family ownership for firm selection. Second, it required at least one family member, whether related by blood or marriage, to serve as a director, shareholder, or manager (Anderson and Reeb, 2003; Chua et al., 1999). To ensure data reliability, we excluded firms in the financial services industry, as their unique financial statement structures and typically high debt ratios lead to biased regression results.

However, variables such as managers' baseline information like education background, age, etc., could not be obtained directly from the database, so we manually distinguished and calculated these variables. The process was as follows: first, we downloaded managers' resumes from the CSMAR database, then searched their names online to determine if they had a familial relationship with the holding

family. If such a relationship existed, we coded them as family managers, otherwise, they were coded as non-family managers. Second, we collected information on these managers' age, education, and whether family members served as CEOs or board directors.

Our dataset is an unbalanced panel for several reasons. First, we excluded samples with incomplete information disclosure to prevent missing values. Second, we omitted data for firms that were sold, went bankrupt, or experienced a change in control during the sample period, though we retained data for these firms prior to these events. Consequently, our unbalanced panel comprises 255 firms, representing 2,877 firm-year observations.

4.2 Variable measurement

4.2.1 Dependent variable

Return on equity (ROE) of the sample firms is used to represent firm performance, reflecting economic goals. Additionally, since the impact of family managers on financial performance may not be immediately apparent but generally manifests in the following year, this paper utilizes the average ROE of one-year lag (year $t+1$) and two-year lag (year $t+2$) measure firm performance in year t .

4.2.2 Independent variable

Following prior literature, we operationalized family management as the proportion of family managers relative to all managers employed in the firm (Block, 2010), which is also the percentage of a firm's managers who were also family members (Sánchez-Marín et al., 2020).

4.2.3 Moderating variables

Following the research of Fang et al. (2016) and Skorodziyevskiy et al. (2022), this paper incorporates firm size and firm age as moderating variables. Firm size is measured by the logarithm of the operating revenue in the current fiscal year, while firm age is measured by the number of years since the firm was established.

4.2.4 Control variables

In alignment with the previous study of Jaskiewicz et al. (2017), our analysis incorporates a comprehensive set of control variables that are potential determinants of firm performance, systematically categorized into firm characteristics, managerial attributes, corporate governance characteristics and financial attributes. For firm characteristics, we included a variable indicating whether a firm qualifies as a high-tech enterprise, as high-tech industries often exhibit greater performance volatility due to rapid technological advancements and shorter product life cycles. Such volatility can obscure the effects of family management and other variables on firm performance. For managerial attributes, the traits of family managers may influence firm performance (Fredrickson et al., 2010). We controlled for the average age and education level of family managers. Additionally, for corporate governance characters, we controlled for CEO duality, coded as "1" when the CEO also holds the position of chairman of the board. We also controlled for intergenerational succession, as the involvement of second-generation can also influence the firm's goal setting. For financial attributes, we controlled for the debt-to-asset ratio and beta, which reflects a firm's financial leverage and debt repayment ability. We also controlled for equity concentration, which reflects the distribution of shareholders' ownership stakes. High equity concentration typically shows that a few major shareholders have

TABLE 1 Variable definitions.

Category	Variable name	Symbol	Measurement
Independent variable	Family management	Family management	The ratio of family managers in TMTs
Dependent variable	Firm performance	Performance	The average ROE (Return on Equity) of year $t+1$ and year $t+2$.
Moderators	Firm size	Firm size	The natural logarithm of the operating revenue in the current fiscal year.
	Firm age	Firm age	The number of years since the family firm was established.
Control variables	High-tech enterprise	High tech	A binary variable, if a firm is designated as a high-tech enterprise is coded as 1, otherwise 0.
	Independent directors	Independent	The percentage of independent directors in the board of directors.
	CEO duality	Duality	A binary variable, if the CEO also served as the chairman of the board of directors are coded as 1, otherwise 0.
	Intergenerational succession	Succession	If the second generation involved in the firm are coded 1, otherwise 0.
	Debt-to-Asset Ratio	Asset	Debt/Asset
	Beta	Beta	An indicator measures the volatility of a stock relative to the overall market.
	Equity Concentration	Equity	Sum of the shareholding ratios of the 2nd to 5th largest shareholders / Shareholding ratio of the largest shareholder.
	Family managers' age	FM Age	The natural logarithm of average nonfamily managers' age.
	Family managers' education background	FM Edu	1 = Middle school; 2 = Junior college; 3 = Bachelor degree; 4 = Master degree; 5 = PhD.
	Year	Year	Dummy variables, the sample spans from 2009 to 2019 (11 years).
	Industry	Industry	Dummy variables: According to the 2012 industry classification by the China Securities Regulatory Commission (CSRC), the industries covered in the sample are divided into 17 categories.

significant control over the firm, directly impacting its decision-making process and governance structure. The variable description is listed in Table 1.

4.3 Data analysis

4.3.1 Descriptive statistics and correlation analysis

Table 2 presents the descriptive statistics and correlation coefficients of the variables. The average ROE of the sample firms is 0.055, with a standard deviation of 0.292, indicating significant differences in firm performance. The average proportion of family managers is 0.169. Regarding firm characteristics, the average firm size and firm age are 21.35 and 2.828. The average age and education level of family managers are 46.02 and 3.104, respectively, which means the average family managers' age is approximately 46.02 years, and the average education level corresponds to an undergraduate degree.

Table 2 also reports the correlation coefficients of the variables. The distribution of sample variables is within a reasonable range and will not be elaborated further here. The correlation coefficients between variables are all below 0.5, indicating no serious multicollinearity problem. Additionally, a Variance Inflation Factor (VIF) test was conducted, showing VIF values for each variable ranging from 1.01 to 1.16, further confirming that multicollinearity is not a significant concern in our research.

4.3.2 Methodology and results

In this study, STATA 15.0 was used for data processing to test the hypothesis. To ensure model consistency and validity, the data were processed as follows: First, continuous variables involved in interaction terms, were centered to avoid the influence of multicollinearity. Second, before conducting the regression tests, a Hausman test was performed. Based on the Hausman test results, the fixed effects regression model for panel data was deemed appropriate for this study, as it also helps to address endogeneity issues.

The regression results were presented in Table 3. First, Model 1 is the baseline model, including only control variables. Model 2 tests the relationship between family management and firm performance by adding both the first-order term (Family Management) and squared term (Family Management²) of the independent variable. The results show that the squared term of family management is significantly negative ($\beta = -0.320, p < 0.05$), while the first-order term is significantly positive ($\beta = 0.310, p < 0.01$). This indicates that the relationship between family management and firm performance exhibits an inverted U-shape, meaning that as the ratio of family managers increases, firm performance first rises and then falls. And around the turning point, family firms can reach the optimal performance level. Thus, Hypothesis 1 is supported.

To ensure the correct interpretation of the results, the significance of the inverted U-shaped relationship was assessed following the method outlined by Lind and Mehlum (2010) (see Table 4). To further

TABLE 2 Correlation analysis.

	Mean	Std. dev.	1	2	3	4	5	6	7
1. Performance	0.055	0.292	1.000						
2. Family Management	0.169	0.166	−0.003	1.000					
3. Firm Size	21.350	1.222	0.029	−0.135***	1.000				
4. Firm Age	2.828	0.418	−0.037**	−0.099***	0.177***	1.000			
5. High Tech	0.651	0.477	−0.016	0.078***	−0.071***	−0.066***	1.000		
6. Independent	0.374	0.053	−0.022	0.076***	−0.078***	0.061***	0.0280	1.000	
7. Duality	0.358	0.479	−0.040**	0.275***	−0.115***	−0.020	0.035*	0.196***	1.000
8. Succession	0.452	0.498	−0.001	0.155***	0.059***	0.113***	−0.096***	−0.133***	−0.137***
9. Asset	0.682	1.330	0.006	0.013	−0.133***	−0.059***	−0.014	−0.013	−0.016
10. Beta	1.093	0.260	−0.056***	−0.020	−0.071***	0.095***	0.152***	0.012	0.041**
11. Equity	0.537	0.201	0.069***	−0.019	−0.165***	−0.083***	−0.169***	0.007	−0.009
12. FM Age	46.016	3.671	0.001	−0.124***	0.183***	0.195***	−0.0250	0.044**	0.046**
13. FM Edu	3.104	0.545	−0.024	−0.053***	0.097***	0.060***	0.042**	0.048**	0.014

	8	9	10	11	12	13
8. Succession	1.000					
9. Asset	0.001	1.000				
10. Beta	−0.027	−0.039**	1.000			
11. Equity	0.004	0.043**	−0.074***	1.000		
12. FM Age	0.013	−0.027	0.050***	−0.217***	1.000	
13. FM Edu	−0.060***	0.001	0.029	−0.137***	−0.034*	1.000

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

TABLE 3 Regression results.

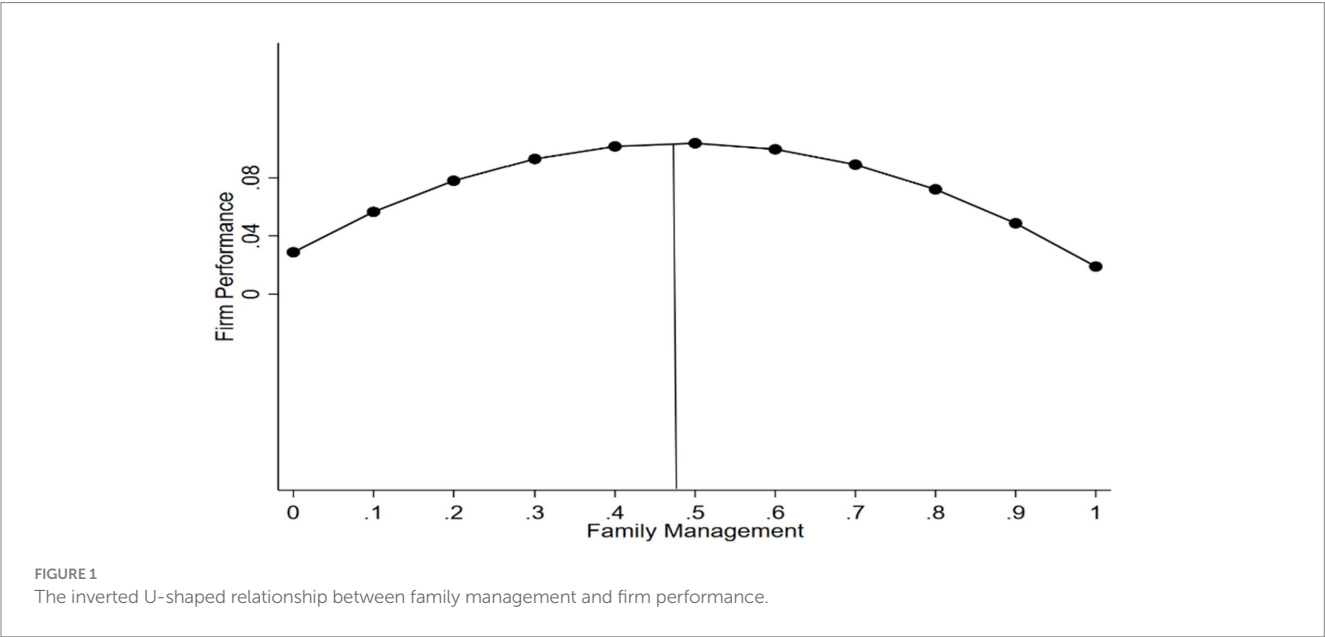
Variables	Model 1	Model 2	Model 3	Model 4	Model 5
	Performance	Performance	Performance	Performance	Performance
Family Management		0.310***	0.273***	0.297***	0.256**
		[0.097]	[0.100]	[0.097]	[0.100]
Family Management ²		−0.320**	−0.243	−0.305**	−0.217
		[0.141]	[0.152]	[0.141]	[0.153]
Family Management × Firm Size			−0.103**		−0.092**
			[0.042]		[0.042]
Family Management ² × Firm Size			0.239**		0.242**
			[0.108]		[0.111]
Family Management × Firm Age				−0.500***	−0.493***
				[0.122]	[0.123]
Family Management ² × Firm Age				0.692*	0.799**
				[0.394]	[0.407]
Firm Age	0.009	0.006	0.006	0.010	0.007
	[0.025]	[0.025]	[0.025]	[0.026]	[0.026]
Firm Size	−0.006	−0.006	−0.017	−0.003	−0.014
	[0.010]	[0.010]	[0.011]	[0.010]	[0.011]
High Tech	0.009	0.008	0.009	0.004	0.005
	[0.022]	[0.022]	[0.022]	[0.022]	[0.022]
Independent	−0.214	−0.220	−0.248*	−0.267*	−0.291**
	[0.136]	[0.136]	[0.136]	[0.136]	[0.136]
Duality	−0.015	−0.031**	−0.032**	−0.030**	−0.031**
	[0.014]	[0.015]	[0.015]	[0.015]	[0.015]
Succession	−0.008	−0.013	−0.014	−0.010	−0.011
	[0.018]	[0.018]	[0.018]	[0.018]	[0.018]
Asset	−0.000	0.000	0.001	0.001	0.001
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
Beta	−0.024	−0.027	−0.029	−0.024	−0.026
	[0.020]	[0.020]	[0.020]	[0.020]	[0.020]
Equity	0.100	0.101	0.111*	0.095	0.104
	[0.063]	[0.063]	[0.063]	[0.063]	[0.063]
FM Age	0.000	0.001	0.000	0.001	0.001
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
FM Edu	−0.000	0.000	0.000	−0.001	−0.001
	[0.016]	[0.015]	[0.015]	[0.015]	[0.015]
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
_cons	0.115	0.086	0.337	0.031	0.279
	[0.251]	[0.251]	[0.270]	[0.251]	[0.271]
adj. R ²	0.181	0.185	0.187	0.190	0.192
N	2,877	2,877	2,877	2,877	2,877

* $p < 0.1$; ** $p < 0.05$; and *** $p < 0.01$. Standard errors in brackets.

verify this relationship, we followed the approach of Haans et al. (2016) and Lind and Mehlum (2010) and conducted the following tests. First, we estimated the turning point of family management and calculated confidence intervals using the Delta method (Fernhaber and Patel, 2012). The turning point of the inverted U-shaped curve between family management and firm performance is 0.485.

TABLE 4 Additional test of an inversely U-shaped relationship.

Method	Results
Estimated turning point	0.485
95% confidence interval—Delta method	(0.269, 0.701)
Slope	Slope _L : 0.310*** Slope _R : −0.330*
Test of joint significance of PPC variables [family management and family management ²] (<i>p</i> -value)	0.000
Test of joint significance of all the variables (<i>p</i> -value)	0.0009
Test of joint significance of all variables in the model	0.006



Additionally, the 95% confidence intervals for the Delta method (0.269, 0.701) indicates that the family management values fall within the data limits. Second, we calculated the slope on both sides of the turning point. The results show that the slope on the left side (X_L) of the inverted U-shaped curve is significantly positive (Slope_L = 0.310, $p < 0.001$), and the slope on the right side (X_R) of the curve is significantly negative (Slope_R = −0.330, $p < 0.1$). Third, following Fernhaber and Patel (2012), we conducted a joint significance test of the direct and squared terms of family management according to the method of Sasabuchi (1980). These validations confirm the existence of the inverted U-shaped relationship between family management and firm performance (see Figure 1).

