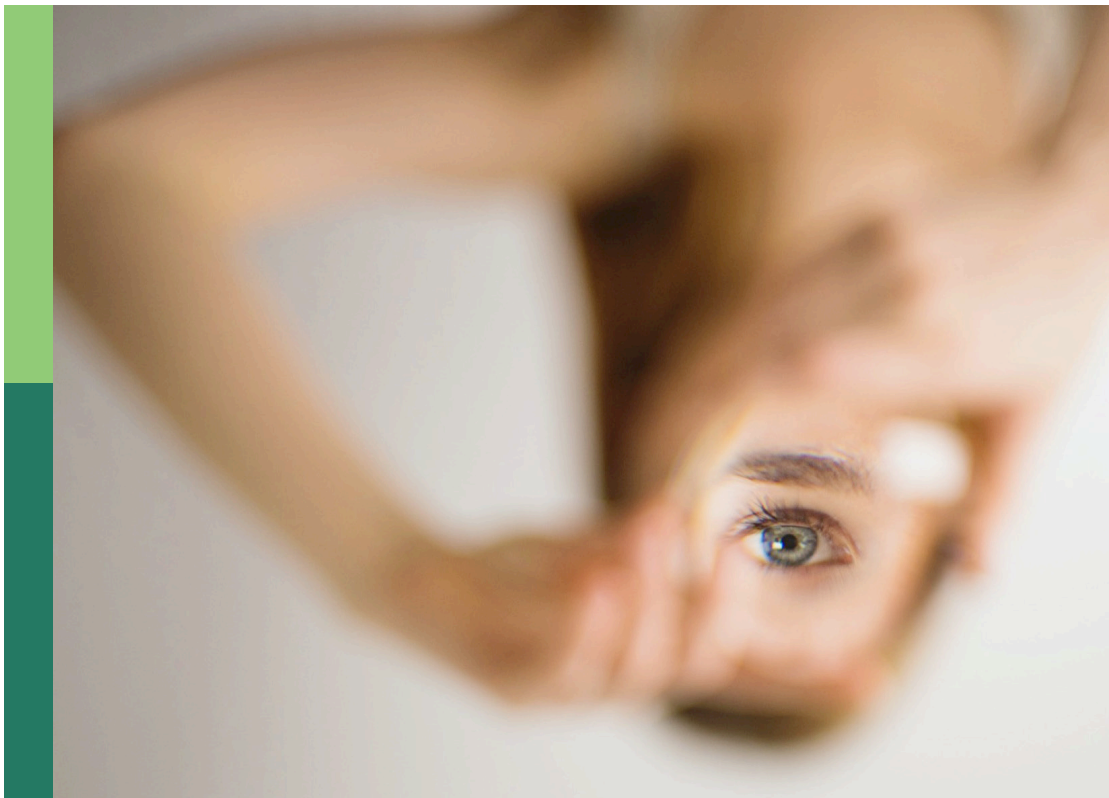
frontiers | Research Topics

Innovative and creative behaviours in the modern workplace: causes and consequences

Edited by
Mike James Mustafa, Mathew Hughes and Delia Virga

Published in
Frontiers in Psychology



FRONTIERS EBOOK COPYRIGHT STATEMENT

The copyright in the text of individual articles in this ebook is the property of their respective authors or their respective institutions or funders. The copyright in graphics and images within each article may be subject to copyright of other parties. In both cases this is subject to a license granted to Frontiers.

The compilation of articles constituting this ebook is the property of Frontiers.

Each article within this ebook, and the ebook itself, are published under the most recent version of the Creative Commons CC-BY licence. The version current at the date of publication of this ebook is CC-BY 4.0. If the CC-BY licence is updated, the licence granted by Frontiers is automatically updated to the new version.

When exercising any right under the CC-BY licence, Frontiers must be attributed as the original publisher of the article or ebook, as applicable.

Authors have the responsibility of ensuring that any graphics or other materials which are the property of others may be included in the CC-BY licence, but this should be checked before relying on the CC-BY licence to reproduce those materials. Any copyright notices relating to those materials must be complied with.

Copyright and source acknowledgement notices may not be removed and must be displayed in any copy, derivative work or partial copy which includes the elements in question.

All copyright, and all rights therein, are protected by national and international copyright laws. The above represents a summary only. For further information please read Frontiers' Conditions for Website Use and Copyright Statement, and the applicable CC-BY licence.

ISSN 1664-8714
ISBN 978-2-8325-6628-2
DOI 10.3389/978-2-8325-6628-2

Generative AI statement
Any alternative text (Alt text) provided alongside figures in the articles in this ebook has been generated by Frontiers with the support of artificial intelligence and reasonable efforts have been made to ensure accuracy, including review by the authors wherever possible. If you identify any issues, please contact us.

About Frontiers

Frontiers is more than just an open access publisher of scholarly articles: it is a pioneering approach to the world of academia, radically improving the way scholarly research is managed. The grand vision of Frontiers is a world where all people have an equal opportunity to seek, share and generate knowledge. Frontiers provides immediate and permanent online open access to all its publications, but this alone is not enough to realize our grand goals.

Frontiers journal series

The Frontiers journal series is a multi-tier and interdisciplinary set of open-access, online journals, promising a paradigm shift from the current review, selection and dissemination processes in academic publishing. All Frontiers journals are driven by researchers for researchers; therefore, they constitute a service to the scholarly community. At the same time, the *Frontiers journal series* operates on a revolutionary invention, the tiered publishing system, initially addressing specific communities of scholars, and gradually climbing up to broader public understanding, thus serving the interests of the lay society, too.

Dedication to quality

Each Frontiers article is a landmark of the highest quality, thanks to genuinely collaborative interactions between authors and review editors, who include some of the world's best academicians. Research must be certified by peers before entering a stream of knowledge that may eventually reach the public - and shape society; therefore, Frontiers only applies the most rigorous and unbiased reviews. Frontiers revolutionizes research publishing by freely delivering the most outstanding research, evaluated with no bias from both the academic and social point of view. By applying the most advanced information technologies, Frontiers is catapulting scholarly publishing into a new generation.

What are Frontiers Research Topics?

Frontiers Research Topics are very popular trademarks of the *Frontiers journals series*: they are collections of at least ten articles, all centered on a particular subject. With their unique mix of varied contributions from Original Research to Review Articles, Frontiers Research Topics unify the most influential researchers, the latest key findings and historical advances in a hot research area.

Find out more on how to host your own Frontiers Research Topic or contribute to one as an author by contacting the Frontiers editorial office: frontiersin.org/about/contact

Innovative and creative behaviours in the modern workplace: causes and consequences

Topic editors

Mike James Mustafa — Division of organisational and Applied Psychology University of Nottingham Malaysia, Malaysia

Mathew Hughes — University of Leicester, United Kingdom

Delia Virga — West University of Timișoara, Romania

Citation

Mustafa, M. J., Hughes, M., Virga, D., eds. (2025). *Innovative and creative behaviours in the modern workplace: causes and consequences*. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-8325-6628-2

Table of contents

frontiers | Frontiers in Psychology

TYPE Editorial
PUBLISHED 04 July 2025
DOI 10.3389/fpsyg.2025.1647616

Check for updates

OPEN ACCESS

EDITED AND REVIEWED BY
Jolita Vveinhardt,
Lithuanian Sports University, Lithuania

*CORRESPONDENCE
Mike James Mustafa
✉ michael.mustafa@nottingham.edu.my

RECEIVED 16 June 2025
ACCEPTED 19 June 2025
PUBLISHED 04 July 2025

CITATION
Huang S, Mustafa MJ, Hughes M and Virga D (2025) Editorial: Innovative and creative behaviours in the modern workplace: causes and consequences.
Front. Psychol. 16:1647616.
doi: 10.3389/fpsyg.2025.1647616

COPYRIGHT
© 2025 Huang, Mustafa, Hughes and Virga. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Editorial: Innovative and creative behaviours in the modern workplace: causes and consequences

Sheng Huang[1], Mike James Mustafa[1]*, Mathew Hughes[2] and Delia Virga[3]

[1]Institute of Work, Organisation and Wellbeing, University of Nottingham Malaysia, Semenyih, Malaysia, [2]School of Business, University of Leicester, Leicester, United Kingdom, [3]Department of Psychology, Universitatea de Vest din Timişoara, Timişoara, Romania

KEYWORDS

creativity, innovative behavior, innovation, culture, creative behavior

Editorial on the Research Topic
Innovative and creative behaviours in the modern workplace: causes and consequences

Rapid technological development has created the need for bold, radical changes (Dwivedi et al., 2023), rendering the future more unpredictable and uncertain. Consequently organizations and individuals must continuously adapt to such situations to remain competitive (Gu et al., 2023). Specifically, individual creative and innovative actions are becoming increasingly important for organizational competitiveness and success (Rietzschel et al., 2024; Woods et al., 2018). This Research Topic explores novel and useful theoretical approaches to enriching our understanding of the mechanisms and processes through which creative and innovative behaviors emerge in organizations.

Receiving over 67 submissions in total, the 10 carefully selected works (see Table 1) represent various countries in Asia and diverse samples, such as general employees, elder workers, organizational leaders, and entrepreneurs. The studies span multiple sectors, including manufacturing, public services, and knowledge-intensive industries, thus providing nuanced insights into the multifaceted drivers of employee creative and innovative behaviors in modern workplaces. By highlighting commonalities and contextual differences, the studies offer valuable guidance for organizations and leaders seeking to foster creativity and innovation from within.