Table 3 also presents the results of the moderating effects of firm size and firm age (Model 3 and Model 4), with Model 5 as the full model. To test the moderating effect of firm size, Model 3 includes the interaction term between the family management and firm size (Family Management $\times$ Firm Size), as well as the interaction term between the squared term of the family management and firm size (Family Management² $\times$ Firm Size). The results indicate that the coefficient for Family Management $\times$ Firm Size is significantly negative ($\beta_3 = -0.103$, $p < 0.05$), and the coefficient for Family Management² $\times$ Firm Size is significantly positive ($\beta_4 = 0.239$, $p < 0.05$). These results remain significant in the full Model 5, indicating that the inverted U-shaped curve becomes flatter when firm

size increases. The direction of the turning point's movement depends on $\frac{\beta_1\beta_4 - \beta_2\beta_3}{2(\beta_2 + \beta_4M)^2}$, and whether it is significantly different from 0 (see Haans et al., 2016 for a detailed derivation). Since the denominator of the equation is always greater than or equal to 0, the sign of the equation depends on the numerator. Specifically, when $\beta_1 \times \beta_4 - \beta_2 \times \beta_3 > 0$, the turning point shifts to the right as the moderating variable M increases, and vice versa. Based on the coefficients in Model 3 in Table 3, $\beta_1 \times \beta_4 - \beta_2 \times \beta_3$ is significantly positive, indicating that the turning point shifts to the right as firm size increases. To present more intuitive results, we plot the inverted U-shaped relationship for high, medium, and low values of firm size, as shown in Figure 2. Thus, hypothesis 2 is supported.

Similarly, Model 4 tests the moderating effect of firm age. Model 4 adds the interaction term between the family management and firm age (Family Management $\times$ Firm Age), and the interaction term between the squared term of the family management and firm age (Family Management² $\times$ Firm Age). The results show that the coefficient of Family Management $\times$ Firm Age is significantly negative ($\beta_3 = -0.500$, $p < 0.001$), and the coefficient of Family Management² $\times$ Firm Age is significantly positive ($\beta_4 = 0.692$, $p < 0.1$), indicating that the inverted U-shaped curve becomes flatter as firm age increases. Based on the coefficients of the variables in Model 4, the sign of $\beta_1 \times \beta_4 - \beta_2 \times \beta_3$ is

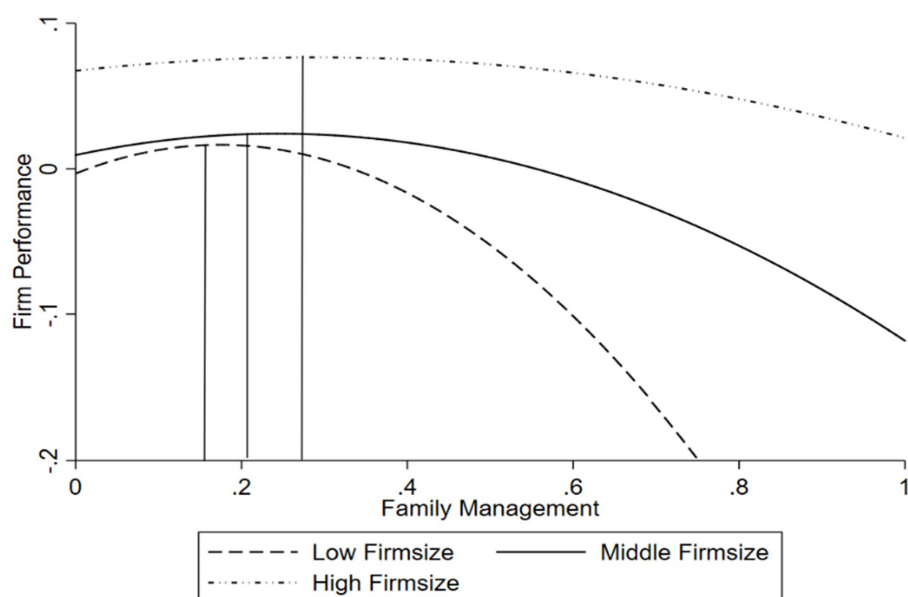


FIGURE 2
The moderating effect of firm size.

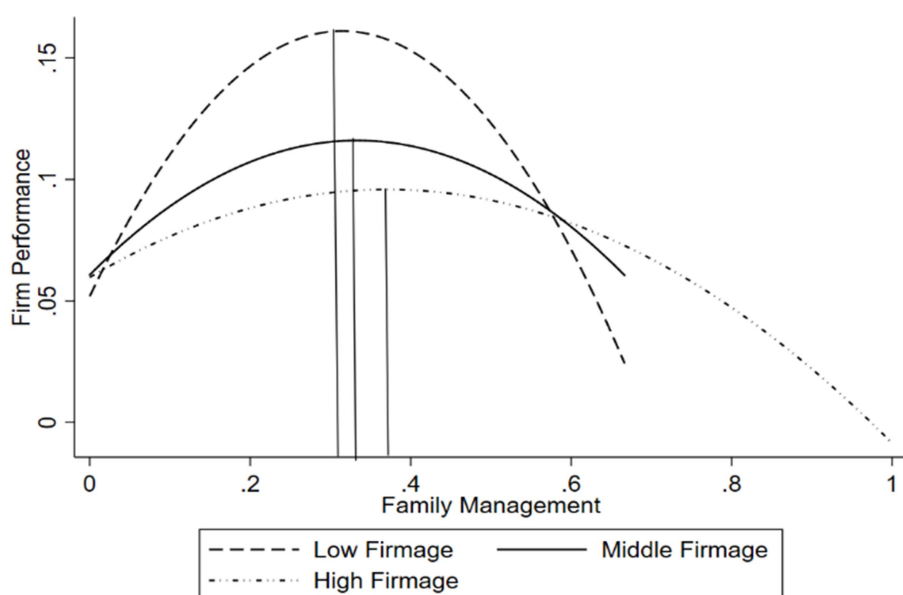


FIGURE 3
The moderating effect of firm age.

significantly positive, indicating that the turning point shifts to the right as firm age increases. To present more intuitive results, we plotted the inverted U-shaped relationship for high, medium, and low values of firm age, as shown in Figure 3. Thus, Hypothesis 3 is supported.

5 Robustness tests

We conducted several robustness tests to ensure the reliability of our results.

5.1 Robustness checks: alternative measure of non-economic goals

To capture the complex nature of non-economic goals, we conducted additional analysis using the proportion of family board members as an alternative measure of non-economic goals. The variable reflects the family's control over residual claims, enabling families to maintain strategic control and prioritize non-economic goals over economic returns (Gomez-Mejia et al., 2007). While family management reflects the family's direct involvement in daily operations and

TABLE 5 Adding dependent variable: family board.

Variables	Model 1	Model 2	Model 3	Model 4
	Performance	Performance	Performance	Performance
Family Board	0.462**	0.377*	0.495**	0.414**
	[0.193]	[0.195]	[0.194]	[0.197]
Family Board ²	−0.802**	−0.632*	−0.876**	−0.698*
	[0.377]	[0.383]	[0.380]	[0.387]
Family Board × Firm Size		−0.012		−0.022
		[0.057]		[0.057]
Family Board ² × Firm Size		0.873**		0.870**
		[0.353]		[0.355]
Family Board × Firm Age			−0.253	−0.269
			[0.166]	[0.167]
Family Board ² × Firm Age			2.238**	2.016**
			[0.958]	[0.962]
Firm Size	−0.008	−0.020*	−0.007	−0.019*
	[0.010]	[0.011]	[0.010]	[0.011]
Firm Age	0.008	0.007	−0.011	−0.008
	[0.025]	[0.025]	[0.027]	[0.027]
High Tech	0.012	0.008	0.012	0.008
	[0.022]	[0.022]	[0.022]	[0.022]
Independent	−0.199	−0.176	−0.215	−0.194
	[0.136]	[0.136]	[0.136]	[0.137]
Duality	−0.015	−0.015	−0.016	−0.015
	[0.014]	[0.014]	[0.014]	[0.014]
Succession	−0.011	−0.010	−0.010	−0.007
	[0.018]	[0.018]	[0.018]	[0.018]
Asset	−0.001	−0.001	−0.001	−0.001
	[0.004]	[0.004]	[0.004]	[0.004]
Beta	−0.024	−0.024	−0.022	−0.022
	[0.020]	[0.020]	[0.020]	[0.020]
Equity	0.104	0.102	0.094	0.092
	[0.063]	[0.063]	[0.063]	[0.063]
FM Age	0.000	0.000	0.000	0.000
	[0.002]	[0.002]	[0.002]	[0.002]
FM Edu	−0.001	−0.003	−0.002	−0.003
	[0.015]	[0.015]	[0.015]	[0.015]
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
_cons	0.112	0.401	0.156	0.378
	[0.251]	[0.266]	[0.252]	[0.269]
adj. R ²	0.183	0.184	0.185	0.186
N	2,877	2,877	2,877	2,877

* $p < 0.1$; ** $p < 0.05$; and *** $p < 0.01$. Standard errors in brackets.

short-term decision-making authority, family board embodies the family’s legal control over the firm, ensuring long-term strategic autonomy. By employing family board as an additional measurement, we address the potential limitations of relying solely on family management and provide a more comprehensive understanding of the family’s non-economic intention (Chrisman et al., 2012). The results

presented in Table 5, are consistent with our primary findings, further validating the robustness of our conclusions.

5.2 Endogeneity test

To address potential endogeneity concerns, we employ an instrumental variable approach. Following prior studies (e.g., Fang et al., 2022), we use the average size of the management team as our instrumental variable. This variable is calculated as the average number of managers for all firms within each industry, state, and year. The rationale for this choice is that the variable shapes the structural context in which firms operate. For example, larger average management teams may signal greater professionalization or resource availability within an industry or region, reducing the reliance on family managers, which is likely to influence the firm's management structure (e.g., the proportion of family managers) but is unlikely to be directly correlated with firm performance or other firm-specific outcomes.

Following (Hamilton and Nickerson, 2003), we employed a two-stage regression approach with instrumental variables to address endogeneity. Table 6 reports the regression results of the endogeneity test. In the first stage, the instrumental and control variables were used to estimate the predicted value of family management, with family management as the dependent variable and the average size of the management team as the independent variable. The regression results show a significant negative correlation ($\beta = -0.084, p < 0.01$), indicating that the average size of the management team significantly affects the degree of family management, confirming the validity of the instrumental variable. In the second stage, the predicted value of the instrumental variable estimated in the first stage is included as an additional control variable in the regression, resulting in findings consistent with the main model.

5.3 Alternative dependent variables

We use an alternative measure of the dependent variable as the robust test (see Table 7). Return on Equity (ROE) for year $t + 1$ is used as an alternative to the original measure of firm performance. Employing this approach, we also found results that were consistent with those of the main model.

6 Additional analysis: the pandemic period (year 2020–2023)

The COVID-19 pandemic leads to a significant exogenous shock characterized by trade disruptions, resource shortages, and economic downturns, which would change the firm's behavior and goal settings. To address this change, we conducted an additional analysis during the pandemic period. Using data from 2020 to 2023, we collected 778 observations to explore how family firms balanced economic and non-economic goals during this extraordinary period.

Table 8 presents the results of the period of 2020–2023. Specifically, we observed that an increase in the pursuit of non-economic goals was negatively correlated with economic goals during 2020–2023. This finding contrasts with the inverted U-shaped relationship observed during the pre-pandemic period (2009–2019), suggesting that the pandemic fundamentally altered the dynamics of family firm goal pursuit.

We hypothesize that this shift is driven by two key factors: for the ability perspective, the economic uncertainty and market volatility brought by the pandemic demanded greater managerial expertise and strategic flexibility, potentially disadvantaging family managers who may have lacked the necessary professional skills to navigate this challenging environment. For the willingness perspective, in the VUCA environment of the COVID-19 pandemic, family managers may have prioritized the preservation of SEW even at the expense of short-term financial performance (Gomez-Mejia et al., 2024). Our analysis also revealed a moderating effect of firm size and firm age during the pandemic. Specifically, we found that the negative relationship between non-economic goals and economic goals weakened as firm size increased. As firms grow larger, they tend to develop more sophisticated organizational structures and professional management teams, which can dilute the influence of family managers and promote a more balanced approach to goal pursuit. Larger firms also possess greater resources and capabilities, enabling them to better adapt to changing market conditions and mitigate the risks associated with conservative decision-making driven by SEW considerations.

7 Conclusion and discussion

7.1 Conclusion

Family managers possess both the willingness and ability to achieve diverse goals, a combination that significantly influences the behaviors and outcomes observed in family firms (De massis et al., 2014). Their strong identification with both the family and the firm leads to a high level of willingness advantage (Wielsma and Brunninge, 2019), thereby promoting the achievement of firm's economic goals. However, the willingness advantage is constrained by the law of diminishing marginal returns: as the proportion of family managers increases, the willingness advantage diminishes. Additionally, family managers face an ability disadvantage. As the appointment of family managers increases, the limited family talent pool may no longer provide sufficiently capable managers. It also becomes difficult to dismiss less competent family managers (Mazzi, 2011). This discrepancy in quality between the internal family talent pool and the external labor market becomes more pronounced, highlighting ability deficiencies. These deficiencies hinder the improvement of the firm's performance and the realization of its economic goals. The presence of these opposing forces leads to an inverted U-shaped relationship between family management and firm performance, which manifests as from symbiosis to competition. Changes in firm age and size can affect the willingness and ability of family managers, thereby influencing this inverted U-shaped curve. As the firm grows in size and age, its formal and informal norms become more established, and organizational routines stabilize. This stability can enhance the commitment of managers and mitigate their ability deficiencies, resulting in a rightward shift and a flattening of the inverted U-curve.

7.2 Discussion

The current findings offer theoretical implications in the following ways. First, by addressing goal complexity in family firms through the perspective of willingness and ability, we provide new insights into the

TABLE 6 Robustness test: endogeneity tests.