Broadly, the 10 articles illustrate the diverse psychological, organizational, and contextual mechanisms that underpin employee creative and innovative behaviors in the modern workplace. The studies by Jiang D. et al., Arshad et al., and Wang C. et al. demonstrate how human resource (HR) practices can play a pivotal role in shaping organizational innovation. These practices include high-involvement work practices, high-performance work systems, and high-performance HR practices. Additionally, other mechanisms, such as fostering intrinsic motivation (Liu et al.), promoting knowledge sharing (Li Y. et al.), and facilitating knowledge acquisition (Li S. et al.), are identified as effective strategies that managers and HR professionals can employ to cultivate creativity and innovation, even in the absence of technical backgrounds. Moreover, research by Li Y. et al., Lee and Kim, and Yang et al. suggests that the organization's innovative climate and culture have conditioning effects on both actor-level and contextual factors that shape employees creative and innovative behaviors. Specifically, supportive climates

TABLE 1 Overview of selected articles.

Creative and innovative behaviors in the modern workplace: causes and consequences									
No	Authors	Research questions	Num	Participants and country	Key variables studied	Findings	Theories applied	Theoretical contribution	Practical contribution
1	Wang L. et al.	How does leader perfectionism affect radical innovation?	343	Employees of SEMs, China	Leader perfectionism, Leader's conscientiousness, work engagement, promotion focus, radical innovation	Work engagement mediates; conscientiousness and promotion focus moderate.	JD-R theory,	Found that leader's other-oriented perfectionism boosts radical innovation via work engagement.	Incorporated both leader and follower traits in understanding innovation dynamics.
2	Li Y. et al.	How does craftsmanship spirit influence innovative behavior?	400	Skilled workers, Manufacturing, China	Craftsmanship spirit, Innovative self-efficacy, knowledge sharing, Innovative climate, Innovative behavior,	Mediated by self-efficacy and knowledge sharing; innovative climate as moderator.	Social Cognitive Theory: Social Exchange Theory:	Bridges mindset and behavior through dual mediators. Promoted the concept of craftsmanship as a psychological driver of innovation.	Emphasizes crafting spirit in HR practices.
3	Jiang B. et al.	How does overqualification relate to innovation performance via perfectionism and job crafting?	363	Employees, manufacturing and service, China	Perceived overqualification, Independent self-construction, perfectionism, job crafting, informal status, innovation performance	Chain mediation via perfectionism and job crafting; moderated by independent self-construction and informal status.	Trait Activation Theory	Shows double mediation and dual moderation effect. Framed perceived overqualification as a source of innovation via perfectionism and job crafting.	Reframes overqualification as a creative resource.
4	Lee and Kim	What drives innovative behavior in public organizations?	1,021	Public servants, South Korea	Public service motivation, organizational commitment, perceived innovative culture Innovative behavior	PSM drives innovation; organizational commitment not mediating; perceived innovative culture moderates PSM and innovation behavior.	Public Service Motivation Theory	Clarifies PSM and innovative culture effects on innovative behavior in public sector. Confirmed that PSM directly fosters innovation even when organizational commitment does not mediate.	Recommends PSM-based recruitment and cultural alignment. Showed that innovative culture strengthens the impact of motivation on innovation.
5	Yang et al.	How does entrepreneur creativity transform into organizational creativity?	458	Entrepreneurs and organization members, China	Entrepreneur creativity, platform leadership, org culture(moderator) Org creativity	Platform leadership mediates, org culture moderates transformation.	Social Exchange Theory, Social information processing theory Social cognitive theory	Extends understanding of top-down creativity transfer. Highlighted that platform leadership enables the transfer of entrepreneurial creativity to organizations.	Guides leaders to facilitate creativity diffusion.

(Continued)

10.3389/fpsyg.2025.1647616

TABLE 1 (Continued)

Creative and innovative behaviors in the modern workplace: causes and consequences									
No	Authors	Research questions	Num	Participants and country	Key variables studied	Findings	Theories applied	Theoretical contribution	Practical contribution
6	Jiang D. et al.	How do HIWPs influence elder employees' innovation performance?	278	Elder employees (>35), China	HIWPs, exploratory and exploitative innovation, transformational leadership innovation performance	Non-linear U-shaped and inverted U-shaped effects observed; transformational leadership moderates.	Social Exchange Theory Self-determination theory	Discovered nonlinear U-shaped and inverted-U effects of innovation strategies on older employees. Reveals complex dynamics of HIWPs and innovation forms.	Offers HR strategies for elder employees' innovation.
7	Liu et al.	How does humble leadership affect creative performance?	350	Employees and supervisors, Pakistan	Humble leadership, intrinsic motivation, work engagement creative performance	Intrinsic motivation and work engagement sequentially mediate humble leadership–creativity link.	Self-Determination Theory, JD-R model	Identified sequential mediation of intrinsic motivation and work engagement in creativity. Advanced leadership research by showing humble leadership's motivational power.	Promotes humble leadership as a creativity enabler.
8	Arshad et al.	How does HPWS impact innovation via social capital and knowledge-sharing?	262	Job incumbents, service firms, Pakistan	HPWS, social capital, knowledge sharing, need for cognition, Innovative behavior	HPWS promotes innovation via social capital and knowledge sharing; need for cognition moderates.	Social Exchange Theory, Elaboration Likelihood Model	Combines social/cognitive pathways to explain innovation behavior. Showed that social capital and knowledge sharing mediate the HPWS-innovation link.	Guides design of HPWS to foster innovation in knowledge firms.
9	Wang C. et al.	Does organizational ambidexterity mediate high performance HR practices - performance link? Does organizational learning moderate the organizational ambidexterity-performance link?	347	Senior managers of SMEs, China	HPHR practices, organizational ambidexterity, organizational learning Organizational performance	HPHR improves organizational performance; ambidexterity mediates; learning moderates.	Strategic human resource management theory, strategic management theory, contingency theory, organizational learning theory	Clarifies how organizational ambidexterity mediates HPHR practices-organizational performance relation. Revealed that organizational learning enhances the effect of HR practices through ambidexterity.	Suggests organizations to realize organizational ambidexterity by integrating HPHR practices, ultimately enhance organizational performance.
10	Li S. et al.	How can nudging push employees beyond comfort zones in green innovation?	2,253	Employees from manufacturing firms, China	Combination nudge, isolation nudge, green knowledge acquisition	Combined nudges (social norm + status) outperform individual ones; praise-before-pressure more effective.	Expectancy Theory	Expands expectancy theory in green learning via nudging mechanisms. Demonstrated that combining praise and social norm nudges is more effective than using pressure.	Offers effective nudging strategies for green innovation.

10.3389/fpsyg.2025.1647616

and cultures positively condition these relationships, strengthening their impact on creative and innovative behavior. Collectively, such findings offer valuable insights and practical approaches that can guide HR professionals in fostering organizational creativity and innovation from a non-technical perspective.

Notably, the studies also reveal moderated mediation mechanisms through which HR practices and leadership styles influence creative and innovative behavior, including organizational learning (Wang C. et al.), transformational leadership and leader's conscientiousness (Jiang D. et al.; Wang L. et al.). Jiang D. et al. examined nonlinear and cross-level dynamics, uncovering the nuanced relationships between factors such as organizational ambidexterity, transformational leadership, and innovation outcomes.

From a theoretical prestige, four articles utilized relational and exchange-based theories (Li Y. et al.; Yang et al.; Jiang D. et al.; Arshad et al.). This may hold particular significance for employers and managers who need to recognize this common interest in the workplace, as it suggests that individuals value reciprocation when they make efforts to contribute to the organization. One cannot expect employees to deliver top performance without providing them with adequate resources and appropriate rewards—such an expectation is akin to wanting to have one's cake and eat it too. The remaining articles drew on a broad range of psycho-social theories such as job demands—resources (JD-R) theory (Wang L. et al.; Liu et al.), trait activation theory (Jiang B. et al.), expectancy theory (Li S. et al.), self-determination theory (Liu et al.; Jiang D. et al.), and social cognitive theory (Li Y. et al.; Yang et al.) to explore how employees' creative and innovative behaviors are supported in the workplace.

The Research Topic contributes theoretically in two main ways: it combines various levels of analysis—individual, team, and organizational—to offer a comprehensive understanding of the factors leading to creativity and innovation. Additionally, they connect psychological and strategic viewpoints by correlating intrinsic motivation and cognition with performance outcomes at the firm level. From a practical standpoint, the findings suggest actionable strategies for organizations, managers, HR professionals such as creating tailored HR systems that signify commitment to employees; cultivate leadership that promotes motivation and engagement; acknowledge and utilize individual differences like over qualification or a craftsman spirit; and nurture organizational cultures that fostering knowledge sharing and learning, building social capital, and deploying behavioral nudges to enhance creativity and innovation. Such studies bridge theoretical gaps and provide a solid foundation for practical implementation in creativity- and innovation-driven organizations.

While the Research Topic provides solid and comprehensive contributions to both theory and practice, further research is still needed. For instance, studies have shown individuals' psychological capital significantly enhances employee performance, including employee creativity and innovation (Ghafoor and Haar, 2022; Tho, 2022). Creativity and innovation are highly cognitively demanding processes that consume personal resources (Serban et al., 2023; Sidelkivska and Bilbao-Calabuig, 2023), while psychological capital is a major individual psychological resource that acts as a major personal resource in support of employee creative and innovative behavior (Ghafoor and Haar, 2022). It encompasses hope, optimism, self-efficacy, and resilience, which are considered fundamental drivers of creative and innovative behavior (Luthans and Youssef-Morgan, 2017; Newman et al., 2014; Yu et al., 2019). However, there is a lack of understanding regarding the contexts and conditions that underlie the relationships between psychological capital, creativity, and innovation (Loghman et al., 2023; Lupsa et al., 2020). Accordingly, future research would benefit from examining how and when psychological resources can promote creative and innovative behavior in the workplace. In particular, further research is needed to gain a deeper understanding of how proximal factors in an employee's work environment, such as their job, either challenge or hinder their ability to engage in creative and innovative behaviors (De Clercq and Mustafa, 2024). Such efforts can advance our understanding of the conditions and boundaries that facilitate or inhibit the effective translation of psychological resources into creativity and innovation.

In the era characterized by rapid technological change, heightened unpredictability, and growing uncertainty, literature increasingly highlights creativity and innovation as vital drivers of organizational adaptability and long-term success (Sidelkivska and Bilbao-Calabuig, 2023; Zhou and Hoever, 2023). Advancing our understanding of creative and innovative behavior is essential for supporting employers, managers, and HR professionals in navigating these complex challenges. However, the number of empirical research studies in this Research Topic remains limited. Therefore, further scholarly efforts are warranted to conduct empirical studies to support and enable organizations to remain competitive and future-ready.

Author contributions

SH: Conceptualization, Writing – original draft, Writing – review & editing. MM: Writing – review & editing. MH: Writing – review & editing. DV: Writing – review & editing.

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.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

De Clercq, D., and Mustafa, M. J. (2024). How transformational leaders get employees to take initiative and display creativity: the catalytic role of work overload. *Personnel Rev.* 53, 488–507. doi: 10.1108/PR-02-2022-0090

Dwivedi, Y. K., Sharma, A., Rana, N. P., Giannakis, M., Goel, P., and Dutot, V. (2023). Evolution of artificial intelligence research in Technological Forecasting and Social Change: research topics, trends, and future directions. *Technol. Forecast. Soc. Change* 192:122579. doi: 10.1016/j.techfore.2023.122579

Ghafoor, A., and Haar, J. (2022). Does job stress enhance employee creativity? Exploring the role of psychological capital. *Personnel Rev.* 51, 644–661. doi: 10.1108/PR-08-2019-0443

Gu, X. J., Tong, D. D., Shi, P. Q., Zou, Y. C., Yuan, H., Chen, C., et al. (2023). Incorporating STEAM activities into creativity training in higher education. *Think. Ski. Creat.* 50:101395. doi: 10.1016/j.tsc.2023.101395

Loghman, S., Quinn, M., Dawkins, S., Woods, M., Sharma, S. O., and Scott, J. (2023). The comprehensive meta-analyses of the nomological network of psychological capital (PsyCap). *J. Leadersh. Organizat. Stud.* 30, 108–128. doi: 10.1177/15480518221107998

Lupsa, D., Vîrga, D., Maricutoiu, L. P., and Rusu, A. (2020). Increasing psychological capital: a pre-registered meta-analysis of controlled interventions. *Appl. Psychol.* 69, 1506–1556. doi: 10.1111/apps.12219

Luthans, F., and Youssef-Morgan, C. M. (2017). Psychological capital: an evidence-based positive approach. *Annu. Rev. Organizat. Psychol. Organizat. Behav.* 4, 339–366. doi: 10.1146/annurev-orgpsych-032516-113324

Newman, A., Ucbasaran, D., Zhu, F., and Hirst, G. (2014). Psychological capital: a review and synthesis. *J. Organ. Behav.* 35, S120–S138. doi: 10.1002/job.1916

Rietzschel, E. F., Ritter, S. M., and Baas, M. (2024). "A systematic review of creativity evaluation and creativity selection measurement tasks," in *Psychology of Aesthetics Creativity and the Arts*.

Serban, A., Kepes, S., Wang, W., and Baldwin, R. (2023). Cognitive ability and creativity: typology contributions and a meta-analytic review. *Intelligence* 98:101757. doi: 10.1016/j.intell.2023.101757

Sidelkivska, V., and Bilbao-Calabuig, P. (2023). Conceptualizing cognitive and behavioral elements of individual's creativity and innovation: systematic literature review. *Eur. J. Soc. Sci. Res.* 21, 190–195. doi: 10.1080/13511610.2023.2231161

Tho, N. D. (2022). Employees' psychological capital and innovation outputs: the roles of job crafting and proactive personality. *Innovation* 24, 333–353. doi: 10.1080/14479338.2021.1979987

Woods, S. A., Mustafa, M. J., Anderson, N., and Sayer, B. (2018). Innovative work behavior and personality traits: examining the moderating effects of organizational tenure. *J. Manag. Psychol.* 33, 29–42. doi: 10.1108/JMP-01-2017-0016

Yu, X. F., Li, D. H., Tsai, C. H., and Wang, C. H. (2019). The role of psychological capital in employee creativity. *Career Dev. Int.* 24, 420–437. doi: 10.1108/CDI-04-2018-0103

Zhou, J., and Hoever, I. J. (2023). Understanding the dynamic interplay between actor and context for creativity: progress and desirable directions. *Annu. Rev. Organ. Psychol. Organ. Behav.* 10, 109–135. doi: 10.1146/annurev-orgpsych-120920-055457

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 03 January 2024
DOI 10.3389/fpsyg.2023.1283637

Check for updates

OPEN ACCESS

EDITED BY
Mike James Mustafa,
University of Nottingham Malaysia, Malaysia

REVIEWED BY
Lutfihak Alpkan,
Istanbul Technical University, Türkiye
Mathew Hughes,
University of Leicester, United Kingdom

*CORRESPONDENCE
Hongtao Ma
✉ 983221109@qq.com

RECEIVED 26 August 2023
ACCEPTED 06 December 2023
PUBLISHED 03 January 2024

CITATION
Wang C, Zhang M and Ma H (2024) The more ambidexterity the better? The moderating effect of organizational learning between high-performance HR practices and organizational performance.
Front. Psychol. 14:1283637.
doi: 10.3389/fpsyg.2023.1283637

COPYRIGHT
© 2024 Wang, Zhang and Ma. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

The more ambidexterity the better? The moderating effect of organizational learning between high-performance HR practices and organizational performance

Canhao Wang[1,2], Meng Zhang[3] and Hongtao Ma[4]*

[1]Administration and Management Institute, Ministry of Agriculture and Rural Affairs School, Beijing, China, [2]Business School, Beijing Normal University, Beijing, China, [3]Business School, Shandong Normal University, Jinan, China, [4]The Tourism College of Shanghai Normal University, Shanghai, China

Objective: The objective of this study is to test the directly impact of high-performance HR practices on organizational performance, and the mediating effect of organizational ambidexterity empirically. Moreover, the moderating role of organizational learning in the relationship between ambidexterity and specialization in exploitation or exploration on firm performance has also been examined. Ultimately, we construct a moderated mediation model.

Methods: Questionnaires were distributed to the target enterprises mainly through the contacts of the research group members, the local management consulting association and the training opportunities for leaders. Finally, a total of 347 CEO questionnaire data were collected from Chinese SMEs. The sample cover Shanghai, Beijing, Chongqing, Jiangsu, Zhejiang, Guangdong, Henan, Sichuan and other eastern and central regions. SPSS 23.0 and AMOS 24.0 were used to analyze the data.

Results: The results revealed that high-performance HR practices had a positive effect on organizational performance and that organizational ambidexterity played a partially mediating role between high-performance HR practices and organizational performance. Further, organizational learning moderated the effects of organizational ambidexterity and organizational specificity on firm performance.

Discussion: This study provided valuable practical insights. On one hand, this study provides a concrete operational scheme for SMEs in China to realize organizational ambidexterity by integrating a series of HR practices such as employees' ability, motivation and opportunity. On the other hand, through organizational ambidexterity, firms can not only obtain organizational long-term performance by enhancing their new product R & D capabilities, that is, exploratory innovation, but also utilize their existing resources to improve and expand their existing products and services, that is, to achieve short-term performance by exploitative innovation.

KEYWORDS

high-performance HR practices, organizational ambidexterity, organizational learning, organizational performance, SMEs

1 Introduction

At present, the wave of economic globalization has deepened the economic ties between countries, and it has also intensified competition in domestic and foreign markets. For enterprises, in order to hire and retain excellent talents to gain their own competitive advantages, it is inseparable from the efficiency of human resources and human resource management. Therefore, effective management of organizational talent is widely recognized as a crucial factor for organizations to improve their competitiveness.

Over the past two decades, the strategic role of high-performance human resource (HR) practices has received considerable attention in management literature, e.g., the impact of high-performance HR practices on individual (Wood et al., 2012; Ma et al., 2021) and organizational performance (Kroff et al., 2017; Kirkpatrick and Hoque, 2022). Although most previous studies have confirmed the positive relationship between high-performance HR practices and organizational performance from behavioral, human capital, and resource-based perspectives, some scholars have questioned this hypothesis and reached opposite conclusions (Richard and Johnson, 2001; Batt and Colvin, 2011; Gardner et al., 2011). The inconclusive findings suggest that the theoretical logic underlying the mechanisms linking high-performance HR practices and organizational performance remains fragmented, and a deeper understanding of the relationship between the two is needed. This paper contributes to the existing literature in two aspects: First, focus on mediating factors that link high-performance human resource practices to corporate performance, e.g., organizational ambidexterity; second, explore the contextual factors (organizational learning) that may influence the impact of high-performance HR practices on firm performance.