Variables	First-stage	Second-stage	Second-stage	Second-stage	Second-stage
	Family management	Performance	Performance	Performance	Performance
Average TMTsize	−0.084***				
	[0.015]				
PredictAverage TMTsize		−0.934**	−0.888**	−0.848**	−0.812**
		[0.402]	[0.402]	[0.401]	[0.401]
Family Management		0.314***	0.274***	0.300***	0.257**
		[0.097]	[0.100]	[0.097]	[0.100]
Family Management ²		−0.307**	−0.227	−0.292**	−0.201
		[0.141]	[0.152]	[0.141]	[0.153]
Family Management × Firm Size			−0.100**		−0.090**
			[0.042]		[0.042]
Family Management ² × Firm Size			0.240**		0.245**
			[0.108]		[0.111]
Family Management × Firm Age				−0.487***	−0.480***
				[0.122]	[0.123]
Family Management ² × Firm Age				0.686*	0.798**
				[0.394]	[0.407]
Firm Size	−0.000	−0.008	−0.019*	−0.005	−0.015
	[0.005]	[0.010]	[0.011]	[0.010]	[0.011]
Firm Age	0.024**	0.026	0.025	0.028	0.025
	[0.011]	[0.027]	[0.027]	[0.028]	[0.028]
High Tech	−0.002	0.008	0.009	0.004	0.005
	[0.010]	[0.022]	[0.022]	[0.022]	[0.022]
Independent	−0.064	−0.267*	−0.292**	−0.307**	−0.329**
	[0.060]	[0.137]	[0.138]	[0.137]	[0.138]
Duality	0.082***	0.044	0.040	0.038	0.034
	[0.006]	[0.035]	[0.035]	[0.035]	[0.035]
Family Board	0.452***	0.423**	0.406**	0.391**	0.378**
	[0.033]	[0.192]	[0.192]	[0.191]	[0.191]
Succession	0.019**	0.004	0.002	0.005	0.003
	[0.008]	[0.019]	[0.019]	[0.019]	[0.019]
Asset	−0.001	−0.001	−0.001	−0.001	−0.000
	[0.002]	[0.004]	[0.004]	[0.004]	[0.004]
Beta	0.009	−0.019	−0.021	−0.016	−0.019
	[0.009]	[0.020]	[0.020]	[0.020]	[0.020]
Equity Concentration	0.023	0.115*	0.124*	0.107*	0.115*
	[0.028]	[0.064]	[0.064]	[0.063]	[0.064]
FM Age	−0.003***	−0.002	−0.002	−0.002	−0.002
	[0.001]	[0.002]	[0.002]	[0.002]	[0.002]
FM Edu	−0.000	0.001	0.001	−0.001	−0.001
	[0.007]	[0.015]	[0.015]	[0.015]	[0.015]
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
_cons	0.292***	0.261	0.502*	0.192	0.434
	[0.112]	[0.262]	[0.278]	[0.262]	[0.280]
adj. R ²	0.065	0.187	0.188	0.192	0.193
N	2,877	2,877	2,877	2,877	2,877

* $p < 0.1$; ** $p < 0.05$; and *** $p < 0.01$. Standard errors in brackets.

TABLE 7 Robustness test: alternative measure of dependent variable.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
	Performance 2	Performance 2	Performance 2	Performance 2	Performance 2
Family Management		0.247**	0.256**	0.241**	0.251**
		[0.098]	[0.100]	[0.097]	[0.100]
Family Management ²		−0.287**	−0.261*	−0.283*	−0.257*
		[0.146]	[0.149]	[0.146]	[0.149]
Family Management × Firm Size			−0.030		−0.027
			[0.060]		[0.060]
Family Management ² × Firm Size			0.998***		0.948***
			[0.364]		[0.365]
Family Management × Firm Age				−0.266**	−0.258**
				[0.127]	[0.129]
Family Management ² × Firm Age				0.235	0.195
				[0.412]	[0.417]
Firm Age	−0.035***	−0.035***	−0.050***	−0.033***	−0.048***
	[0.010]	[0.010]	[0.012]	[0.010]	[0.012]
Firm Size	0.018	0.016	0.015	0.022	0.021
	[0.026]	[0.026]	[0.026]	[0.027]	[0.028]
High Tech	0.004	0.003	0.003	0.001	0.002
	[0.023]	[0.023]	[0.023]	[0.023]	[0.023]
Independent	−0.306**	−0.319**	−0.294**	−0.343**	−0.319**
	[0.142]	[0.142]	[0.143]	[0.142]	[0.143]
Duality	−0.033**	−0.044***	−0.044***	−0.044***	−0.044***
	[0.015]	[0.015]	[0.016]	[0.015]	[0.016]
Succession	−0.024	−0.028	−0.027	−0.027	−0.026
	[0.018]	[0.018]	[0.019]	[0.018]	[0.019]
Asset	−0.004	−0.004	−0.004	−0.003	−0.004
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
Beta	−0.010	−0.013	−0.011	−0.012	−0.009
	[0.020]	[0.020]	[0.021]	[0.020]	[0.021]
Equity	0.125*	0.130**	0.086	0.127*	0.083
	[0.065]	[0.065]	[0.066]	[0.065]	[0.066]
FM Age	0.000	0.000	0.001	0.000	0.001
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
FM Edu	−0.020	−0.019	−0.019	−0.020	−0.020
	[0.016]	[0.016]	[0.016]	[0.016]	[0.016]
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
_cons	0.680***	0.664**	0.947***	0.632**	0.899***
	[0.258]	[0.258]	[0.281]	[0.259]	[0.282]
adj. R ²	0.451	0.452	0.443	0.453	0.444
N	2,877	2,877	2,877	2,877	2,877

* $p < 0.1$; ** $p < 0.05$; and *** $p < 0.01$. Standard errors in brackets.

dynamic relationship between economic and non-economic goals in Chinese family firms. Previous research has often assumed that family firms exhibit an “either-or” relationship in pursuing these goals, implying that increasing one may come at the expense of the other. However, our study reveals that these two types of goals can initially promote each other, evolving from “symbiosis” to “competition.” This

TABLE 8 Additional analysis: the pandemic period (year 2020–2023).

Variables	Year: 2020–2023				
	Model 1	Model 2	Model 3	Model 4	Model 5
	Performance	Performance	Performance	Performance	Performance
Family Management		−0.351***	−0.282**	−0.345***	−0.281**
		[0.130]	[0.132]	[0.131]	[0.133]
Family Management × Firm Size			0.214**		0.211**
			[0.086]		[0.087]
Family Management × Firm Age				0.450	0.176
				[0.697]	[0.703]
Firm Size	0.030	0.025	0.028	0.025	0.028
	[0.025]	[0.025]	[0.025]	[0.025]	[0.025]
Firm Age	0.428	0.348	0.262	0.341	0.261
	[0.650]	[0.647]	[0.645]	[0.647]	[0.645]
High Tech	−0.009	−0.026	−0.016	−0.028	−0.017
	[0.190]	[0.189]	[0.188]	[0.189]	[0.188]
Independent	−0.243	−0.241	−0.334	−0.251	−0.336
	[0.272]	[0.270]	[0.271]	[0.271]	[0.272]
Duality	−0.022	−0.001	−0.003	−0.003	−0.004
	[0.035]	[0.036]	[0.035]	[0.036]	[0.035]
Succession	0.014	0.020	0.010	0.018	0.009
	[0.038]	[0.038]	[0.038]	[0.038]	[0.038]
Asset	−0.090	−0.094	−0.092	−0.097	−0.093
	[0.123]	[0.122]	[0.121]	[0.122]	[0.122]
BETA	0.034	0.026	0.025	0.025	0.025
	[0.028]	[0.028]	[0.028]	[0.028]	[0.028]
Equity	0.007	−0.003	−0.004	−0.002	−0.003
	[0.053]	[0.053]	[0.052]	[0.053]	[0.053]
FM Age	2.256	1.045	1.182	0.973	1.151
	[4.304]	[4.302]	[4.282]	[4.306]	[4.288]
FM Edu	0.000	0.000	0.000	0.001	0.001
	[0.015]	[0.015]	[0.015]	[0.015]	[0.016]
Year	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
_cons	−10.716	−5.551	−5.865	−5.236	−5.736
	[16.962]	[16.973]	[16.892]	[16.989]	[16.915]
adj. R ²	0.405	0.389	0.375	0.390	0.378
N	778	778	778	778	778

* $p < 0.1$; ** $p < 0.05$; and *** $p < 0.01$. Standard errors in brackets.

indicates that family firms’ goal pursuit reflects a multi-dimensional interactive relationship.

Second, for cross-cultural implications, our study’s focus on Chinese family firms, where Confucian values profoundly shape the pursuit of both economic and non-economic goals, raises important questions regarding the generalizability of these findings to other cultural contexts. While [Gomez-Mejia et al. \(2024\)](#) highlight the SEW-intensive and SEW-sensitive nature of family firms in Latin America and the Caribbean (LAC), our

findings reveal similar dynamics in China, where cultural values such as Confucian familism, loyalty and long-term orientation shape SEW preservation. By linking these insights to Chinese cultural patterns, we not only enrich the SEW discourse but also pave the way for cross-regional comparative research, and responding to [Gomez-Mejia et al.’s \(2024\)](#) call to extend SEW findings beyond LAC to regions like Africa and Asia, linking our analysis to Chinese cultural patterns and offering a globally relevant perspective.

Finally, our study advances the family business literature by clarifying the dynamics of goal balancing in family firms across stable and crisis contexts. By analyzing the 2009–2019 period, we establish a robust baseline for understanding how family firms balance economic and non-economic goals under the long-term stable conditions, revealing consistent strategic patterns. A supplementary analysis of the 2020–2023 pandemic period enriches this framework by showing how extreme exogenous shocks intensify goal-driven trade-offs, such as prioritizing family control over firm performance. This dual-context approach bridges normative and crisis-driven behaviors, providing a nuanced theoretical lens to explore the resilience and vulnerabilities of family firms in turbulent environments.

7.3 Limitations and future research

Although this study offers important insights, limitations exist. First, given that non-economic goals in family firms are a multi-dimensional concept, due to data availability and the limitations of current research progress, this paper only considers family management and family board as the representative of non-economic goals, which may be somewhat one-sided. In future research, we will attempt to examine other dimensions of non-economic goals.

Second, the research conclusion primarily come from a sample of listed companies. Thus, caution should be exercised when generalizing these findings to smaller family firms. Compared to small and medium-sized non-listed companies, listed companies are generally larger in scale and more aligned with modern corporate governance practices. Consequently, large listed companies differ in goal selection and balancing multiple goals relative to small and medium-sized enterprises. Thus, the goal pursuits and balancing strategies of numerous non-listed family firms in China, particularly small and medium-sized enterprises, warrant further investigation.

Data availability statement

Publicly available datasets were analyzed in this study. This data can be found at: <https://data.csmar.com/>.

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Interpersonal and intrapersonal leadership competencies: an interpretative phenomenological analysis on effective leadership strategies

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Introduction: In today's dynamic business environment, unforeseen challenges have become increasingly prevalent as markets evolve. Effective leadership is critical to organizational success, requiring leaders who can efficiently manage both their tasks and employees. Thus, it is valuable to explore and identify competencies possessed by competent leaders.

Methods: The study utilized an Interpretative Phenomenological Analysis (IPA) approach to have a detailed exploration of the strategies and practices leaders find most effective in navigating complex organizational challenges, such as strategy adoption, teamwork improvement, client relationship management, ethical decision-making, and industry adaptation. Purposive sampling was used to select five Filipino organizational leaders from diverse industries. The small yet varied sample allowed for an in-depth analysis of personal experiences while ensuring that the findings resonate broadly within the Philippine organizational context. Data collection involved in-depth, semi-structured interviews conducted via Microsoft Teams. The interviews were transcribed, coded, and thematically analyzed in accordance with IPA guidelines.

Results and discussion: Competencies were categorized under the five competency areas, with further exploration of interpersonal and intrapersonal impacts. The iterative analysis revealed recurring competencies across all areas. Intrapersonal competencies included personal growth through change, leadership through vision and resilience, continuous learning, innovative thinking and openness, and resilience in personal challenges. Meanwhile, interpersonal competencies included collective innovation, effective communication, transformative client engagement, empathetic conflict resolution, and building adaptive teams. These enabled leaders to maintain their competence in navigating organizational challenges, including the pandemic, technological advancements, and evolving workforce dynamics. These findings suggest that effective leadership operates on both individual and interpersonal levels. Leaders' internal processes significantly influence their relationships and interactions. Resilient leaders stabilize teams during crises, while a commitment to continuous learning fosters innovation and collaboration. Strong communication skills promote knowledge sharing and strengthen relationships with clients, subordinates, and stakeholders. Empathetic leadership reduces stress and conflict, creating healthier work environments. Finally, leaders' motivation and dedication inspire

team transformation and adaptability. Thus, these leadership competencies are instrumental in sustaining a competitive edge and driving organizational growth amidst a dynamic business environment.

KEYWORDS

effective leader, interpersonal competency, intrapersonal competency, interpretative phenomenological analysis, organizational leadership

1 Introduction

Effective leadership, motivated by strong interpersonal and intrapersonal competence, is crucial for organizational success. Organizational leadership involves guiding members toward shared goals and supporting them through challenges and growth (Saeidi et al., 2021). Interpersonal competence is the ability of leaders to achieve team and personal goals while maintaining positive relationships with the members (Shek and Lin, 2015). In the same study, intrapersonal competence encompasses a leader's internal processes and internalization of high-performance standards. Effective leadership requires a balance of interpersonal and intrapersonal skills to drive team performance and organizational success.

Although widely discussed, the application of these competencies in the Philippine context remains unexplored. Examining further how Filipino leaders apply them in real-world settings could help researchers gain insights into navigating key aspects of their organizational leadership roles by addressing the following questions:

- 1 How do leaders experience and interpret the process of adopting new strategies within their departments?
- 2 How do leaders perceive and describe their efforts to enhance teamwork quality?
- 3 What are the lived experiences of leaders in building and maintaining strong client relationships, and how do they handle the termination of these relationships?
- 4 How do leaders experience and navigate ethical dilemmas in their decision-making processes?
- 5 How do leaders adapt to changing industry environments, and what strategies do they find compelling in managing these changes?

Although global literature offers insights into leadership competencies, it remains primarily grounded in Western, industrialized contexts. Highlighting universal principles, it often overlooks how culturally distinct environments shape leadership competencies. As leadership is not culturally neutral, one practice may be effective in a particular country but inappropriate in another (Vander Pal and Ko, 2014). This gap underscores the need to explore leadership within non-Western, developing contexts.

Leadership development improves when supervisors support autonomy by encouraging choice, recognizing emotions, and avoiding coercion, leading even lower-ranking employees to feel more empowered and self-directed (Slemp et al., 2018). In contrast, many Filipino organizations use top-down decisions, limiting employee's autonomy (Mapoy et al., 2021). This dynamic is often rooted in local cultural norms that favor discipline, hierarchy, and indirect communication.

Furthermore, as a developing country, the Philippines faces structural challenges in leadership development, including limited

access to comprehensive training programs (Jordan, 2024). Cultural values also influence how leaders resolve conflict, communicate, and make decisions. In collectivistic societies such as the Philippines (Datu and Reyes, 2015), indirect strategies like silent resistance, going through intermediaries, or waiting for tensions to subside are often seen not as weaknesses but as culturally appropriate and practical approaches to maintaining group harmony (Vander Pal and Ko, 2014).

The rise of global leadership highlights cultural distinctions that shape organizational practices. Given these gaps, it becomes imperative to examine how Filipino leaders apply competencies such as strategy adoption, teamwork quality, client relationship management, ethical decision-making, and industry adaptation, as it is often overlooked in a universal context. This study examines how they navigate interpersonal and intrapersonal competencies in the context of real-world, culturally embedded organizational challenges.

2 Literature review

The first key leadership area is strategy adoption. Leaders implement new strategies and guide teams through change. Hussain et al. (2018) identified leadership, employee involvement, and knowledge sharing as key change factors. During transitions, leaders must offer support, incentives, and clear guidance (Hussain et al., 2018, as cited in Musaigwa, 2023). Communication should explain role impacts, align with company values, clarify goals, and outline resources (Yue et al., 2020). Adaptable leaders foster innovation, learning, and team effectiveness amid constant change (Stehnkuhl, 2024).

Secondly, teamwork quality is another key area of responsibility for a leader. Leaders foster strong team dynamics by resolving internal and external issues (Zhao et al., 2022). Effective teamwork involves collaboration, idea exchange, and mutual support (Fathin and Raharjo, 2023). Building trust and harmonious communication is essential (Luca and Tarricone, 2002, as cited in Dhurup et al., 2016). Ethical behavior, leadership, communication, teamwork skills, and emotional intelligence are crucial for managing relationships and promoting positive dynamics (Mercader et al., 2021; Eva et al., 2024; Kasrah et al., 2024). This competence boosts productivity and success.