Organizational ambidexterity originated from March (1991) and Tushman and O'Reilly (1996). They extended the exploration versus exploitation construct to define a new typology of technological innovation strategy along two generic dimensions: exploration innovation and exploitative innovation. If an organization scores high in both exploratory and developmental innovation strategies, we can consider it as organizational ambidexterity. In this case, the product of the two scores will be a good proxy measure of organizational ambidexterity (He and Wong, 2004). In this study, we attempt to examine the mediating role of organizational ambidexterity between high-performance HR practices and organizational innovation performance for the following reasons: First of all, More and more research on strategic human resource management (SHRM) has recognized employees at the individual level as important sources of competitive advantage for enterprises and believed that a system of human resource practices may enable firms to develop ambidexterity (Patel et al., 2013; Mom et al., 2019; Gürlek, 2021). For example, Swart et al. (2019) raised the senior employees are more likely to use "integration", "role expansion" and "tone setting", whilst employees with specialist knowledge about their clients use "gap filling" to enable ambidexterity. Furthermore, despite the general assumption that exploration and exploitation in organizational ambidexterity are often inconsistent or even contradictory, a series of theories and methods are adopted to solve the conflict between exploration and exploitation, such as different leadership styles at the individual level (Wang and Duan, 2018), top management team behavioral integration at the team level (Lubatkin et al., 2006) and organizational learning at the organizational level (Xu and Li, 2013), few studies have examined the role of human resource practices in the process of realizing organizational ambidexterity. Finally, although previous researches have confirmed that high-performance HR practices is the most direct prerequisite for organizational performance (van Esch et al., 2021), the internal mechanism of how high-performance HR practices affects organizational performance remains to be further explored, this manuscript attempts to examine the mediating role of organizational ambidexterity within this comprehensive framework.

In addition, this study suggests that there may be some situational factors, such as organizational learning, that enhance the positive relationship between organizational ambidexterity and organizational performance. Organizational learning refers to a process of acquiring, absorbing, integrating and applying internal and external knowledge and skills, and regards it as a dynamic capability that affects organizational innovation performance (Baker and Sinkula, 1999; Carmeli et al., 2010). First of all, due to the lack of theoretical support, there are still many uncertainties in the relationship between organizational ambidexterity and organizational performance. For example, there is a positive correlation between organizational ambidexterity and organizational performance (Voss and Voss, 2013), and the inverse U-shaped influence (Caspin-Wagner et al., 2012) and negative correlation (Junni et al., 2013). These results show that there is a contingency effect between organizational ambidexterity and organizational performance. Unfortunately, however, there are few studies on this contingency effect. Furthermore, organizational learning can effectively help enterprises identify new internal and external information, and better manage cognitive overload caused by organizational ambidexterity through knowledge transformation, which enables organizations to not only utilize existing knowledge to improve their profitability, but also develop new knowledge to enhance their ability to adapt to new radical changes, ultimately achieving a synergistic effect between exploration and utilization. Therefore, organizational learning is beneficial for enterprises to more effectively acquire, absorb, transform, and apply knowledge, which is conducive to overcoming the trade-offs between simultaneous exploration and exploitation, promoting the advantages of organizational ambidexterity, and transforming it into an improvement in organizational performance. In conclusion, this paper attempts to examine the moderating role of organizational learning between organizational ambidexterity and organizational performance, which can serve as a trigger for organizations to prefer a certain strategy to a certain extent. Additionally, recent researches on other internal and external contingency factors between organizational ambidexterity and organizational performance mainly includes environmental uncertainty (Uotila et al., 2009), organizational redundant resources (Fu et al., 2016), organizational dynamic environment (Chang, 2016), absorptive capacity (Solís-Molina et al., 2018) and dynamic capabilities (Jin et al., 2019).

Therefore, drawing on the strategic human resource management theory, strategic management theory (this article conceptualizes organizational ambidexterity as a strategic perspective), and contingency theory (organizational learning is seen as an intrinsic contextual variable), this study reveals the mediating role of organizational ambidexterity between high-performance HR practices and organizational performance, and takes organizational learning as a moderating variable to further investigate the relationship between organizational ambidexterity and organizational performance.

Ultimately, we constructs a moderated mediation model as shown in Figure 1.

2 Theoretical background and hypothesis development

2.1 Strategic human resource management

In recent years, with the increasing market environment of VUCA and market competition, based on the original human resource management theory, strategic human resource management has gradually become a hot topic in academia and industry (Sun et al., 2007). Drawing on the resource-based view, strategic human resource management scholars argue that high-commitment human resource strategy gains a competitive advantage by create a larger pool of enterprise-level human resources that are unique and valuable. Different from traditional human resource management that has been critiqued for its failure, or conceptual inability (Harney and Collings, 2021), strategic human resource management is shifting to a more nuanced conceptualization and measurement of HR practices (e.g., flexibility, job design, etc.), which emphasizes the construction of reasonable human resource practices by influencing employees' attitudes and behaviors (Boon et al., 2019). Consequently, the research of strategic human resource management examines the impact of high-performance HR practices on organizational performance. Bamberger and Meshoulam (2000) believed that high-performance HR practices were composed of a series of policies and measures that can significantly enhance employees' working ability, motivation and participation opportunities. Sun et al. (2007) divided the dimensions of high-performance HR practices into three dimensions: ability-enhancing practice, motivation-enhancing practice, and opportunity-enhancing practice, which included eight aspects. The current researches on high-performance HR practices are mainly based on the results-oriented to examine its impact on the individual level and organizational level (Castanheira and Story, 2016; Iyanda Ismail et al., 2021; el-Kassar et al., 2022; Hauff et al., 2022). Therefore, based on the theory of human strategic human resource management, this study attempts to investigate the internal mechanism of high performance human resource management practices on organizational performance.

2.2 Organizational ambidexterity

Ambidextrous organizations advocated for having two different abilities, i.e., exploratory ability and exploitative ability, to enhance their core competitiveness in an increasingly competitive environment (Duncan, 1976). March (1991) innovatively divided organizational learning into exploratory learning and exploitative learning. Subsequently, Tushman and O'Reilly (1996) raised organizational ambidexterity to the theoretical level based on March's research, pointing out that organizations should not only meet the needs of external environmental changes (exploratory ability), but also focus on the ability to meet current organizational needs (exploitative ability), which means that organizational ambidexterity must meet the needs of both current and future development of organizations. Current researches on organizational ambidexterity mainly focuses on antecedents including individual level, team level and organization level (Alghamdi, 2018; Luo et al., 2018; Chen et al., 2019; Mammassis and Kostopoulos, 2019; Guo et al., 2022; Wang et al., 2023). Specifically, at the individual level, the researchers examined the impact of different leadership styles on organizational ambidexterity. For example, at the individual level, CEO, as a key decision maker for the success and development of the organization has played a guiding role in organizational ambidexterity (Wang et al., 2023). At the team level, it mainly examines the impact mechanism of diversity, heterogeneity and cognitive structure of top management team on organizational ambidexterity. For example, Chen et al. (2019) believed the time horizon mean and diversity possessed by TMT can individually and interactively influence organizational ambidexterity. Similarly, at the organizational level, most studies on organizational dualism mainly focus on organizational strategy, organizational structure and organizational context (Jansen et al., 2009; Alghamdi, 2018). Hughes et al. (2021) proposed the term "innovation ambidexterity" and examined the impact of strategic entrepreneurship on innovation ambidexterity and expected that subsequent innovation

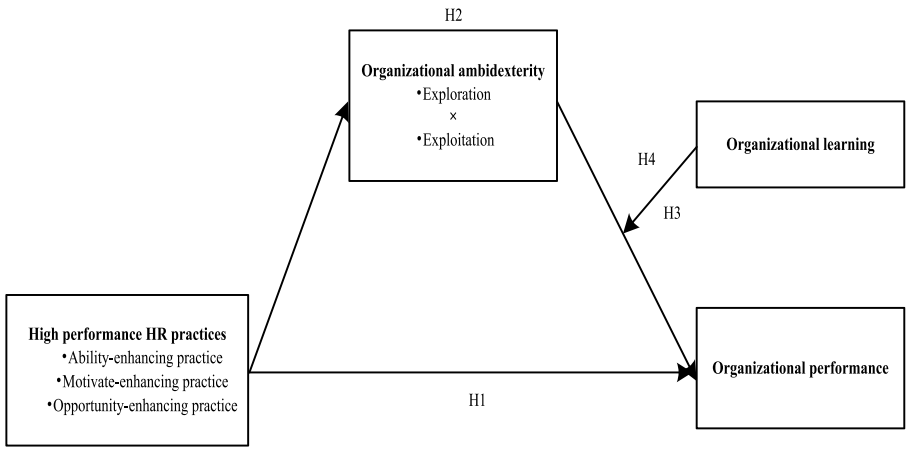


FIGURE 1
Theoretical research model.

ambidexterity affected profitability in the young technology-based firms. Generally, organizational structure is considered as the macro antecedent of organizational ambidexterity, while organizational context is the micro antecedent of organizational ambidexterity. Therefore, this study tries to combine organizational ambidexterity with high-performance HR practices to investigate the mechanism of organizational performance.

2.3 From high-performance HR practices to organizational ambidexterity: establishing the links

Previous studies have shown different ways to achieve organizational ambidexterity (O'Reilly and Tushman, 2013; Heracleous et al., 2017; Umans et al., 2018). Organizational ambidexterity means that employees can decide when to focus on exploratory activities and when to focus on exploitative activities, which enables employees to pursue both exploratory activities and exploitative activities simultaneously, thus providing theoretical possibilities to promote the realization of organizational ambidexterity from the perspective of high performance HR practices at the employee level.