The third key area emphasizes leaders' proficiency in cultivating robust client relationships while steering teams toward strategic objectives. Client relationship management involves building and maintaining relationships to create value for both client and business (Boljanovic and Stankovic, 2012, as cited in Oksana, 2018). Understanding client needs and the manager's role is essential (Tahan, 2018). Competencies like emotional intelligence, leadership performance, and teamwork predict client satisfaction (Adu, 2020). This requires empathy, strong leadership, and strategic customer knowledge management.

The fourth key area is a leader's ability to navigate ethical challenges while serving as a role model (Ko et al., 2018). Ethical decision-making is a core of effective leadership. Ethical leaders, with moral awareness and an employee-focused approach, foster ethical workplaces (Touma, 2022). This promotes employee growth through interpersonal justice and clear rules (Rahaman et al., 2021). They also self-regulate, maintain integrity, and cope using intrapersonal skills (Merlin and Soubramanian, 2024). Ethical decision-making remains essential in evaluating leadership.

Lastly, industry adaptation assesses leaders' ability to adjust to changes from the pandemic and technological advances (Goniewicz and Hertelendy, 2023). Stefan and Nazarov (2020) emphasized considering work schedules, team dynamics, health, and job requirements when assigning tasks. Transformational leadership supports change and employee training (Faupel and Süß, 2019). Interpersonal and intrapersonal competencies help leaders manage stress, build diverse teams, and foster taking a team perspective (Schulze and Pinkow, 2020; Marbun, 2021). These studies show the importance of leaders' adaptability when dealing with changes.

Recent research in the Philippine service industry highlights the importance of leadership competencies in managing a multigenerational workforce and fostering motivation and positive culture (Kurata et al., 2022). Hamilton and Kuchinka (2022) found Filipino-American leaders balance assertiveness with traditional values, a skill essential for strategy adoption. These findings underscore adaptability's role in responding to organizational and industry changes.

Filipino leaders now prioritize relationship-building and harmonious workplaces, especially in multicultural settings, to build long-term client ties (Dequilla et al., 2023). Ethical leadership balances goals with employee wellbeing and trust (Lantican, 2020). Digital transformation reshapes leadership as technology enhances operations and customer experience, a shift accelerated by COVID-19 (Caringal-Go et al., 2024). Agile leadership, with decentralized decision-making, also improves efficiency and responsiveness (Luningning, 2023).

In sum, the cited studies underscore the multifaceted nature of leadership competencies, which are applicable in the modern dynamics and culture of a diverse work environment. Across all five key areas, both interpersonal and intrapersonal competencies are necessary. Effective leadership requires adaptability, ethical integrity, cultural sensitivity, and strong relationship-building to manage change and drive organizational success.

3 Materials and methods

Over the years, scholars have tried to develop numerous ideas to explain what constitutes effective leadership, thus, becomes central to the inquiry process of the researchers of this study. Leadership is not merely a set of overarching overt set of behaviors, as cited by Miller and Sardais (2011), it includes an interplay of interpersonal dynamics, individual cognitive processes, personality differences, and the subjective meaning individuals ascribe to their personal experiences. Therefore, studying leadership, as seen from the studies conducted by Arda et al. (2016), necessitates a research approach that can capture the intricate layers of human experience, revealing the full complexity of it must be supported by a methodological approach that can see the subtle nuances of leadership styles (Safonov et al., 2018).

Interpretative Phenomenological Analysis (IPA) was chosen for this research because it offers a robust framework to explore how individuals make sense of their personal and professional experiences. The works of Arda et al. (2016) and Safonov et al. (2018) support the need for qualitative methods that can reveal the depth and subtlety of leadership as experienced by those in leadership roles. IPA aligns with this objective by placing the individual's perspective at the center of inquiry. Central to the IPA approach is its focus on exploring in-depth analysis of one's individual lived experiences, making it highly distinguished among other qualitative methods. This triadic framework enables researchers to analyze the internal processes behind overt leadership skills. IPA allows the researchers to convey participants' own understanding of their competencies and contextually grounding their experiences without fixing it in a static construct. This method also supports a more humanistic and dynamic approach of leadership skills rather than treating it as mere objective variables.

In addition, the robust framework of IPA provides an avenue to explore the rich contribution of the combined ideas of phenomenology, idiography and the dualistic hermeneutics that converge into a rich tapestry of human experiences. It also empowers the researchers to gain traction of profound insights of the participants, especially how leaders interpret their own experiences and make sense of the unique interaction within their department, as they acknowledge a multifaceted leadership styles that happen within could also be transcendental looking from inside to outside perspective. To add, given that both interpersonal and intrapersonal dynamics in an organization, are greatly anchored in the individual's perceptions and subjective interpretations, the said approach makes it a powerful lens to explore different enacted facets in leadership, such as, communication, empathy, conflict resolution and even one's views about the uniqueness of any given organizational culture.

3.1 Sample

Since IPA is a rigorous and in-depth qualitative methodology, its implementation requires specific strategies as recommended by Smith et al. (2009). One of these is the use of a small sample size—typically fewer than 10 participants—to allow the researcher to deeply engage with each individual's experience on a case-by-case basis (Pietkiewicz and Smith, 2014). Given IPA's idiographic nature, a smaller sample ensures that each participant's voice is clearly represented within the study.

As stated in the introduction of the methodology section, leadership is a complex and multifaceted phenomenon. It cannot be reduced to a singular leadership style, as it involves internal cognitive processes, interpersonal dynamics, organizational culture, and broader sociocultural contexts. The temporal dimension—when and in what context leadership experiences occurred—also plays a crucial role. Due to these layers, the analysis must be deep and detailed for each individual. Therefore, our research aligns with Noon's (2018) study, which also involved only five interviewees to avoid data overload. This approach enabled the researcher to focus exclusively on each participant and thoroughly explore their internal, relational, cultural, temporal, and organizational contexts.

This does not suggest, however, that our dataset lacked variability. As Tracy (2020) emphasized, the quality of qualitative research is not solely determined by the sample size but also by the relevance and diversity of the participants. In line with the recommendations of

Tracy (2020) and Subedi (2021), while all participants in this study shared the common experience of being organizational leaders, they were selected from varied functions and domains. Though all were employed by the same company, the organization's diverse service offerings allowed the study to draw from two distinct industries: industrial assessment services and business consulting.

During participant recruitment, the researchers reached out via email to organizational leaders within the company. The participants represented various functional areas, including sales, human resources, assessment services, administrative services, business development, quality assurance, and business consulting. Only departments with individuals who gave informed consent were included, ensuring that participants were willing to offer genuine insights aligned with the study's goals.

Since these participants came from different fields and industries, they were able to provide diverse insights shaped by their unique work contexts and demands. While all participants experienced similar leadership challenges—such as persuading subordinates, enhancing teamwork, managing client relationships, navigating ethical decisions, and adapting to industry changes—the nuances of how these challenges were encountered differed depending on their specific context.

As supported by Chan (2010), leadership development is shaped more by the reflective processing of experience than by mere tenure. Although this study included only those with at least 2 years of accumulated supervisory or managerial experience, the focus remained on capturing the depth of each leader's reflections rather than quantifying experience by years alone.

In sum, this sampling approach enabled the researchers to explore participants' leadership strategies in depth, while also investigating the internal, relational, organizational, and cultural dynamics surrounding these strategies. This allowed IPA to be fully utilized in providing rich, nuanced, and contextualized interpretations of each participant's lived experience (Brocki and Wearden, 2006). This purposive sampling, therefore, captures the complexity of leadership experiences and ensures that the insights gathered resonate broadly within the Filipino organizational landscape, reinforcing the study's contribution to the field of leadership competencies.

3.2 Researchers' characteristics and reflexivity

The researchers, employed as licensed psychometricians and psychologists in a company that develops standardized industrial assessments, possess prior knowledge of leadership competencies through literature reviews conducted during the development of tools for supervisory and managerial roles.

For practical reasons, participants were selected from the same organization. As a result, a degree of professional familiarity existed. The researchers were aware of the participants' roles, designations, and functions within the company, including identifying the department heads and understanding the organizational culture. However, this familiarity did not involve direct engagement, supervision, or personal relationships. The researchers had no close interpersonal ties with participants; the interaction remained neutral and professional.

To further mitigate bias and ensure consistency, only one researcher, who also served as the interviewer and primary reviewer

of data, interacted directly with participants throughout the entire data collection and member checking process. This helped maintain uniformity in how questions were asked, how responses were followed up, and how clarifications were sought. The rest of the research team deliberately limited their contact with the participants and were assigned to review data from individuals with whom they had no personal connection, reinforcing neutrality.

This professional familiarity proved advantageous as it facilitated smoother recruitment, quicker management approval, and increased participant cooperation (Berger, 2015), without compromising objectivity or introducing bias. Furthermore, the researchers' contextual understanding of internal policies and leadership practices facilitated the accurate interpretation of participant narratives. The familiarity also supported rapport-building and effective communication, which are essential components in any form of qualitative interviewing (Roiha and Iikkanen, 2022, as cited in Roiha et al., 2024), but only to the extent of encouraging open and comfortable dialogue.

This dynamic, while aiding in the richness of responses, remained strictly within professional boundaries. As such, this alignment with IPA's principles enabled the collection of rich, contextualized testimonies while upholding methodological integrity.

3.3 Ethical consideration

As part of research ethics, an informed consent form was provided to participants several days before the interviews. The form, seen in Appendix, detailed the study's purpose, procedures, potential risks, benefits, and data confidentiality measures. Participants were informed the interviews aimed to explore leadership experiences to develop a leadership skills assessment tool.

Those who agreed to take part were asked to sign a consent form and were provided with interview questions in advance. Although the study followed an IPA approach, the questions were shared beforehand to promote transparency, reduce potential anxiety, and allow participants to reflect more deeply on their experiences. This preparatory step helped ensure participant comfort and richer responses, without compromising the flexibility of the interview process, as follow-up questions and the exploration of emergent themes remained integral to the IPA methodology.

3.4 Data gathering

The study employed in-depth, semi-structured interviews, deliberately chosen to align with its objectives and IPA, which aims to explore participants' testimonies in depth. With interviews, researchers are able to facilitate participants to reflect on their experiences as organizational leaders (Smith et al., 2009). Since the participants were employed in the same company as the researchers, a one-on-one interview approach was chosen when designing the interview schedule. Group interviews were deemed inappropriate, as participants might feel uncomfortable discussing personal workplace experiences in the presence of colleagues. Following Noon's (2018) recommendation, the interviews were conducted privately via Microsoft Teams, with only the participant and the sole interviewer present. This setup ensured confidentiality and created a safe space for participants to share openly, without fear of judgment or potential repercussions from management.

As a result, the researcher was able to establish rapport and facilitate the elicitation of more intimate, in-depth accounts, with the focus solely on the individual being interviewed.

To minimize bias and ensure consistency in data collection, the researchers developed a structured interview protocol. While IPA traditionally emphasizes open exploration of lived experiences, the inclusion of five pre-identified leadership competencies was intentional and strategic. Drawn from prior empirical studies and theoretical frameworks, these competencies served as an anchor to guide the interviews toward areas directly relevant to the research questions. Similar to Noon's (2018) and Smith's (2015) funneling technique, this approach allowed the interviews to maintain a clear focus on competencies vital for organizational leadership while still providing space for participants to share individual experiences and introduce emergent themes beyond the predefined structure. The interview questions were carefully crafted to align with this competency framework and to elicit rich, experiential insights into the interpersonal and intrapersonal aspects of leadership. The following questions in Table 1 served as the core focus of the Main Interview.

3.5 Validity and reliability

Since the researchers had a degree of professional familiarity with the participants, multiple strategies were employed to minimize bias and ensure the validity and reliability of the data. Given that IPA, both the researcher and participant aim to make sense of the participant's lived experience, it is essential to maintain transparent documentation of the analytical decision-making process. Following the recommendation of Smith et al. (2009), the researchers utilized an Excel-based audit trail and reflective journal to capture their evolving interpretations and decisions throughout the analysis.

This file was regularly revisited, allowing the researchers to re-read interview transcripts alongside their reflective entries. This

practice ensured that interpretations remained closely grounded in the participants' actual responses, supporting a dynamic and iterative approach to theme development.

The audit trail also played a central role in investigator triangulation (Carter et al., 2014), as seen in Figure 1. The researchers served as each other's reviewers. The primary reviewer, who conducted all the interviews, produced the first round of analyses. The secondary reviewers then cross-checked the transcripts, conducted their independent analyses of the recordings, and compared findings. An expert review was conducted by a licensed psychologist, who then evaluated the results of the initial analysis. The use of the audit trail enabled the researchers to trace the development of themes at any stage of the process, ensuring methodological rigor and transparency.

A focus group discussion (FGD) was also conducted to identify and reflect on potential personal biases or assumptions that may have influenced the interpretations. This session provided a structured opportunity for the research team to discuss their thought processes, align thematic insights, and collaboratively refine the findings.

Lastly, member checking was integral to the process (Dimler et al., 2017). Participants were re-invited to review the preliminary findings, during which they were presented with verbatim transcriptions alongside the researchers' initial analyses to confirm accuracy and determine whether the interpretations genuinely reflected their lived experiences.

In summary, this approach established a systematic process of participant and peer triangulation, allowing the researchers to accurately capture the participants' perspectives while continuously refining the emerging themes, thus ensuring reliability and validity of the research.

3.6 Data analysis

The data analysis employed in this study followed a multiperspective, group-level IPA (Larkin et al., 2019). While

TABLE 1 Core interview questions and their objectives.

Interview question	Justification
Think of a time when you had to fix an internal issue regarding your department's teamwork quality. What is a good strategy for this? What are the things that should be avoided when handling this?	The first question, "Strategy Adoption," explores leaders' persuasive abilities and approaches to implementing strategies. By examining effective and ineffective methods, this question sheds light on leaders' capacities to secure departmental alignment with strategic goals.
Think of a time when you had to convince your department to go with your strategy. What is a good way to handle this? What is a bad way to go about this?	In examining Teamwork Quality, the second question delves into how leaders resolve internal team issues. This question emphasizes problem-solving and collaboration skills, focusing on the interpersonal competencies necessary for fostering a cohesive team dynamic while identifying commonly encountered challenges.
Think of a time when you had to maintain a good relationship with a customer. How do you ensure their loyalty as the company's client? Was there a time when a relationship with a client was terminated?	The third question concerns Client Relationship Management, targeting the interpersonal and emotional intelligence skills that leaders employ to build and sustain client loyalty. This question provides a nuanced view of how leaders manage client interactions and loyalty by including scenarios involving sustained and terminated client relationships.
Think of a time when you faced a dilemma choosing between an ethical solution and a more practical solution. How did you handle this?	The fourth question, aligned with Ethical Decision-Making, explores leaders' approaches to navigating ethical dilemmas where practical solutions may conflict with ethical standards. This question allows insights into leaders' moral reasoning and integrity as they balance organizational goals with ethical principles.
Think of a time when you had to deal with the changing environment of your business' industry. How did you address this?	Lastly, Industry Adaptation is assessed through a question that investigates leaders' responses to industry changes. This question highlights adaptive competencies such as flexibility, resilience, and strategic thinking, providing a view into how leaders navigate and manage their industry's evolving demands.

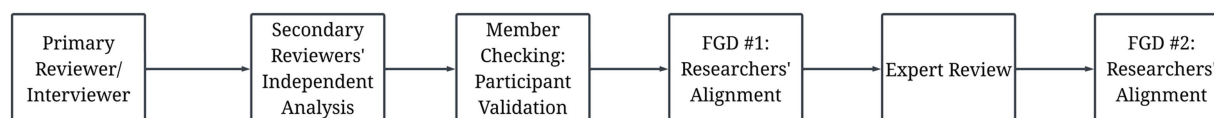


FIGURE 1
Triangulation process.

grounded in the core principles of IPA (Smith et al., 2009), the approach also considered shared experiences across participants, as seen in Table 2.

The first analysis of the raw qualitative data involved collaboration between the primary reviewer/interviewer and the secondary reviewers. The process began with data familiarization, where the primary reviewer independently transcribed the interviews and performed an independent analysis, focusing on the specific competencies each participant demonstrated in across five key areas of leadership experience. The transcripts and audit trail were then shared with the secondary reviewers, who reviewed the primary reviewer/interviewer's analysis and carried out their own independent evaluation of the data.

Each reviewer conducted a line-by-line analysis of participant responses, focusing on descriptive, linguistic, and conceptual elements, as seen in Table 3. Particular attention was given to each participant's unique experiences and the competencies demonstrated in persuading subordinates, fostering team collaboration, managing client relationships, making ethical decisions, and adapting to industry changes. This individual-level analysis captured the nuances of how each participant exhibited intrapersonal and interpersonal competencies, focusing on how each participant uniquely approached these leadership challenges.

Subsequently, a member checking process was conducted. The primary reviewer/interviewer facilitated this step to maintain consistency in interactions among all participants. Participants were encouraged to correct or clarify the researchers' interpretations, and any adjustments were noted in an Excel tracking table to reflect revised understandings. This helped deepen the researchers' insight into each participant's context and experience.

To further reduce bias and ensure analytical validity, an FGD among all the researchers was held to evaluate the outcomes of both the first analysis and feedback from the member checking.

The second analysis followed, in which an expert reviewer evaluated the themes, and identified recurring patterns across participants' experiences in the five key leadership areas. A cross-case thematization followed, comparing similarities and differences in participants' experiences to refine the prominent intrapersonal and interpersonal themes further. This process resulted in the identification of five core intrapersonal and five core interpersonal themes. Importantly, competencies exhibited by even a single participant were not excluded; thus, diversity in expression was preserved. This acknowledges that while patterns existed, each participant enacted competencies in contextually unique ways. A second FGD was subsequently conducted to review and discuss the final themes, ensuring alignment and credibility.

Overall, the analytic process moved from an idiographic focus on individual lived experiences, such as how each participant persuaded subordinates or adapted to industry shifts, to a group-level synthesis

that uncovered convergences and divergences in leadership approaches across different contexts of the participants. This outward analytic movement enabled a nuanced understanding of how interpersonal and intrapersonal competencies intersect in practice, ultimately providing a rich, interpretive account that honors both the multiplicity and shared meaning within participants' lived experiences.

4 Results

The researchers initially conducted an analysis to gather insights from the five participants on strategies they would use to effectively address or prevent common challenges within their departments. This analysis focused on five key areas: strategy adoption, teamwork quality, client relationship management, ethical decision-making, and industry adaptation. The subsequent sections explore the themes identified in each key area.

4.1 Strategy adoption

Participants reflected on how they led their teams in the process of Strategy Adoption, revealing a range of leadership competencies that helped minimize resistance to change. Each leader demonstrated distinct approaches, shaped by their personal leadership styles and the specific contexts in which they operated. P2 adopted a firm, directive approach, particularly in the face of resistance. "You have to accept that this is what we will use... I deleted the Excel so they would not revert to it," they explained, demonstrating a non-negotiable stance that reinforced commitment to the new system. Their leadership relied on structure, boundary-setting, and decisive enforcement to guide the team through transition. In contrast, P1 influenced change through trust rather than authority: "I'm not a pushover. They will do it not because I'm a manager, but because I feel like they trust me." Grounded in relational credibility, P1 fostered voluntary alignment by building strong interpersonal connections. While both leaders were intentional in setting expectations, P2 emphasized structural clarity, whereas P1 drew strength from interpersonal trust. Despite their differing styles, both approaches ultimately led to effective Conflict Resolution and Negotiation during strategy implementation.

P3 highlighted the importance of participative decision-making: "I relay the information to my team because I need their buy-in. Once they say 'yes,' it means we are accepting the responsibility." Similarly, P4 stressed the role of trust in securing team alignment, noting, "One of the best practices to get their buy-in is you have to build their trust." While both prioritized engagements, their methods diverged—P3 fostered alignment through shared decisions, while P4 emphasized long-term commitment through relational trust. Together, their

TABLE 2 Step-by-step IPA procedure.

Step number	Process	Description	Source
Step 1. Reading and re-reading	Reviewers immerse themselves in the raw data to accurately interpret the participants' experiences.	The primary reviewer/interviewer transcribed the interviews in Microsoft Word, capturing verbatim responses and notable nonverbal cues such as laughter. Once completed, secondary reviewers cross-checked the transcriptions against the recordings to ensure accuracy and consistency.	Smith et al. (2009)
Step 2. Initial noting	Condense the words in a transcript		
	Descriptive comments	Reviewers outlined the experience antecedents, the participant's behavior, and the resulting consequences.	
	Linguistic comments	Reviewers took note of specific language patterns and nonverbal cues, such as the interchange between "I" and "we," as well as the use of fillers like "uhms" and instances of laughter.	
	Conceptual comments	Reviewers identified and described the leadership strategy demonstrated by the participant.	
Step 3. Developing emergent themes		The primary reviewer identified the general competencies applied and how they were used in each participant's unique experience. The secondary reviewers refined this by specifying the intrapersonal and interpersonal competencies demonstrated, along with their impacts.	
Step 4. Searching for connections across emergent themes	Abstraction: an analytic process where emerging themes were clustered with other similar themes.	Excel was used to create a visual map of the emergent themes, which helped identify the superordinate themes. In this case, many themes clustered around the contexts of Strategy Adoption, Teamwork Quality, Client Relationship Management, Ethical Decision-Making, and Industry Adaptation.	
Step 5. Moving to the next case	Steps 1 to 4 were repeated individually for each participant.		
Step 6. Looking for patterns across cases	a. Identifying paths of meaning: where participants had similar experiences but interpreted them differently, or shared similar meanings despite differing experiences.	The secondary reviewers identified patterns across participant narratives: 1. All participants experienced the five key areas, but interpreted them in different ways. 2. Some had similar experiences but used different strategies. 3. Others applied the same strategy in different contexts, based on their interpretations.	Larkin et al. (2019)
	b. Cross-case thematization	The expert reviewer examined the Excel files containing the audit trail and visual mapping, and analyzed patterns and themes across all participant cases and identified overarching insights.	
	c. Subsumption: an analytic process where an emergent theme becomes a superordinate theme.	The expert identified the overarching interpersonal and intrapersonal competencies that emerged across all participants and the five key areas.	Smith et al. (2009)

TABLE 3 Sample IPA coding process.

Transcript	Descriptive	Linguistic	Conceptual/Interpretative
P2: Sometimes, people even stop talking to each other in the office. So it becomes quite difficult. But the good thing is, we are all old enough—we are mature enough to know better. Interviewer: Right.	Acting as a mediator when two employees are in a conflict. Asking for suggestions from both sides to determine how to move forward.	Deliberate choice of words in using “you” to emphasize that the subordinate caused the problem yet using “our” to emphasize that both the participant and their subordinate were accountable in resolving the situation.	‘What is our problem?’, What do you want to happen?’ • Demonstrates self-awareness and perspective-taking—choosing to frame the issue as “our” rather than “your” problem. This reflects an internal value of fairness and relational insight.
P2: It’s part of being a worker or an employee. So I talked to the other person and asked, “What is our problem?” “What do you want to happen?” “What are your suggestions?” Because that’s how I handle things when I see a problem. I ask, “What’s your suggestion?” I don’t start by saying, “This is what you should do.” <i>You gave me a problem—give me a solution. [laughs]</i> “You caused this problem, so help me resolve it. But let me hear you first.”		Participant was laughing as they recounted the memory of asking the subordinate to provide a solution to address the problem.	• Reflects a deliberate effort to uncover underlying motivations and unmet expectations, showing cognitive empathy and foresight. The leader is not assuming the solution but seeking clarity from the individual’s perspective. “What are your suggestions?” • The leader recognizes that the best solutions often come from those closest to the problem. This shows humility and an internally driven belief in collaboration. • openly discussing problems and inviting input, rather than imposing solutions. It reflects a leader who has both the awareness and the interpersonal tact to find collaborative ways forward. The transcript shows self-driven concern for team dynamics, rather than waiting for conflict to escalate. This proactive step indicates the leader has noticed something is “off” and feels a personal responsibility to address it—a hallmark of perceptiveness. Resilience in Personal Challenges (Intrapersonal Competency)
			“You caused this problem, so help me resolve it.” • cooperative and inclusive approach to resolving disputes—not blaming and punishing, but involving the individual in creating a solution. • empowering others to take part in the solution. “But let me hear you first.” • This signals a deliberate pause, a conscious decision to suspend judgment and immediate action. It conveys patience and a commitment to gathering all information. • Listening first allows the leader to step into the other person’s shoes, to understand their feelings, frustrations, or logic from their point of view. In this way empathy is vital for finding common ground and solutions that address the root causes of the conflict. The transcript implies effective conflict resolution, whether formal mediation always starts with understanding <i>what</i> the problem is and <i>who/what</i> contributed to it. Resolving Conflicts Through Empathy (Interpersonal Competency)

Bold text in the transcript and in the Conceptual/Interpretative tab highlights the source of the analyzed excerpts. Terms like “perceptiveness” and “conflict resolution” indicate themes from the first analysis, while “Resilience in Personal Challenges” (Intrapersonal Competency) and “Resolving Conflict Through Empathy” (Interpersonal Competency) reflect themes from the second analysis.

strategies reinforced the importance of Building and Strengthening Relationships in supporting smoother strategy adoption.

Further illustrating relational leadership, P2 resisted relying solely on positional authority: “You’re not power-tripping just because you’re the boss. You need to understand the person.” This revealed a desire to lead through empathy and emotional intelligence. Instead of imposing directives, P2 adapted to individual circumstances to guide adoption. P4 echoed this sentiment, stating, “The authority shouldn’t

be imposed [immediately]. It should be the target performance and objectives that should be imposed.” Their method focused on outcome clarity and shared purpose rather than power. While P2 led through empathy and P4 through purpose-driven alignment, both rejected authoritarian tactics—demonstrating Ethical Integrity and Moral Courage in guiding their teams through complex change.

P2 also described using calm, measured communication to handle resistance, linking short-term decisions to long-term impact: “You need to talk to them calmly... show that this is the result if we don’t act.” This approach reflected a deeper belief in reasoning as a motivational tool. In contrast, P3 emphasized ethical leadership developed through self-awareness: “There has been a self-reflection, and I have become more transparent [about the context of a decision].” Rather than assert authority, P3 relied on openness to build trust. In their own ways, both leaders nurtured psychological safety—P2 through calm, forward-looking dialogue, and P3 through vulnerability and introspection—demonstrating how ethical leadership supports Fostering an Ethical Culture.

Leaders also focused on proactive engagement to prevent conflict. P3 emphasized relationship-building: “I connected with them... it’s easier for us to work together if we know each other,” showing how familiarity facilitated smoother collaboration. P5, meanwhile, encouraged participation from the outset: “We consolidate all the ideas, and we present them with the team... we pitch in and we get their insights.” By structuring early collaboration, they fostered shared ownership. While P3 emphasized one-on-one rapport and P5 leaned on collective input, both exemplified how inclusive practices support Proactive Conflict Prevention.

Building on these relational efforts, leaders reflected on how they navigated complex decisions. P3 recounted how their team adapted during the pandemic—“one of the external changes that we did not have control of but we had to manage”—showing a capacity to recalibrate under pressure. In contrast, P5 emphasized the need for stakeholder buy-in: “You don’t initiate any big change because you don’t have buy-in.” Their method involved documenting current processes and streamlining only where needed to minimize disruption. P3 prioritized agility and forward planning, while P5 focused on inclusivity and operational continuity. Despite differing strategies, both underscored the need to align decisions with team realities—demonstrating how leaders develop Strategic and Inclusive Decision-making through a blend of adaptability, collaboration, and contextual sensitivity.

P1 also shared how transparency strengthened their leadership: “Our communication is very open. I can tell them what I’m thinking, and they can also suggest,” describing how mutual exchange encouraged participation. P4 took a complementary approach, emphasizing affirmation: “You always have to make them feel that their suggestion is always valued, that their suggestion is not disregarded.” For P4, psychological safety rested on emotional validation. While P1 emphasized dialogic exchange and P4 prioritized recognition, both fostered trust through openness—each contributing to Creating a Psychologically Safe Environment that encouraged team engagement.

When navigating the discomfort of change, leaders also relied on reassurance and clarity. P2 offered empathy: “It’s just difficult for now. Once you have had it or you get used to it... it’s going to be very easy for us,” helping normalize resistance while setting positive expectations. P3 provided cognitive structure: “I explain what’s the

reason, the plan there, and the context of why it has been assigned to our team.” Their clarity helped teams see their role in a broader strategy. While P2 focused on emotional support and P3 on logical explanation, both demonstrated Effective Communication in Difficult Situations to sustain engagement through change.

Rather than treating strategy adoption as a transactional process, participants described it as a dynamic practice of leading through complexity. Across their accounts, effective leadership involves deliberate, often personal choices—whether enforcing structure, building trust, anticipating conflict, or guiding change with moral clarity. These competencies were not just enacted but cultivated through lived experience and reflection. Leaders showed that fostering openness, collaboration, and integrity not only minimized resistance but also built organizational resilience. Their narratives suggest that strategic success lies not in controlling outcomes, but in cultivating environments where people can confidently and ethically contribute to change.

4.2 Teamwork quality

Participants shared examples of how they improved teamwork by handling internal problems. Each person had their own view of what good teamwork means, based on their job and experience.

P1 emphasized that teamwork was strengthened through shared struggles during high-pressure periods, such as bidding and tight deadlines. These intense situations fostered unity and reinforced a strong sense of collective responsibility. P1 recalled, “We had to work overnight. She did not leave me then. We worked overnight until 7:00 a.m. We finished the bid,” illustrating how mutual effort deepened team commitment. Now serving as a supervisor, P1 applies this experience by modeling Supportive Leadership—choosing to work alongside their team rather than simply delegating. “So I saw from my director, so that’s what I’m doing with my team,” they explained, promoting a hands-on, team-centered leadership culture.

P1 emphasized that a leader’s tone and presence significantly impact team dynamics. “Don’t be overbearing... Being authoritative discourages collaboration,” they explained, highlighting the importance of a balanced, approachable leadership style. While P1 did not experience authoritarian leadership, they acknowledged its potential to hinder open communication. In contrast, Democratic Leadership fosters idea-sharing and inclusion, enabling diverse perspectives to surface and drive innovation.