Currently, the impact of high performance HR practices on organizational ambidexterity mainly lies in the consistency and adaptability necessary to generate organizational ambidexterity. Such as staff recruitment, selection and training as the main form of ability-enhancing HR practices and performance management, incentive compensation as the main form of motivation-enhancing HR practices will motivate employees to achieve organizational expectations, and induce employees to fight for more ambitious goals by establishing the common aspiration and collective identity, which will help employees to create value in the short term, thus promoting the consistency of organizational ambidexterity. Opportunity-enhancing HR practice, mainly in the form of internal promotion opportunities, job security, information sharing and decision-making participation will make employees believe that they are the most valued member of the organization, which will help to cultivate trust among employees and form a good organizational atmosphere; In addition, by providing smooth promotion channels, organizations can make employees willing to take risks to explore and innovate. Therefore, opportunity-enhancing HR practice promotes the adaptability of organizational ambidexterity. To some up, ability-enhancing HR practice and motivation-enhancing HR practice can help employees acquire the knowledge, skills and abilities to effectively fulfill current job demands in a productive manner (exploitive activities); Opportunity-enhancing HR practice can bring a greater sense of trust and support within the organization. In this situation, it is conducive to knowledge sharing and exchange among employees, thus helping the organization to put forward more innovative solutions (exploratory activities). A recent study on the Spanish hotel industry has confirmed that a series of activities such as ability, motivation and opportunity contained in high-performance HR practices will positively affect organizational ambidexterity, for example, ability-enhancing HR practice can not only closely match personal skills with job requirements to pursue short-term value creation, but also help employees participate in decision-making and information sharing to pursue exploratory innovation, that is, ability-enhancing HR practice can promote organizational exploitative activities and exploratory activities simultaneously; Based on the data of 84 multinational M&A enterprises from emerging economies, Rao-Nicholson et al. (2020) confirmed that high performance HR practices have a positive impact on organizational ambidexterity. Based on the above, we propose that high-performance HR practices may promote the realization of organizational ambidexterity. Therefore, we hypothesize the following:

> *H1:* High-performance HR practices is positively correlated with organizational ambidexterity.

2.4 The mediating role of organizational ambidexterity

In this research, we refer to the research of Bamberger and Meshoulam (2000), and divide high-performance human resource practices into three dimensions: ability-enhancing practice, motivation-enhancing practice and opportunity-enhancing practice. First, ability-enhancing HR practice including staffing and employee training will directly affect employees' work efficiency through their knowledge, skills and work ability. Through systematic training, the recruited employees can transform their existing knowledge and skills into new knowledge, and constantly expand the breadth and depth of knowledge to create new organizational knowledge pool, which is also crucial to the improvement of organizational performance (van Esch et al., 2021). Second, motivation-enhancing HR practices generally include formal performance appraisal, skill-based compensation and incentive compensation, these competitive compensation initiatives can attract and retain more valuable talent. Moreover, skill-based compensation and incentive compensation will provide incentives for the extra effort and are often positively related to employees' organizational citizenship behavior (van Esch et al., 2021). Therefore, employees' awareness of self-learning and self-skill improvement will be further enhanced, and they will more inclined to apply their skills to organizational performance (Chiang and Birtch, 2012). Finally, opportunity-enhancing practice is found that when employees are given autonomy to participate in the strategic decision-making of the organization, they may be more willing to take risks, and try to actively seek new organizational solutions to handle the challenges, which will effectively meet the needs of organizational performance improvement. Therefore, this paper believes that high-performance HR practices may promote the realization of organizational ambidexterity. For example, Zhou et al. (2021) confirmed the positive correlation between organizational ambidexterity and organizational performance.

High performance HR practices are a set of management measures and means aimed at influencing employees' attitudes and behaviors, thereby further affecting organizational performance. However, generally speaking, the improvement of organizational performance does not directly come from high-HR practices themselves (Crook et al., 2011; Ployhart and Moliterno, 2021), but from the application of these human resource practices and the ability of employees to pursue both exploratory and exploitative activities, that is, organizational ambidexterity. Specifically, both the cultivation of exploitative capability and exploratory capability depend on the strategic goal of the enterprise as the guidance and direction.

Moreover, the matching organizational resources are also required to provide guarantee and support for the realization of organizational ambidexterity. In particular, high-performance HR practices can bring process advantages such as learning and innovation to organizations, thus promoting the improvement of organizational performance. Finally, according to the resource-based view, high-performance HR practices can also improve organizational performance by developing and testing key internal capabilities, such as organizational ambidexterity, so that organizations can obtain lasting competitive advantages (Chadwick and Cappelli, 1999). For example, on one hand, high-performance HR practices can improve organizational short-term performance by improving the knowledge, skills and ability of employees to maintain and consolidate the existing market and reduce the operating cost of the enterprise. On the other hand, high-performance HR practices can also improve employees' risk-taking and exploratory abilities by providing them with internal promotion opportunities, job security, information sharing, and decision-making participation, which will help organizations to have more innovative solutions to enhance their flexibility and defense against market changes, thus contributing to the sustainable dynamic competitiveness.

Based on the above, this study constructs a complete chain of high-performance HR practices-organizational ambidexterity-organizational performance. In other words, the positive effects of high-performance HR practices may flourish in the form of both exploration and exploitation capabilities or outcomes, i.e., organizational ambidexterity. Therefore, we hypothesize the following:

> *H2:* The positive effect of high-performance HR practices on firm performance is mediated by organizational ambidexterity.

2.5 The moderating role of organizational learning

Organizational ambidexterity, as an organization's ability to pursue exploratory innovation and exploitative innovation at the same time, has long been considered important for the survival and success of organizations (Kafetzopoulos, 2021; Solís-Molina et al., 2022). However, there is also some empirical evidence that organizational ambidexterity has mixed effects on performance, i.e., there are complex relationships of positive correlation, negative correlation and even no correlation between organizational ambidexterity and organizational performance, these findings are consistent with the concern of Gupta et al. (2006), that is, organizational ambidexterity is sometimes ineffective for organizational performance, which also makes organizational specificity strategy focusing on either exploratory activities or exploitative activities better than organizational ambidexterity. When organizations adopt a specific strategy, they can concentrate on a large amount of resources in a certain field, thus avoiding the tensions that arise from competing for an organization's limited resources. However, organizational specificity also has its shortcomings, which may lead organizations to fall into the "success trap" caused by excessive attention to exploitative activities, or may also lead organizations to fall into the "failure trap" due to excessive attention to exploratory activities, resulting in the negative effect of self-reinforcing brought by exploratory activities and exploitative activities. So, under what circumstances, which strategy (organizational ambidexterity and organizational specificity) will have a more positive impact on organizational performance? Therefore, this paper attempts to investigate the contingency effect of organizational learning between organizational ambidexterity and organizational performance.

Organizational learning theory holds that enterprises can help themselves identify the value of new internal and external information through organizational learning and apply it to business purposes, which enables organizations to improve organizational performance through interaction with the environment and other companies at the inter-organizational level. The current measurement of organizational learning is mainly based on Baker and Sinkula's (1999) research, which divides organizational learning into three dimensions: vision sharing, open mind, and learning commitment. Considering that this research examines the moderating effect of organizational learning, in order to avoid unnecessary confusion, we treat organizational learning as a single structure without separately hypothesizing and testing the effects of each dimension. Based on the knowledge transformation path related to organizational learning ability proposed by Fernhaber and Patel (2012), this study argues that when the organizational learning level is high, organizations can better manage the cognitive load caused by organizational ambidexterity, so that organizations can not only utilize the existing knowledge to improve their profitability in the technology cycle, but also develop new knowledge to enhance company's ability to adapt to new radical changes, and ultimately achieve synergy between exploration and exploitation. Therefore, high-level organizational learning can enable enterprises to acquire, absorb, transform and apply knowledge more effectively, enable companies to overcome the trade-offs between exploration and exploitation simultaneously, promote the advantages of organizational ambidexterity, and finally translate it into the improvement of organizational performance.

On the contrary, at low organizational learning level, enterprises are unable to effectively absorb and utilize internal and external knowledge simultaneously, they have to only concentrate limited resources on exploration or exploitation. Specifically, at the initial stage of the enterprise life cycle, due to the fact that the new technology has not yet developed to a mature commercial application stage, combined with the low level of organization learning, the knowledge required for exploratory activities has not been fully developed. In this case, if precious resources are invested in exploitative activities, a lot of time and money will be wasted. Therefore, at low organizational learning level, organizational specificity strategy that specialize in exploratory activities are more effective than organizational ambidexterity. However, in the mature period of technology, the core technology mastered by enterprises has matured and there is no room for further development. In this case, if enterprises blindly pursue exploration, they will fall into a vicious circle of failure. Therefore, it will be more beneficial for the organizational performance to focus on exploitive activities. In addition, the low level of organizational learning means that organizations cannot acquire existing knowledge and new knowledge at the same time, that is, enterprises are unable to integrate exploration and exploitation. Ultimately, at low organizational learning level, organizations pursuing exploration and exploitation simultaneously will reduce organizational performance. Ebben and Johnson (2015) proved that when an enterprise pursues a specific strategy, it will achieve better performance than pursuing two or more strategies at the same time. Therefore, in enterprises with low organizational learning level, organizational specificity strategy is preferable to organizational ambidexterity.

In conclusion, this paper argues that, at low organizational learning level, organizational specificity, which focuses on exploratory activities or exploitative activities, can improve organizational performance more than organizational ambidexterity. On the contrary, at high-level organizational learning, organizations can not only improve the existing knowledge pool, but also absorb and digest new knowledge and implement knowledge innovation, thus helping to realize the synergy between exploratory activities and exploitative activities. Organizational ambidexterity can achieve better organizational performance than organizational specificity strategy.

Therefore, we hypothesize the following:

> *H3:* Organizational learning positively moderates the positive relationship between organizational ambidexterity and organizational performance.

In order to better compare and analyze the contingency effect of organizational learning in the process of organizational ambidexterity and organizational specificity on organizational performance, we further propose the following hypothesis based on H3:

> *H3a:* At a high-levels of organizational learning, organizational ambidexterity is more effective in improving organizational performance than organizational specificity strategy that only focuses on exploitative activities.
>
> *H3b:* At high-levels of organizational learning, organizational ambidexterity is more effective in improving organizational performance than organizational specificity strategy that only focuses on exploratory activities.
>
> *H3c:* At low-levels of organizational learning, organizational specificity strategy focusing only on exploitative activities is more effective in improving organizational performance than organizational ambidexterity.
>
> *H3d:* At low-levels of organizational learning, organizational specificity strategy focusing only on exploratory activities is more effective in improving organizational performance than organizational ambidexterity.