P1 also described the value of *saluhan*—a culture of mutual support. “We have each other’s back... We don’t leave each other hanging,” they said, reflecting their belief in shared responsibility and consistent support. For P1, being a Team Player means stepping up when others struggle and showing reliability throughout the team’s journey. Similarly, P5 shared, “The majority of the people in AS have a ‘C personality’ type. Some may have an ‘I,’ ‘IC,’ or ‘IS’ type, but most are ‘C.’” This underscores that teamwork also involves adapting to the team’s dominant personality and working style, supporting cohesion and collaborative success.

P3’s view of teamwork quality emphasizes building bonds beyond work hours to strengthen cohesion. Acknowledging the nature of their work, P3 shared, “We often organize out-of-town activities on our own dime, and these trips have been instrumental in strengthening our bond.” While social in nature, these gatherings serve a strategic

purpose—fostering trust, morale, and group identity, all essential for sustained collaboration.

For P3, shared experiences improve adaptability and motivation within the team. Highlighting the importance of consistent support, they said, “To be flexible, to be present, to be reachable... because motivation is really important in a team.” This availability reflects P3’s Courage—the ability to stay emotionally grounded and responsive even under pressure, ensuring others feel supported. P3’s continued efforts also reflect Resilience, shown not just by enduring challenges but by responding with empathy and dedication. By valuing emotional connection and being consistently present, P3 cultivates an environment where team members feel seen and motivated. This relational resilience strengthens both individual performance and collective success, reinforcing the role of emotional presence in effective teamwork.

While P1, P5, and P3 all value Supportive Leadership and being a Team Player, they differ in approach. P1 focuses on solidarity during high-pressure tasks, while P3 fosters cohesion through voluntary social bonding. P1 is more task-driven; P3, relationship-focused. Despite this, both emphasize leader presence and availability as essential to cultivating Courage and Resilience within the team.

P4 offered a perspective on teamwork focused on managing internal issues through transparent communication. Recalling a case with a non-performing team member, P4 shared, “We distributed the tasks to others who were more efficient... There was probably an internal issue before.” Despite coaching efforts, performance did not improve, prompting a clear decision and open explanation to the team. “The team adopted a transparent approach... explaining the reasons behind the decision and the consequences.”

This Proactive Communication reduced misunderstandings, promoted fairness, and preserved morale. By addressing the issue directly and honestly, P4 demonstrated a Conflict Resolution strategy grounded in clarity and accountability. Their approach highlights how openness can defuse tension and reinforce trust, ensuring alignment and team cohesion during challenging situations.

P2 also addressed conflict through Proactive Communication to maintain team harmony. Serving as a mediator, P2 shared, “I tell them, ‘Just tell me, and I’ll talk to them... That way, we can avoid argument,’” highlighting their role in preventing escalation. This reflects emotional intelligence and empathy, allowing P2 to manage issues without damaging relationships. P2 stressed compassionate communication during tense moments: “You have to be light with them. It still has to be gentle.” For P2, Empathy builds trust and fosters a respectful environment where team members feel heard.

Complementing P4’s approach, P2 emphasized listening before acting. In a conflict, they said, “You caused this problem, so help me resolve it. But let me hear you first,” showing a balance of accountability and understanding. P2 also clarified intentions to avoid misinterpretation: “That’s not my intention to make it difficult... maybe it was just misinterpreted,” demonstrating how reflection and dialogue de-escalate tension and strengthen team cohesion.

P2 demonstrated strong self-awareness and Perceptiveness by recognizing early signs of conflict and addressing them through reflective questioning: “What is our problem? What do you want to happen? What are your suggestions?” This approach created space for shared problem-solving and reinforced a culture of trust and collaboration.

Both P2 and P4 utilized Proactive Communication but with differing styles. P4 focused on structured transparency to uphold fairness and morale, while P2 relied on emotionally attuned mediation grounded in Empathy and Perceptiveness. Their contrasting tones highlight how effective conflict resolution depends on situational context and interpersonal dynamics.

In summary, all participants emphasized the importance of teamwork quality and conflict management, but through diverse approaches. P1 and P3 embodied relational leadership—through task-based solidarity and social bonding—demonstrating Supportive Leadership, Democratic Leadership, Courage, and Resilience. Meanwhile, P2 and P4 addressed conflict through different communication strategies: P2 through empathy and emotional insight; P4 through clarity and accountability. Despite varied methods, each leader reinforced that effective teamwork thrives on presence, emotional intelligence, and a shared commitment to collaboration and trust.

4.3 Client relationship management

When participants were asked how leadership competencies contribute to maintaining a strong client relationship, P1 promotes boundaries to manage client expectations, “What I tell the team is, don’t stress yourselves out. Just tell them, ‘Okay, we’ll handle it. We’ll get back to you tomorrow morning at the earliest.’ So they would also know that there are limits.” While P2 demonstrated empathy and politeness in resolving conflict, “Just be polite. My rule of thumb is: treat others the way you want to be treated. If you don’t want to be yelled at, don’t yell. If you want respect, give respect. If you want others to be polite when giving you instructions, be polite when talking to them. Meanwhile, P4 prioritized client needs to ensure client satisfaction, “Establish rapport with the client during the initial meeting when the project is awarded. Make them feel valued right away and prioritize their needs.” Reflecting on clarity, empathy, and proactive engagement, Effective Communication was showcased.

Emphasis on prioritizing rebuilding client trust, P1 shared, “I did not stop following up with our after-sales team, who handled it until it was resolved. It did not take more than two days to resolve the problem.” In addition, P4 highlights patience toward unreasonable demands and timely acknowledgment, avoiding tension “Of course, there are clients who make excessive demands that go beyond the scope of the contract. In those cases, you just have to be kind and patient,” and preventing conflict “Even if you can’t provide an immediate answer, acknowledging their message... is important. The main thing is that they feel heard.” Demonstrating Conflict Resolution, leaders maintained professionalism and fostered positive relationships with clients, even in challenging situations.

Furthermore, P1 highlights proactive responsiveness to resolve issues and maintain rapport. “It’s making them feel that they are a priority, that if they need anything, we will find a way to do it.” In contrast, P4 designed solutions that ensures clients feel valued, “Even if you can’t provide an immediate answer, acknowledging their message... is important. The main thing is that they feel heard.” Fostering Client Engagement, participants emphasize the importance of ensuring client trust and loyalty.

Promptly, P1 ensured satisfaction and regularly engaged with clients, “We’ve been keeping in regular contact with the client, asking

questions to ensure their satisfaction.” Furthermore, P5 emphasizes the importance of holding accountability and viewing complaints as opportunities for improvement. “We’re client-facing, so there were a lot of complaints.” The demonstration of leaders seeking Feedback and Improvement from the client strengthens trust and accountability. Statements emphasized that they use feedback as a tool for growth to ensure better client experience and long-term success.

Maintaining composure under pressure, P2 demonstrated excellent customer service by emotional regulation, “Because even if they are already angry, you still think about the positive side...” While P4 reflects a relational approach and exhibited patience and kindness toward the client, “Of course, there are clients who make excessive demands that go beyond the scope of the contract. In those cases, you just have to be kind and patient.” these insights from participants emphasize that Customer Service Excellence is giving more than meeting basic expectations.

To uphold the team’s wellbeing, P1 set boundaries by recognizing client limitations, “Just tell them, ‘okay, we’ll handle it; we’ll get back to you tomorrow morning at the earliest.’” While P2 reflects on past emotional struggles, to build personal resilience and mentor others, “I told them, ‘Don’t worry, they will not hurt you. Just be confident in yourself and know that you have done nothing wrong.’ That’s the advice I needed when I first started this job.” Highlighting the significance of Self-awareness in the client relations context, recognizing personal space and reflecting on learning enables leaders to maintain emotional regulation and foster productive relationships with clients.

Balancing urgency through structured response, P1 exemplified, “I do respond after office hours... I make sure to get back to them within the day with a solution or an answer from the project management team.” In addition, P4 willingly extend effort beyond regular hours to meet client needs, showcasing commitment amid personal sacrifice, “We often go beyond what’s expected of us, even working on Saturdays and during holidays like Holy Week... We usually try to respond, especially if it’s urgent.” As leaders make time for client concerns, they demonstrate Self-management through disciplined efficiency, perseverance, and adaptability.

Demonstrating optimism during high-pressure client interactions, P2 shared, “Because even if they are already angry, you still think about the positive side... ‘How do you do that? Sir (name of executive) is already angry, but we are still calm.’” While P5 emphasizes the need for perseverance, “That’s the reality... There were complaints from the clients and complaints internally because we are partners with sales in providing service to the clients.” Showcased Resilience involves maintaining a positive outlook to foster continuous improvement and build lasting connections with clients.

Giving importance to client feedback, P1 shared their practice, “We’ve been keeping in regular contact with the client, asking questions like, ‘How are you? How is our project implementation going? Do you have any feedback?’” In addition, P3 emphasizes strategic industry awareness, focusing on proactive learning through competitor analysis to maintain market relevance. “We have to remain competitive by doing a competitor analysis. We need to know how our competitors are performing outside. We strategize on pricing and approach.” As leaders pursue knowledge, skills, and self-improvement, they promote Professional Development to innovate solutions and build enduring trust with clients.

Emphasizing the importance of transparency and accountability, P1 ensures trust and integrity, reinforcing the client’s confidence in their professionalism and dedication, “But then we make it a point

that we still get in touch with the end-users since we have the initiative to talk to them.” Similarly, Participant 4 demonstrated prioritizing client needs and fostering rapport, “Establish rapport with the client during the initial meeting... Make them feel valued right away and prioritize their needs. If they have scheduling conflicts, be accommodating.” Upholding Ethical Standards, the leaders fostered trust and maintained integrity in client relations.

4.4 Ethical decision-making

Participants were asked about how they handled situations when choosing between practical and ethical solutions. Mixed responses were observed as the context played a role in the participants’ experiences.

In the case of P1, they did not have a difficult time choosing ethical solutions even when odds are against them, evident in their statement, “It was as if they were accusing us. I don’t do that, but I would explain to them to let them know what happened to resolved the conflict...” Although they encountered a dispute with another department, P1 opted to explain and clarify what happened instead of retaliating, even if they had the right to do so. It points to Strengthened Interdepartmental Relationship because P1 was able to elaborate on better work boundaries that could prevent future conflicts. Additionally, P1 prioritized resolving the conflict, demonstrating their Negotiation Skills in a tense situation. These highlight how P1 responds ethically, as they ensure that each department’s needs are satisfied.

For instance, P1 emphasized that they do not have difficulty choosing between what’s ethical and practical. As stated, “I do not find it challenging when choosing what’s right because the organization itself demands integrity.” Along with that, P1 mentioned, “You should have integrity in every transaction, whether internal or external...” This showcases that, regardless of who they are dealing with, they aim to uphold their ethics and follow the proper process. This demonstrates the department’s Strong Ethical Culture, as it leads to a uniform approach to their work. Furthermore, it elicits Moral Courage, given that the level of authority does not affect their process. Thus, regardless of the client or organization, P1 encourages its subordinates to uphold Ethical Decision-Making.

Despite a strong imposition of ethics on subordinates, P1 values receiving insights from colleagues when it comes to establishing an effective solution. A collective approach is observed in the quote by P1, emphasizing, “You have to weigh things... What solution can be done so that the company can benefit the most through your department?” This encourages feedback because weighing things means considering several perspectives. Moreover, P1 views the department as a group, which implies that Psychological Safety is established, as contributions are viewed through a group lens rather than individually. In relation to that, the statement, “From what I can see, the solution is to mitigate any conflict that may arise from a certain situation,” illustrates that P1 has a solution-oriented approach. This can be observed in how they aim to gather insights from different angles to reach the most efficient method. P1 then displays Conflict Prevention Skills, considering only the short-term but also the long-term.

In comparison, P2’s experiences in handling ethical and practical solutions showed that they had difficulty in addressing dilemmas, as

it involved coordinating with employees and top management. Their statement, “I’m an understanding person, so when the top management says to execute it this way, even though it doesn’t align with my principles, I don’t resist...” shows that they would choose to comply instead of raising their concerns. In another setup, P2 shared that, “During the pandemic, when probationary employees had to be laid off, there was no strategic approach on how the company could cope but to let go of new employees.” This shows P2’s capacity to handle Difficult Conversations, given that they are aware of how valuable it is to have a job during the pandemic. As P2 ultimately resorted to employee termination to ensure the company’s survival, they were able to show their Decision-Making skills in a time of uncertainty.

Similarly, P3’s approach to choosing ethical and practical solutions aligned more with P1, where ethics was strictly enforced. The statement by P3, stating that “You can’t do practical if your ethics are going to be compromised,” displays a sense of responsibility when making decisions. Although P3 understood that being practical can be an easier way of managing situations, they chose to delve deeper into how a problem can be ethically addressed by considering all angles, rather than opting for a quick-fix solution.

The same approach was exhibited by P4 when managing ethical decisions. As stated, “I think we have not encountered a situation yet where we have to choose the practical side over the ethical one since we are consultants... Maybe I’d be more practical when handling other matters, such as terminating an employee.” This only shows that ethics is non-negotiable for P4 as they emphasized that there is almost no situation where they would consider practicality over ethics. On the other hand, employee termination became an option if it would ensure that everyone would deliver quality work. P4 demonstrates that they consistently uphold Integrity and Conflict Prevention Skills within their department. This was also evident in the way P4 handles data, as observed in their statement, “All our work, including data management, when one respondent’s data is missing, we can’t just say that okay let us fill it up.” Thus, this demonstrates that P4 implements a Strong Ethical Culture that enables them to deliver accurate and high-quality output.

On the other hand, P5 showed the same sentiment as P2 when choosing between a practical and ethical solution. In their statement, “Actually, for this, whenever I’m forced to choose between what’s practical and what’s ethical, I feel that I always put forth what is beneficial for the company,” it’s evident that they perceive it as a dilemma, opting to prioritize the organization. This means that their Decision-Making is highly affected by external factors, considering that there is room for choosing practicality over ethics. In P5’s defense, they said, “It is very easy to say that this is the more ethical choice if you do not know how big of an effect the choice would be if you take a look at it for 5 to 10 years from now.” This scenario highlighted Proactiveness in P5 as they consider how decisions can impact the company even after a few years.

4.5 Industry adaptation

Participants reflected on how they adapted to shifts in their industries, revealing varied interpretations of “changing demands” and context-specific adaptation strategies.

For P1, shifting industry demands were defined by the 2020 lockdown, which rendered their paper-based workflows unworkable. Recalling, “We’d work overnight documenting, filing, and compiling everything for paper submission,” P1 highlighted the scale of change. Their use of “we” emphasized Enhanced Collaboration and Innovation, as the team regularly met to reimagine their processes. By stating “What are we going to do?” P1 demonstrated awareness of the urgent need for change and a collaborative approach to addressing it, which are both fundamental components of effective Change Management.

P1 introduced innovations like online submissions, direct agency coordination, and targeted client communication—demonstrating Change Leadership through clear communication and strategy. Involving the team in service adaptation fostered Employee Empowerment, enhancing confidence, motivation, and resilience.

P1 further emphasized the role of Learning Agility in sustaining organizational performance amid adversity: “You would find ways to innovate so you can still serve your clients.” This willingness to seek new knowledge and adopt novel approaches reflected their capacity to remain competent and competitive in a rapidly changing environment. Additionally, their assertion, “It’s a bit difficult to do, but if you really want it, when you aim for something, it becomes a motivation to achieve your goals and objectives,” illustrated the role of perseverance and goal orientation in fostering creativity and resilience under pressure.

While P1’s context was centered on the pandemic, P4 focused on shifting client demands. In response to a newly introduced client guideline that rendered their existing service obsolete, P4 took proactive measures to reposition their organization by organizing a seminar to reframe their value proposition: “We invited all our government clients to the seminar to position ourselves at the forefront and establish this organization as the premier third-party service provider for this new guideline.” This action demonstrated anticipatory problem-solving and strategic foresight, hallmarks of agile leadership in dynamic markets.

Despite differing contexts and approaches, P1 and P4 both demonstrated More Robust Innovation and Problem Solving in navigating complex challenges. Their proactive, adaptive responses embodied Change Leadership, fostering motivation and a supportive environment for growth and resilience.

P2 viewed changing industry demands through the lens of technological adaptation, emphasizing the need to support their team in learning new digital tools. They highlighted the role of Communication Skills in facilitating this transition. When introducing new software that enhanced work efficiency, they stated: “Be very gentle, especially when introducing something new. Because, you know, they are not used to that.” P2 emphasized empathy and patience to ease their subordinates’ frustrations, creating a psychologically safe environment that reduced resistance and enabled smoother adoption of new systems.

P2 also embodied Openness to New Ideas by discarding outdated methods in favor of evolving technologies. Reflecting on their own learning journey, they shared, “At first, I was also hesitant. But I did not have a choice. Things are evolving, so we need to keep up,” illustrating a shift from reluctance to acceptance in response to changing industries.

Similarly, P4 demonstrated openness to technological change, initially expressing skepticism about the use of Artificial Intelligence

(AI): “I felt it was unfair because I was relying on AI and asking it for help. But now, I recognize its value.” Both participants’ willingness to embrace technological innovations enabled them to drive progress and enhance productivity through improved workflows.

In contrast, P5 demonstrated openness to new ideas in a broader strategic context by responding to client feedback during the pandemic: “We have more clients because of the pandemic and everything shifted to digital. Information security received more attention, and we took an information security certification...” In doing so, they used client feedback to guide service enhancements.

P5 also demonstrated openness to new ideas by regularly reviewing client memos to assess whether their current assessments were aligned. They reflected, “We take a look at the memo and see... Will our product address this memo or not. What can we do to adapt it, or to change or to update? What are the possible improvements that can be made to the products?” This shows their willingness to consider external input and incorporate new perspectives to improve their services. Furthermore, P5 recognized the strategic value of informal knowledge networks, explaining: “Don’t confine yourself to formal channels because those formal channels only provide limited information. Listen to what others are saying, even the gossip.” This insight emphasized the importance of tapping into diverse information sources to anticipate emerging market trends.

P3 echoed this perspective, highlighting the centrality of networking in securing clients and generating new opportunities: “Building a network is essential because without it, you can’t prospect. To prospect, you must expand your network.” This orientation toward relationship-building supported strategic adaptability and business sustainability in rapidly evolving environments.

Thus, while P2 and P4 showcased openness to technological innovation to streamline internal operations, P3 and P5 showed how openness to client input and network insights informed service design and sustained market relevance.

Beyond digital transformation, P2 also interpreted industry change in terms of navigating flexible work arrangements. They shared the importance of maintaining strong employee relationships in hybrid work settings: “It helps them realize they have officemates aside from the ones they sit next to at home or in their department.” This practice of fostering informal support networks helped reduce isolation and promote cohesion, which is critical to Team Adaptability in hybrid environments.

Lastly, P3, like P1, framed their experience of changing industry demands around the pandemic. ‘It’s a year of challenge for all of us,’ they noted, acknowledging the widespread disruptions brought about by the pandemic. However, unlike P1, P3 emphasized a different core competency, Resilience. “That you are resilient, you’re hopeful that everything will be okay again.” This sense of optimism allowed them and their team to maintain momentum and persevere through adversity, a mindset essential for navigating prolonged periods of uncertainty.

4.6 Second analysis

The first analysis identified core leadership competencies common to all participants, while the second analysis examined how these competencies were applied in specific contexts, revealing variations in their use. This nuance offered a clearer understanding of their adaptability across situations. The study’s

iterative analysis provided a comprehensive view, as illustrated in Figure 2.

Interpersonal competencies are skills and behaviors that facilitate effective interactions and relationships, which are essential for fostering strong bonds, promoting an ethical culture, and cultivating a safe and inclusive space for decision-making.

The first interpersonal competency derived is Experiences of Collective Innovation. It represents the collaborative efforts that resulted in innovations as participants provided diverse ideas to facilitate creative problem-solving. For instance, this covers leaders’ efforts to engage with various technologies by maximizing their use to improve team productivity.

In relation to that, the second interpersonal competency that emerged was the Dynamics of Effective Communication. This represents leaders’ capacity to actively listen to their subordinates while practicing clear and respectful dialogue. With this competency, trust and understanding becomes established, making it easier to manage client expectations while maintaining smooth working relationships. Other than that, giving and receiving feedback was a practice that contributed to the dynamics of effective communication.

The third interpersonal competency that emerged from five different sub-themes is Transformative Client Engagement. This was identified as a recurring pattern among leaders as they showed responsiveness and individualized exchanges to clients. Such became key in nurturing mutual respect and understanding, more so as sincere interactions improved client satisfaction and retention.

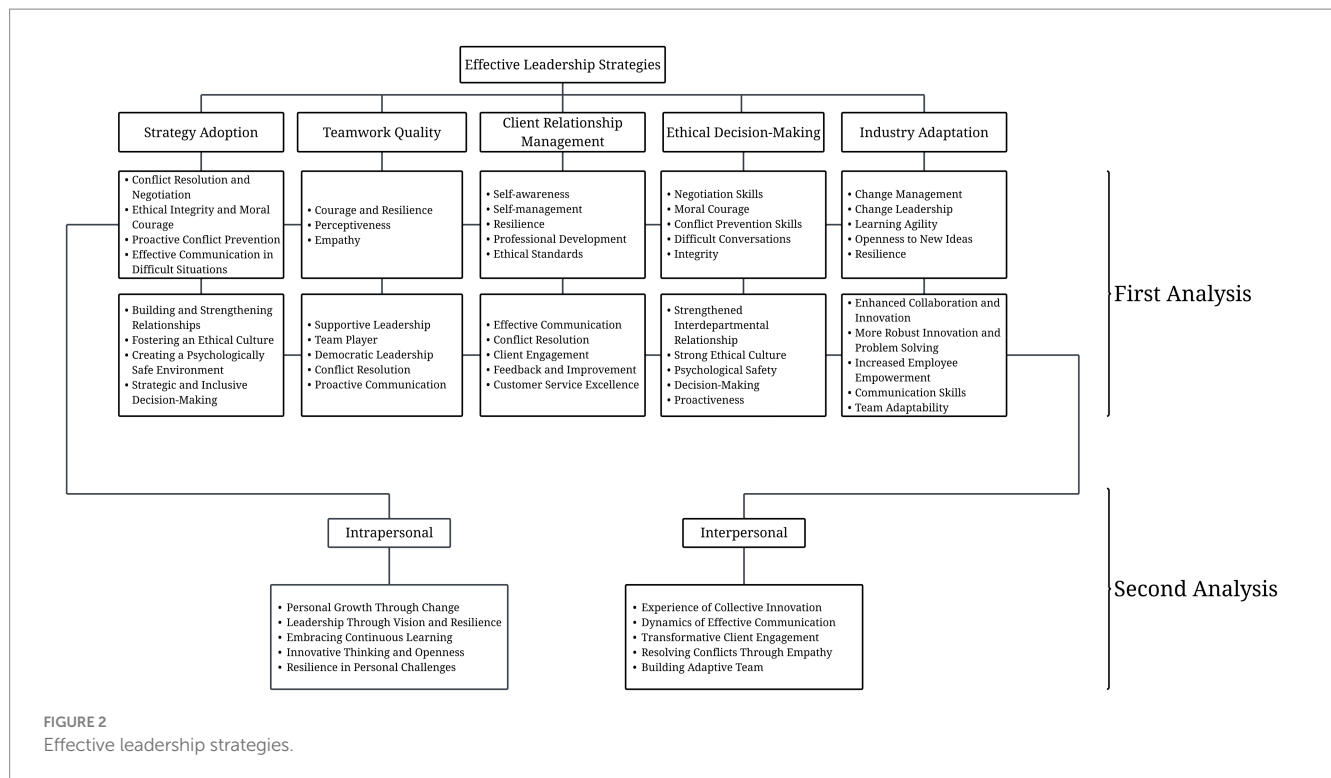
Meanwhile, the fourth interpersonal competency generated is Resolving Conflicts Through Empathy. Leaders highlighted here how they utilized de-escalation techniques to manage tense situations. Because of the ability to mitigate arguments, these did not escalate as a bigger issue. Through this, positive relationships were maintained despite the disagreements they encountered.

Lastly, the final interpersonal competency that was recurring among leaders was Building Adaptive Teams. Navigating challenges as a team was emphasized here as the competency represented leaders’ ability to guide their teams during challenges. Teams were developed to be flexible and resilient as leaders assisted them to adjust to new conditions while maintaining morale and productivity. As the capacity to adapt was observed on the whole team, it became a factor that further unified them. Thus, it then implies that participants are leaders who were able to navigate the changing landscapes of the market while giving direction to their subordinates.

Intrapersonal competencies enable leaders to develop self-awareness, emotional regulation, and adaptability. Their inner world is navigated by fostering resilience, purpose, and a growth mindset. Developing intrapersonal competencies of leaders enhances overall leadership effectiveness.

Firstly, Personal Growth Through Change emphasizes the transformative power of adapting to new circumstances, challenges, or environments. Personal growth through change highlights leaders’ resilience, self-reflection, and planning in adapting to challenges. Intrapersonal skills like self-awareness and patience help navigate transitions, fostering strength and adaptability in dynamic environments.

In addition, Leadership Through Vision and Resilience focuses on the importance of a leader’s ability to inspire and guide their team with unwavering commitment during times of transformation. Leadership through vision and resilience highlights leaders’ ability to inspire



teams, navigate challenges with adaptability, and foster unity through inclusive decision-making, clear communication, and a steadfast commitment to strategic goals.

Moreover, Embracing Continuous Learning highlights the importance of maintaining an open mindset and continuously seeking knowledge to stay agile in a constantly evolving landscape. Embracing continuous learning emphasizes leaders' commitment to self-improvement, adaptability, and innovation. By seeking new knowledge, they inspire teams, foster agility, and strengthen resilience, driving personal and organizational growth in dynamic environments.

Furthermore, Innovative Thinking and Openness underscores the significance of staying receptive to unconventional approaches and fostering a culture of creativity and collaboration. Innovative thinking and openness highlight leaders' openness to new ideas and unconventional approaches, fostering innovation, adaptability, and collaboration. This mindset enhances problem-solving, inspires teams, and builds resilient, forward-thinking organizational cultures.

Finally, Resilience in Personal Challenges refers to the ability to remain steadfast and optimistic, overcoming adversity while pursuing long-term goals. Resilience in personal challenges refers to the ability to remain steadfast and optimistic in adversity, allowing leaders to continue pursuing their goals despite setbacks. Leaders demonstrated resilience and optimism, managing challenges with clarity, mindfulness, and goal-setting. Their perseverance inspired teams, fostering a culture of adaptability, focus, and progress in overcoming obstacles and driving organizational success.

5 Discussion

Effective leadership competencies contribute to individual and organizational success by inspiring, guiding, and influencing others to

achieve common goals (Chow and Singh, 2023). The study conducted an in-depth analysis of leaders' experiences using IPA, identifying several key competencies in strategy adoption, teamwork quality, customer relationship management, ethical decision-making, and industry adaptation. After reanalyzing emerging themes among all key areas, it was revealed how interpersonal and intrapersonal competencies influence leadership, bridging the gap between theory and practice and highlighting the importance of holistic leadership in achieving organizational success.

5.1 Interpersonal competencies

The first interpersonal competency theme reveals Experiences of Collective Innovation cultivated by teamwork and shared commitment. P1 illustrated this dedication: "We'd work overnight documenting, filing, and compiling everything for paper submission." This collaborative approach enhances innovation through improved coordination, idea-sharing, and systematic planning. This contradicts the findings of Heldal (2023) to some extent where the role of Design Thinking (DT) to innovation is emphasized. In this case, divergent and convergent thinking is prioritized along with authority and discipline rather than merely focusing on collaboration.

Meanwhile, P1 noted: "It's a bit difficult to do, but if you really want it—when you aim for something—it becomes a motivation to achieve your goals." Leaders foster environments encouraging creative thinking and experimentation. By leveraging technology and embracing team-oriented strategies, organizations generate innovative solutions while building foundations for adaptive decision-making, sustaining agility amid evolving industry demands. Still, Barroga et al. (2021) showed how micro, small, and medium businesses in the Philippines varied in how they adopted smart manufacturing (SM)

technologies as technological knowledge and implementation played a role. Thus, the results add to the existing knowledge that for collective innovation to transpire, collaboration, technological changes, and team-oriented strategies are important.

The second theme reveals Dynamics of Effective Communication where leaders actively encourage team dialogue while serving as bridges for understanding and resolution. P4 emphasized collaborative decision-making: “I relay the information to my team because I need their buy-in. Once they say ‘yes,’ it means we are accepting the responsibility.” This builds shared accountability through open communication, mutual trust, and consensus-building. This approach contradicts to Mapoy et al. (2021) which revealed that many Filipino organizations still depend on top-down decision-making that limits employee involvement and reduces team agility.

While P2 highlighted the balance between directness and empathy: “You need to talk to them calmly... show that this is the result if we don’t act.” P4 treats communication as both a tool for guidance and caring for team members while maintaining organizational responsibility.

This study addresses the gap in leadership accountability and employee wellbeing identified by Angeles (2024). The theme, drawn from the insights of P2 and P4, illustrates how leaders leverage communication to promote care and shared responsibility. This reflects a shift toward collaborative leadership that balances people and performance, where communication fosters shared leadership, compassion, and organizational accountability.

The third theme is Transformative Client Engagement as a defining leadership practice, where leaders exceed expectations by prioritizing client satisfaction beyond standard requirements. This theme goes beyond immediate problem-solving to ensure clients feel valued and heard. As P4 noted, “Even without an immediate solution, acknowledging their message matters—what’s key is making them feel heard.” Moreover, exceptional leaders also demonstrate conflict resolution by taking personal ownership of issues until resolution. P1 exemplified this: “I persistently followed up with our after-sales team, ensuring the problem was resolved within two days.”

The findings address gaps in both Tabrani et al. (2018) and Namasivayam et al. (2014). While Tabrani focused on emotional factors like trust and intimacy, and Namasivayam emphasized indirect leadership through employee empowerment, both overlooked direct leader-client interaction. The theme fills this gap by showing how leaders build satisfaction and loyalty through personal responsiveness, empathy, and active problem-solving.

In summation, the theme fosters loyalty by combining conflict resolution, forging strategic, long-term partnerships grounded in professional integrity. By consistently addressing tensions and upholding transparency, leaders solidify trust and mutual benefit, distinguishing their organizations in competitive landscapes.