Based on the above hypothesis, when the level of organizational learning is high, the high-performance HR practices such as capability enhancement practice, motivation enhancement practice and opportunity enhancement practice can be better applied to the consistency and adaptability of organizational ambidexterity. For example, when the level of organizational learning is high, employees often tend to possess rich knowledge, skills, and abilities to effectively meet their current work needs in a productive manner (exploitative activities). At the same time, based on the good organizational learning atmosphere formed within the enterprise, it is conducive to knowledge sharing and communication among employees, thereby helping the organization propose more innovative solutions (exploratory activities) to ultimately promote the improvement of organizational performance. Therefore, we believe that with the improvement of organizational learning level, high-performance human resource practices can better enhance organizational performance through organizational ambidexterity. Finally, we propose hypothesis 4:

> *H4:* Organizational learning positively moderates the mediating effect of organizational ambidexterity on the relationship between high-performance HR practices and organization performance.

A moderated mediation framework and hypotheses are illustrated in Figure 1.

3 Methodology

3.1 Sample and data collection

To test the hypotheses, questionnaire survey was used in this paper. Drawing on the existing scales in foreign literature, we adopted the method of two-way translation to construct the initial scale. In order to better fit the management problems in the Chinese context, this paper first conducted a pre-test. Based on 78 valid questionnaires collected from the predictive test, we analyzed the reliability and validity of the initial scale and further modified the original scale according to the results. In addition, we also invited four scholars with rich theoretical background and senior managers with front-line practical experience to put forward their own opinions and suggestions on the questionnaire items, and the formal scale was constructed finally. The formal investigation was conducted from September 2020 to February 2021. In view of existing studies, compared with large enterprises, it is more instructive to explore how to achieve organizational ambidexterity and improve organizational performance of SMEs. In this study, the senior managers of SMEs were selected as the research object. The questionnaire targets were obtained through the social relationship of research members, enterprise management consulting associations and training opportunities for leaders. The distribution methods were adopted by hand and online. A total of 611 target enterprise CEO questionnaire data were collected. The incomplete and invalid questionnaires were eliminated, finally, a valid questionnaire was obtained from 347 SMEs, with a questionnaire efficiency of 56.8%. The samples cover Shanghai, Beijing, Chongqing, Jiangsu, Zhejiang, Guangdong, Henan, Sichuan and other eastern and central regions, and the potential impact of geographical differences is mitigated to some extent.

3.2 Measurement

The used measurements in this paper is based on the foreign mature scale, and forms the final questionnaire through the pre-test method. Except for control variables, all variable items are anchored on a 5-point Likert scale, ranging from "1" to "5," representing "strongly disagree" to "strongly agree," respectively.

3.2.1 High-performance HR practices

At present, the measurement of high performance HR practices is mainly derived from three comprehensive measures:(1) turnover, including staffing, career security, selection and training; (2) evaluation and rewards, including flexible work design, performance appraisal, incentive compensation and internal promotion; and (3)

employment relations, including job design and employee participation. We used the scale developed by Sun et al. (2007) to measure high-performance HR practices with a total of 22 items from three aspects of employees' ability, motivation and opportunity.

3.2.2 Organizational ambidexterity

Currently, the most widely used measure of organizational ambidexterity is the five-point Likert-type scale by He and Wong (2004). The scale is mainly composed of eight items. The first four items measure the company's exploratory activities, and the last four items are related to the company's exploitative activities. Based on an accurate calculation of organizational ambidexterity must account for both balance and magnitude but must also correct the flaw in the balance calculation, we draw on the measurement method of Hughes et al. (2021), and the final mathematical calculation for innovation ambidexterity is

$$\text{Innovation Ambidexterity} = \sum\left(\left(\text{Explore}\times\text{Exploit}\right) - \sqrt{\left(\text{Explore}-\text{Exploit}\right)^2}\right).$$

3.2.3 Organizational learning

About the measurement of organizational learning, there are multiple maturity questionnaire. We adopted the scale developed by Baker and Sinkula (1999), which had been proved to have strong reliability and validity by a large number of studies. It divided organizational learning into three dimensions, including vision sharing, open mind and learning commitment. Vision sharing consisted of four items, learning commitment and open mind had three items respectively, 10 items in total. It is worth noting that we treat organizational learning as a single structure and do not discuss the moderating effects of the three dimensions separately.

3.2.4 Organizational performance

Considering that the research object of this paper is SMEs, and most of them are non-listed enterprises, it is difficult to obtain indicators of organizational performance from the public database, such as the number of corporate patents and R&D costs. Therefore, based on the organizational performance scale revised by Jiménez-jiménez and Sanz-valle (2008), we adopted subjective measurement method to investigate the overall operation of enterprises in the past 3 years in terms of market share, profitability, productivity level and customer satisfaction, with a total of four items.

3.2.5 Control variables

Considering that the nature of the enterprise, age of establishment, size of firm and industry type may have an impact on organizational ambidexterity and organizational performance, this paper takes them as control variables. We divide the nature of enterprises into two categories: private enterprises and non private enterprises. The size of firm is reflected in the natural logarithm of the number of each firm. Firm age is reflected in the natural logarithm of the number of years it has been established +1. We controlled for industry type onto profitability and respondents self-identified their industry. Descriptive statistics and correlations of variables are shown in Table 1.

4 Results

4.1 Reliability and validity

Exploratory factor analysis (EFA) was employed to assess the reliability of the scales. We calculated Cronbach's α and composite reliability (CR) scores. First, based on the reliability analysis, the Cronbach's α values of high-performance HR practices, organizational ambidexterity, organizational learning and organizational performance were 0.929, 0.862, 0.904 and 0.819, respectively, and the value of each variable exceeded the threshold level of 0.70, providing adequate internal consistency.

Second, we also calculated the KMO values and the Bartlett values of each variable to confirm whether scales are suitable for factor analysis. The KMO of high-performance HR practices, organizational ambidexterity, organizational learning and organizational performance were 0.930, 0.902, 0.917, and 0.787, respectively, which met the threshold of 0.7, and the Bartlett values had a statistically significant level (Sig = 0.000), which indicated that our study was suitable for factor analysis. Subsequently, we used principal component analysis and the maximum variance rotation method to calculate the factor loadings (See the Appendix). All items had statistically significant loadings of over 0.50, indicating high convergent validity. In terms of explaining the total variation, the

TABLE 1 Descriptive statistics and correlation matrix.

Variable	Mean	SD	1	2	3	4	5	6	7	8
Corporate nature	2.22	0.96	1							
Firm age	5.62	1.98	0.084	1						
Firm size	4.44	1.62	0.103	0.431**	1					
Industry type	4.04	2.37	−0.055	0.028	−0.055	1				
HPHRP	3.74	11.68	−0.041	−0.109*	−0.012	−0.082	**0.709**			
OA	3.91	5.38	0.002	−0.054	−0.032	−0.018	0.404*	**0.795**		
OL	3.54	6.70	−0.002	−0.099	−0.017	−0.061	0.515**	0.527**	**0.757**	
OP	3.81	3.05	0.040	0.180*	0.076	−0.050	0.569**	0.496**	0.553**	**0.836**

The diagonal elements (in bold) are the square root AVE of each variable.

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

HPHRP, High-performance HR practices; OA, Organizational ambidexterity; OL, Organizational learning; OP, Organizational performance.

TABLE 2 Confirmatory factor analysis results.

Models	γ^2	df	γ^2/df	RMSEA	NFI	CFI	TLI
Five-factor model	338.693	128	2.646	0.069	0.905	0.938	0.928
Four-factor model	342.523	129	2.646	0.066	0.902	0.925	0.928
Three-factor model[a]	544.104	132	4.122	0.085	0.852	0.884	0.864
Three-factor model[b]	368.786	132	2.794	0.076	0.901	0.923	0.918
Two-factor model	749.481	134	5.493	0.105	0.803	0.821	0.792
Single-factor model	843.616	135	6.249	0.121	0.768	0.793	0.762

Five-factor model: high-performance HR practices, organizational ambidexterity, organizational learning, organizational performance, non-measurable methodological factor; Four-factor model: high-performance HR practices, organizational ambidexterity, organizational learning, organizational performance; Three-factor model[a]: high-performance HR practices + organizational ambidexterity, organizational learning, organizational performance; Three-factor model[b]: high-performance HR practices + organizational learning, organizational ambidexterity; organizational performance; Two-factor model: high-performance HR practices + organizational ambidexterity, organizational ambidexterity + organizational performance; Single-factor model: high-performance HR practices + organizational ambidexterity + organizational learning + organizational performance. "+" means fusion.

variance contribution rate of each variable was more than 50%, indicating that the scales had good construct validity.

Finally, based on the factor loadings and we calculated CR and showed that the values for all the variables ranged from 0.903 to 0.956, which exceeded the threshold level of 0.60, once again proving that the scales had good reliability. In addition, the AVE square root of each variable calculated is greater than the correlation coefficient of the row and column, as shown in the diagonal of Table 1. Every value exceeded the 0.50 cutoff, indicating that the study had high convergent validity.