Results showed that Resolving Conflicts Through Empathy was a common theme among participants as they managed disputes with patience and understanding. Findings showed that participants were equipped with conflict resolution while maintaining accountability among colleagues. This was evident in P4’s passage, “You caused this problem, so help me resolve it. But let me hear you first,” where the leader identified the person accountable for the problem and gave them an opportunity to be heard, rather than punishing them. Also evident in P1’s passage, “I would explain to them to let them know

what happened to resolved the conflict...” is the aim of managing disputes through clarification.

While empathy was key to resolving conflicts in the study, Ilac and Presbitero’s (2022) research revealed that Batad’s indigenous leaders employ several conflict management processes. They described conflict management as complex and having different levels, which requires both humility and unbiasedness from the leaders. This illustrates the distinction between how indigenous leaders manage conflicts and the conflict management strategies employed by corporate leaders. The study then shows how empathy can be more pronounced in leaders in a private organization.

Building Adaptive Teams was the last interpersonal theme to emerge among the participants. Results illustrated that participants adopted a supportive approach and acted as team players, evident in P1’s statement, “We have each other’s back... We make sure we don’t leave each other hanging,” to create an adaptive team. Participants even spent their own money to strengthen their teams, as observed in P3’s passage, “We often organize out-of-town activities on our dime, and these trips have been instrumental in strengthening our bond.” While it is an informal approach to enhancing team cohesion, interactions outside work played a role in the resilience of team members.

This differs from the study by Isip (2022), which identified value creation, a knowledgeable workforce, and organizational resourcefulness utilizing technology as key factors in the adaptive capability of micro agribusiness firms in the Philippines. In this case, adaptability was based on the company’s products and services. Furthermore, adaptability was attributed to proactivity in global companies from Western countries and parts of Asia when work performance adaptability was assessed (Villalobos et al., 2020). This implies that the current findings illustrate how supportive leaders who act as team players are another factor to consider when building an adaptive team.

5.2 Intrapersonal competencies

Personal Growth Through Change emerged as the first theme. Leaders embraced discomfort with growth mindset. P2 noted, “Once you have had it... it’s going to be very easy for us,” showing openness to learning amidst challenges, contrasting with Carbonell-Laguio’s (2023) findings on destructive leadership in Philippine workplace setting, where high power distance and low trust fueled fear-based compliance. In contrast, the leaders in this study leaned into transparency and collaboration, showing that trust and empathy can enable effective leadership even within hierarchical cultures like the Philippines.

Growth mindset was also translated into concrete action. When confronted with operational uncertainty, P1 led their team to co-create solutions under pressure—“working overnight documenting, filing, and compiling everything”—shifting from reactive coping to proactive problem-solving. Similarly, P4 described leading a product seminar to meet changing client needs and “position [themselves] as at the forefront.” This proactive, team-based response reflects kapwa—a Filipino value of shared identity. As Rivera and Ng (2018) explains, Filipino leaders often empower others by fostering a sense of mutual purpose. P4’s use of “ourselves” emphasizes that leadership was exercised in collaboration with their team, demonstrating that

personal growth is inherently relational and responsive to external pressures.

Leadership Through Vision and Resilience emerged as second theme. Leaders decide based on ethical conviction and proactive care over authority. As P2 shared, “You have to accept,” while removing fallback options like “I deleted the Excel,” demonstrating commitment to change despite discomfort. This reflects *paninindigan*—a principled moral stance—which Melendres (2024) describes as the anchor that fastens Filipino virtues to *katotohanan* (truth). Leaders modeled resolve not by asserting rank, but by practicing consistency and ethical accountability.

Leaders also emphasized values-driven leadership, extending Kim’s (2022) concept of relational leadership in Asian settings. They sustained morale through empathy—leveraging connection as a strategic tool for motivation and alignment. Furthermore, Leaders often invested in early relationship-building to preempt resistance and promote cohesion. This proactive stance extends Wong et al. (2020), positioning trust not as a byproduct but as a foundation of leadership during disruption.

Resilience was further reflected in leaders’ emotional availability. As P3 described, they remained “flexible, present, and reachable,” demonstrating leadership as an active presence, not just structural authority. This aligns with Siason and Siason (2023), whose study of institutional leaders in Philippine higher education highlights flexible leadership grounded in credibility, open communication, and commitment to shared values. In this study, empathy served not only relational ends but empowered teams to move forward with clarity—showing that Filipino leadership sustains vision through moral conviction, foresight, and lived resilience.

Embracing Continuous Learning emerged as a third common theme among organizational leaders in the study, showing its critical role in effective leadership. P1’s drive to “find ways to innovate” during the pandemic highlights how adaptability and a learning mindset can sustain leadership effectiveness under pressure. This insight expands Philippine research on adaptive leadership, which has primarily focused on education (Francisco and Nuqui, 2020) and government sectors (Carada et al., 2023), by offering perspectives from the organizational setting. It underscores the importance of continuous learning—through innovation and adaptation—in navigating volatile environments.

Complementing this, P5 emphasized the value of “doing a competitor analysis” to track trends and identify best practices, enabling them to “strategize on pricing and approach” with strategic foresight and a sustained focus on growth. This reinforces and extends the work of Keya and Kinyua (2025), providing individual-level evidence that continuous learning fuels both adaptive and transformative capabilities. P5’s behavior further illustrates how personal learning practices form the microfoundations of organizational agility and innovation.

Together, these findings respond to Atanasova et al.’s (2025) call to examine middle managers’ roles in organizational learning, demonstrating that a leader’s personal commitment to learning is key to fostering a culture of learning within their teams.

Innovative Thinking and Openness emerged as a fourth significant theme in the study as key drivers of breakthroughs. P4’s emphasis on responsible AI use—“just don’t rely on them for everything”—illustrates how openness paired with critical evaluation can drive both efficiency and innovation. While Romeo and Lacko (2025) found that

organizational resistance often hinders AI adoption, this study suggests that such barriers can be addressed through openness, hands-on experimentation, and thoughtful assessment of AI’s practical applications. This insight contributes to the limited literature on AI adoption in Filipino industries, which has largely focused on the government sector (Distor et al., 2021).

Openness extended beyond technology, shaping how participants valued and sourced information. P5 valued informal inputs like “gossip” and client conversations, finding networking at seminars more useful than the content itself. Likewise, P3 attended events to expand networks and stay responsive to client needs—behaviors that supported adaptability and performance. While aligning with Villaluz and Hechanova’s (2019) insights on innovation-supportive leadership, this study adds that informal knowledge and external networks also play a key role. Fostering openness means encouraging leaders and employees to seek insights beyond formal channels, strengthening a collaborative and adaptive innovation climate.

Lastly, Resilience in Personal Challenges emerged as a key theme. This theme contributes to literature by grounding perceptiveness in *pakikiramdam*, a Filipino cultural value of empathetic attunement (Pe-Pua and Protacio-Marcelino, 2000). Leaders did not perceive disruption as an individual burden, but as a shared challenge—encouraging open dialogue and relational trust. In this way, perceptiveness was not merely observational, but a culturally embedded practice that fostered connection and team resilience.

Furthermore, leaders externalize self-awareness to guide and support others, expanding London et al.’s (2022) description of self-awareness as a largely internal process. As P2 explained, they offered the kind of advice they “needed when [they] first started,” using personal struggles as the foundation for mentoring—an act of resilience that strengthened others through shared reflection.

Leadership accountability is also evident in high-pressure situations. P1 addressed client concerns “within the day,” showing responsiveness and resilience in the face of time-sensitive demands. This promptness fostered trust and transformed a potentially stressful encounter into an opportunity to strengthen relationships. While Abdullah (2023) describes after-sales service as a customer-oriented function, this study reframes it as an act of resilient leadership rooted in personal discipline and accountability.

Throughout the data, leaders exemplified the Filipino concept *tibay ng loob*—a quiet yet unwavering moral strength (Pe-Pua, 2018), which refers to an inner strength that is stable, courageous, and persistent in the face of adversity. These actions reveal that resilient leadership in the Filipino context is not about bold declarations or overt assertiveness, but about integrity, humility, and deep cultural grounding.

5.3 Theoretical and practical implications for organizational leadership

The findings highlight that effective leadership depends on integrating both intrapersonal and interpersonal competencies. This challenges traditional models that treat leadership as either trait-based or relational, calling instead for a holistic approach that recognizes the complementary nature of these domains.

Contemporary frameworks like Goleman's Emotional Intelligence and Authentic Leadership Theory reflect this integration, linking self-awareness with social awareness and positioning personal growth as a foundation for relational authenticity. The Leader and Leadership Identity Development framework also aligns with this view, showing how leadership evolves from self to collective identity through intrapersonal competence.

These insights refine existing theories. In Transformational Leadership, the ability to inspire is strengthened by traits like resilience. In Leader-Member Exchange (LMX), strong relationships are supported by emotional regulation. Even Katz's Three-Skill Theory may benefit from recognizing that effective leadership arises from the integration—not separation—of interpersonal, conceptual, and intrapersonal skills.

Building on this perspective, the study offers meaningful contributions to the understanding of leadership by emphasizing the dynamic interplay between intrapersonal and interpersonal competencies. Beyond theoretical advancement, the findings yield practical implications for leadership decision-making, organizational practices, and overall effectiveness, as illustrated in Figure 3.

In terms of organizational practices, the identified competencies can inform job descriptions, selection criteria, and performance

evaluations. By emphasizing both intrapersonal and interpersonal competencies, organizations can design more targeted leadership development programs, leading to improved coaching, succession planning, and talent retention. These competencies can also be embedded in behavioral interviews and onboarding programs, while leadership assessments can be redesigned to capture the integration of self-leadership and relational skills.

In terms of organizational outcomes, fostering a leadership-supportive culture that recognizes and rewards behaviors aligned with these dual competencies reinforces their importance and promotes consistent demonstration across all levels. As the findings suggest, these competencies often produce a ripple effect—leaders with strong intrapersonal skills build stronger interpersonal relationships, modeling behaviors that contribute to a positive work environment and enhanced employee performance. This collective dynamic ultimately strengthens organizational systems, making them more adaptable, resilient, and better equipped to meet evolving demands.

In summary, the findings integrate empirical insight with practical application, presenting a competency-based framework that advances theoretical discourse on leadership while informing evidence-based organizational decision-making, practices, and outcomes.

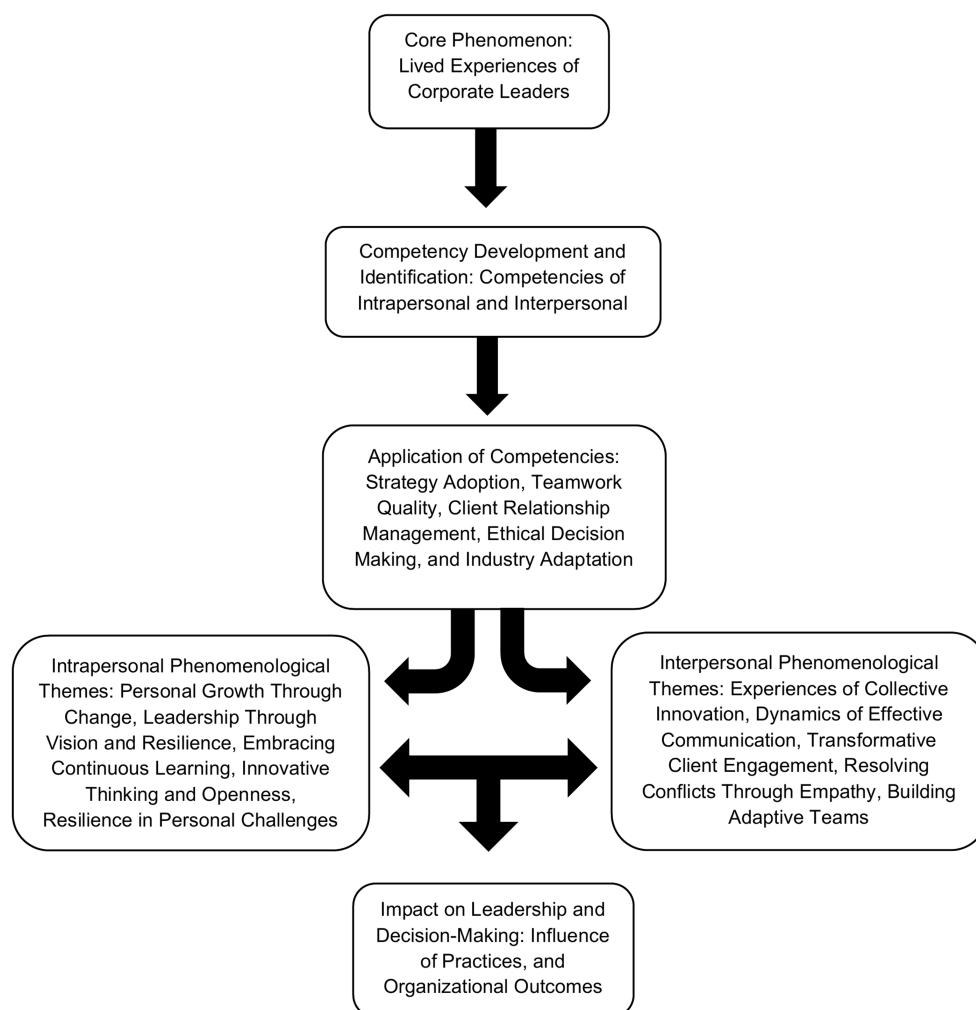


FIGURE 3
Lived experiences of corporate leaders.

6 Recommendations

Research limitations were identified, presenting opportunities for further study and prompting future research recommendations.

Firstly, expanding the participant pool enhances generalizability. While this study focused exclusively on five Filipino corporate leaders, a larger, more diverse sample and varying leadership tenures provide broader insights, revealing how leadership competencies evolve and change over time.

Secondly, conducting longitudinal studies adds a temporal dimension to leadership research, revealing evolving competencies and informing development programs beyond the single-point experiences captured in this study.

Finally, cross cultural comparisons can showcase how cultural norms and values influence leadership competencies beyond the Filipino corporate context explored in this study.

Similarly, generational gaps in leadership need exploration to reveal cross-cultural differences and bridge integrational collaboration within organizations.

Indeed, by implementing these recommendations, future researchers can enhance leadership frameworks to address evolving organizational challenges.

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 approval was not required for the studies involving humans because the research initiative was approved by the company that employs the researchers who conducted the study internally. Collecting data from internal employees is a standard procedure within the organization, primarily used to develop and improve its assessment products. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

MA: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. AB: Data curation, Formal analysis, Funding acquisition, Validation, Visualization, Writing – original

draft, Writing – review & editing. AC: Data curation, Formal analysis, Funding acquisition, Validation, Visualization, Writing – original draft, Writing – review & editing. JY: Data curation, Formal analysis, Funding acquisition, Validation, Visualization, Writing – original draft, Writing – review & editing. MD: Data curation, Formal analysis, Funding acquisition, Validation, Writing – original draft, Writing – review & editing. AA: Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing. JF: Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing.

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Conflict of interest

MA, AB, AC, JY, MD, AA, and JF were employed by People Dynamics, Inc.

Generative AI statement

The authors declare that no Gen AI was used in the creation of this 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.2025.1553620/full#supplementary-material>

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