In terms of discriminant validity, confirmatory factor analysis was used to test. First, the four latent variables, i.e., high-performance HR practices, organizational ambidexterity, organizational learning and organizational performance, involved in this paper are taken as the reference model. Then, through the induction and integration of the above four latent variables, four competition models including three-factor model[a], three-factor model[b], two-factor model and single-factor model are finally generated, respectively. Finally, γ^2/df, RMSEA, NFI, CFI, and TLI were used to illustrate the fitting indices of the established models. As shown in Table 2, in the four-factor model, all the fitting indicators accepted the requirements (RMSEA < 0.08, NFI > 0.90, CFI > 0.90, TLI > 0.90) and were statistically significant compared with other nested models (three-factor model[a], three-factor model[b], two-factor model, and single-factor model), which further indicated that this study had significant discriminant validity.

4.2 Common method variance

This study adopted the unmeasurable latent method factor technique to address common method variance (CMV) concerns. First, based on the four factor model, the common method variance factor (CMV) is entered into the structural equation model as a potential variable to construct a five factor model, and its variance is set as "1," and the load path of CMV affecting each index variable is set as "a." Next, by testing the fitting indicators of the five-factor model, we could verify whether there is a common method variance. The judgment criteria are as follows: after adding the unmeasurable latent method factor, if the fitting indices are significantly improved, such as when the values of CFI, TLI and NFI increase by more than 0.1, and the values of RMSEA and RMR decrease by more than 0.05, it indicates that there is a serious common method variance. As shown in Table 2, compared with the reference model, i.e., the four-factor model, the fitting indices of the five-factor model do not improve, and the results do not meet the above judgment criteria, indicating that the fitting indices are not significantly improved after adding the unmeasurable latent method factor. Therefore, this study believes that there is no serious common method variance.

4.3 Tests of hypotheses

We used tolerance and variance inflation factor (VIF) to test multi-collinearity problems. The results showed that the tolerance of each variable was great than 0.1, and the VIF values were less than 2, which were far below the threshold level of 10. Therefore, there is no serious multi-collinearity problem in this study. Then, hierarchical regression analysis was used to estimate the above hypotheses.

4.3.1 The main effect test

Based on the model M3, we introduced four control variables and the independent variable of high-performance HR practices into the regression equation as shown in Table 3. According to the model M4, the high-performance HR practices had a significantly positive impact on organizational performance ($\beta = 0.598$, $p < 0.001$). Therefore, *H1* is supported.

4.3.2 The mediating effect test

Referring to the research of Baron and Kenny (1986), the test steps of this paper were as follows: First, the main effect of high-performance HR practices and organizational performance was estimated; then, we examined the direct effect of high-performance HR practices on mediating variable, i.e., organizational ambidexterity. Last, we incorporated high-performance HR practices and organizational ambidexterity into the regression equation simultaneously to test the mediating effect.

As shown in Table 3, the model M2 showed that high-performance HR practices had a significant positive effect on organizational ambidexterity ($\beta = 0.698$, $p < 0.001$). Moreover, we found that the model M4 supported the positive impact of high-performance HR practices on organizational performance ($\beta = 0.598$, $p < 0.001$). The model M5 incorporated high-performance HR practices and organizational ambidexterity into the regression equation simultaneously. Regression result showed that organizational ambidexterity had a significant positive effect on organizational performance ($\beta = 0.121$, $p < 0.001$). Further, the influence of

TABLE 3 Regression analysis of high-performance practices and organizational performance.

Variable	Organizational ambidexterity		Organizational performance		
	M1	M2	M3	M4	M5
Control variables					
Corporate nature	0.007	0.035	0.022	0.046	0.041
Firm age	−0.068	0.017	0.183***	0.255***	0.253***
Firm size	−0.013	−0.041	−0.008	−0.032	−0.026
Industry type	−0.021	0.034	−0.054	−0.007	−0.012
Independent variables					
High-performance HR practices		0.698***		0.598***	0.481***
Mediating variables					
Organizational ambidexterity					0.121***
F	0.524	65.207	3.152	42.780	36.228
R^2	0.006	0.421	0.036	0.385	0.401
$\triangle F$	0.524	322.11	3.125	182.047	6.552
$\triangle R^2$	0.006	0.415	0.036	0.339	0.016

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

high-performance HR practices on organizational performance was still significantly positive ($\beta = 0.481$, $p < 0.001$), which meant that organizational ambidexterity played a partial mediating role between high-performance HR practices and organizational performance. Therefore, *H2* was also supported.

4.3.3 The moderating effect test

By introducing two-way interactions of organizational learning with exploitation and exploration, and a three-way interaction with organizational ambidexterity, this paper attempted to compare the different effects of organizational ambidexterity and organizational specificity on organizational performance and test the moderating role of organizational learning. Following Voss and Voss (2013), the impact of organizational ambidexterity on organizational performance was estimated as the effect of increasing exploitation (or exploration) when exploration (or exploitation) are set at high levels. Likewise, the impact of specialization in exploitation (or exploration) was estimated as the effect of increasing exploration (or exploitation) with exploration (or exploitation) set at low levels. This allowed us to compare the effect on organizational performance of organizational ambidexterity with the effect of specialization in exploitation or exploration.

This paper used hierarchical regression method to estimate three nested models. To avoid multi-collinearity due to the presence in the same equation of first order and interaction terms, the VIFs after centralized were all below the critical value of 10. Ultimately, three nested model with hierarchical regression analysis were constructed, as shown in Table 4. First, the model M6 incorporated the control variables such as corporate nature, firm age, firm size and industry type into the regression equation to test its impact on organizational performance. Then, the model M7 introduced variables such as exploratory activities, exploitative activities and organizational ambidexterity on the basis of model M6. Subsequently, the model M8 included organizational learning, interactive items of organizational learning and exploratory activities, organizational learning and exploitative activities, organizational learning and organizational ambidexterity, respectively. According to model M7, the regression coefficient of the interaction between organizational learning and exploratory activities on organizational performance was positive ($\beta = 0.048$, $p < 0.05$), indicating that organizational learning positively moderated the impact of exploratory activities on organizational performance; On the contrary, the regression coefficient of the interaction between organizational learning and exploitative activities on organizational performance was negative ($\beta = -0.136$, $p < 0.05$), indicating that organizational learning negatively moderated the impact of exploitative activities on organizational performance; Finally, the regression coefficient of the interaction between organizational learning and organizational ambidexterity on organizational performance was positive ($\beta = 0.228$, $p < 0.01$), indicating that organizational learning positively moderated the impact of organizational ambidexterity on organizational performance. Therefore, *H3* and *H4* are preliminarily supported.

4.3.4 The moderated mediating effect test

To test organizational learning in moderating the mediating effect of organizational ambidexterity between high-performance HR practices and organizational performance, we continued to use bootstrapping procedures (with 5,000 samples), and the confidence interval was also 95%. Based on the mean value of moderating variables ± SD, we distinguished two categories from organizational learning: high organizational learning and low organizational learning.

The results of moderated by organizational learning. As shown in Table 5, under the organizational learning level of ± S.D., the indirect impact of high-performance HR practices on organizational performance through organizational ambidexterity is 0.004 when organizational learning is at a high level, and the 95% bootstrap confidence interval excludes 0 (LLCI = 0.0264, ULCI = 0.2388). The results of this analysis confirm that at a high level of organizational learning, high-performance HR practices through organizational ambidexterity has a significant positive indirect effect on organizational performance. In addition, when organizational learning is at a low level, the indirect impact of high-performance HR

10.3389/fpsyg.2023.1283637

TABLE 4 Results of regression analysis of the moderating effect of organizational learning.

Variable	Organizational performance			
	M6	M7	M8	VIF
Control variables				
Corporate nature	0.022	0.022	0.012	1.028
Firm age	0.183**	0.218***	0.203***	1.290
Firm size	−0.008	−0.030	−0.021	1.336
Industry type	−0.054	−0.039	−0.016	1.018
Independent variables				
Exploratory activities		0.367***	0.204**	2.655
Exploitative activities		0.254***	0.171*	2.595
Organizational ambidexterity		0.146**	0.049	5.985
Moderating variable				
Organizational learning			0.479***	1.789
Interaction				
Organizational learning*Exploration			0.048*	4.015
Organizational learning*Exploitation			−0.136*	5.386
Organizational learning*Ambidexterity			0.228**	7.224
F	3.170	19.723	20.045	
R^2	0.036	0.286	0.418	
$\triangle F$	3.170	39.487	18.673	
$\triangle R^2$	0.036	0.250	0.132	

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

TABLE 5 Analysis of the moderated mediation model.

Moderating variable	Moderated by organizational learning			
	Direct effect	Indirect effect	Direct effect 95% CI	Indirect effect 95% CI
Mediation condition				
High organizational learning	0.112	0.004	[−0.0119, 0.1567]	[0.0264, 0.2388]
Low organizational learning	−0.030	0.002	[−0.0380, 0.0905]	[−0.0116, 0.0219]

Source: collated by authors.

practices on organizational performance through organizational ambidexterity is 0.002. The 95% bootstrap confidence interval includes 0 (LLCI = −0.0166, ULCI = 0.0219), which indicates that at a low level of organizational learning, the indirect effect of high-performance HR practices on organizational performance through organizational ambidexterity is not significant. Moreover, at different levels of organizational learning, the mediating effect of organizational ambidexterity is significantly different ($\Delta\gamma = 0.10$, $p < 0.01$). Together, organizational learning positively moderates the mediating role of organizational ambidexterity between high-performance HR practices and organizational performance. Therefore, *H4* is supported.

4.4 Supplemental analyses

To further investigate the moderating role of organizational learning, we use marginal analysis to estimate how increasing exploitation in settings involving exploration, and increasing exploration in settings involving exploitation, affect organizational performance. To arrive at a clearer presentation of the results, we use Figures 2, 3 to plot the moderating effect of organizational ambidexterity and organizational specificity on organizational performance obtained at high levels of organizational learning. Figures 4, 5 do the same at low levels of organizational learning. In each figure, the continuous line plots the effect on organizational performance of increasing organizational ambidexterity by increasing exploitation (or exploration) while exploration (or exploitation) is set at high levels; On the other hand, the dashed line represents the effect on organizational performance of increasing organizational specificity by increasing exploitation (or exploration) when exploration (or exploitation) is set at low levels. Each figure presents the comparison between the effects on organizational performance of organizational ambidexterity and organizational specificity.

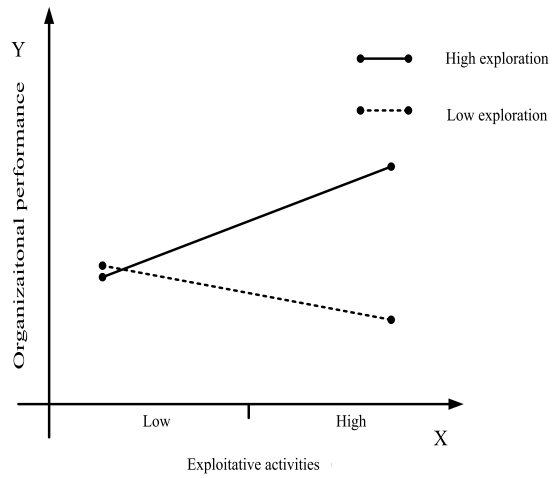


FIGURE 2
Plotting of the effect of exploitative activities on organizational performance under high-levels of organizational learning.

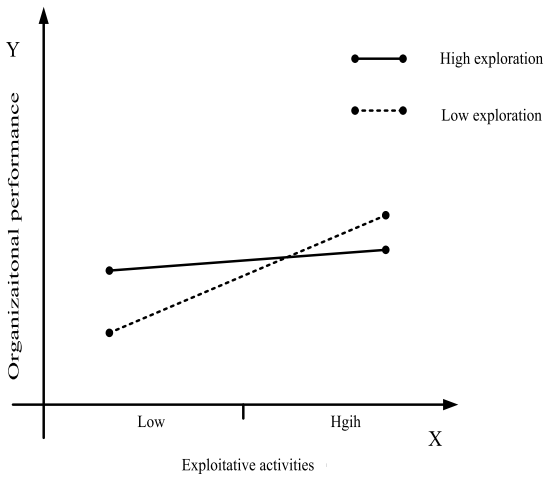


FIGURE 4
Plotting of the effect of exploitative activities on organizational performance under low-levels of organizational learning.

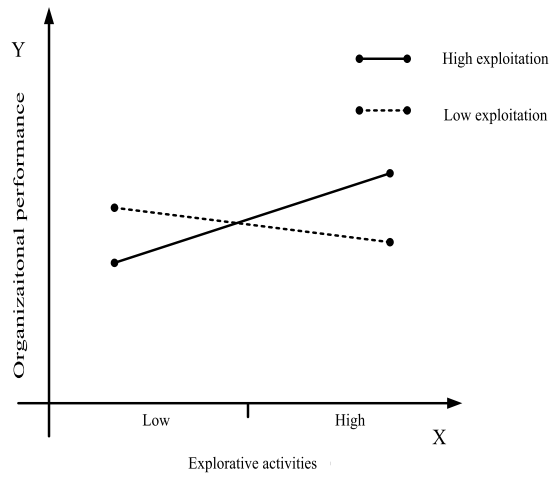


FIGURE 3
Plotting of the effect of explorative activities on organizational performance under high-levels of organizational learning.

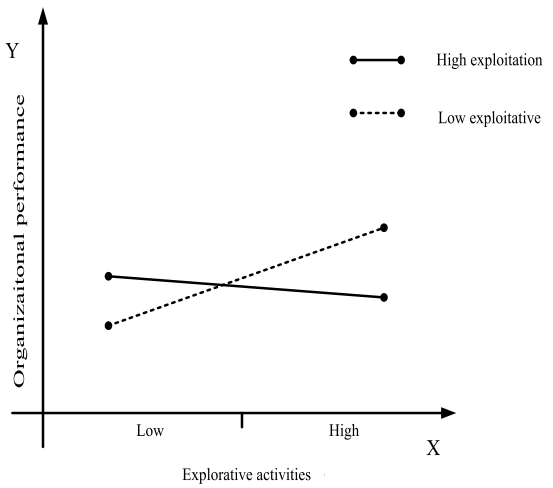


FIGURE 5
Plotting of the effect of explorative activities on organizational performance under low-levels of organizational learning.

4.4.1 The influence of organizational ambidexterity and specialization in exploitation or exploration (organizational specificity) on organizational performance when organizational learning level is high

Hypothesis *H3a* and *H3b* propose that at high-levels of organizational learning, organizational ambidexterity has a greater impact on enterprise performance than organizational specificity focusing on exploratory activities or exploitative activities. Marginal analysis results show that the effect on organizational performance of increasing exploitation activities at high levels of exploration (i.e., achieve organizational ambidexterity by increasing exploitative activities) is positive and significant, as shown by the continuous line in Figure 2. On the other hand, the effect on organizational performance of organizational specificity (specialization in exploitative activities) is assessed by calculating the effect of increasing exploitative activities at low levels of exploration. The value is negative significantly (dashed line in Figure 2). As can be seen in Figure 2, firms with high levels of organizational learning benefit more from pursuing both exploratory activities and exploitative activities (organizational ambidexterity) than from a specialization in exploitative activities (organizational specificity). Hence, *H3a* is further supported.

Likewise, still at high-levels of organizational learning, the effect on organizational performance of increasing explorative activities at high levels of exploitation (i.e., achieve organizational ambidexterity by increasing explorative activities) is positive and significant, as shown by the continuous line in Figure 3. Moreover, specialization in explorative activities (organizational specificity), consisting on increasing explorative activities at low levels of exploitation has a negative role on organizational performance (dashed line in Figure 3). This reflects that organizational ambidexterity is more effective than specialization in

explorative activities (organizational specificity) at high levels of organizational learning. Therefore, *H3b* is further supported.

Overall, at high levels of organizational learning, the impact of organizational ambidexterity on organizational performance is higher than that of organizational specificity focusing on explorative activities or exploitative activities. This shows that organizational learning plays an important role in solving the trade-offs between exploitation and exploration. Organizations can achieve higher performance by pursuing exploratory activities and exploitative activities simultaneously.

4.4.2 The influence of organizational ambidexterity and specialization in exploitation or exploration (organizational specificity) on organizational performance when organizational learning level is low

Hypothesis *H3c* and *H3d* hold that at low-levels of organizational learning, specialization in exploitative activities or explorative activities (organizational specificity) is more effective on organizational performance than organizational ambidexterity. Again, using marginal analysis, the results show that increasing exploitation activities at high levels of exploration (achieve organizational ambidexterity by increasing exploitative activities) has a significant positive impact on organizational performance (continuous line in Figure 4), while increasing exploitative activities at low levels of exploration (achieve organizational specificity by increasing exploitative activities) has also a significant positive impact on organizational performance (dashed line in Figure 4). However, it should be noted that although increasing exploitative activities improves organizational performance at different levels of exploration, the slope of dashed line in Figure 4 is much higher than that of the continuous line. Therefore, organizations cannot obtain better organizational performance by adding exploitative activities to their already high exploration efforts when facing low-levels of organizational learning. In this case, the effect of specialization in exploitative activities (organizational specificity) on organizational performance is higher than that of organizational ambidexterity, which supports *H3c*.

Likewise, still at low-levels of organizational learning, increasing explorative activities at high-levels of exploitation (achieve organizational ambidexterity by increasing explorative activities) has a negative effect on organizational performance (continuous line in Figure 5). Instead, the effect of specialization in explorative activities on organizational performance at low levels of exploitation (achieve organizational specificity by increasing explorative activities) is positive and significant, as shown by the dashed line in Figure 5. This confirms that at low levels of organizational learning, organizational specificity (specialization in explorative activities) is more effective than organizational ambidexterity in improving organizational performance. Therefore, *H3d* is also supported.

Finally, this paper concludes that organizational learning moderates the comparative effect of organizational ambidexterity and organizational specificity on organizational performance. Specifically, at high-levels of organizational learning, the impact of organizational ambidexterity on organizational performance is higher than that of organizational specificity focusing on explorative activities or exploitative activities. On the contrary, at low-levels of organizational learning, organizational specificity focusing on explorative activities or exploitative activities has a higher impact on organizational performance than organizational ambidexterity.

5 Discussion

Based on the theory of human resource management and organizational ambidexterity, this study examines the mediating role of organizational ambidexterity between high-performance HR practices and organizational performance. Different from the traditional human resource theory that only emphasizes how to enhance employees' work motivation to improve organizational performance, such as providing employees with incentive compensation and training, etc., this paper believes that high-performance HR practices that integrates employees' ability, motivation and opportunity can enhance organizational performance by effectively exploiting existing organizational knowledge and exploring new knowledge, that is, organizational ambidexterity. Moreover, we introduce organizational learning as a contingency element to investigate the moderating effect between organizational ambidexterity and organizational performance, and further verify the boundary conditions of organizational ambidexterity, which helps to explain some inconclusive results about the impact of organizational ambidexterity on organizational performance in existing studies.

5.1 Theoretical contributions

The findings of this study have three theoretical contributions. First, compared to current research on the effectiveness of human resource management, which mainly focuses on individual and team levels (Martell and Carroll, 1995; Collins and Clark, 2003), there is a lack of systematic research on the impact on organizational levels. Therefore, this article drew on strategic human resource management theory and focused on the impact of high-performance human resource practices on organizational ambidexterity, we also added a research flow based on human resource theory (Ahammad et al., 2019), and ultimately providing a new theoretical perspective for the antecedents of organizational ambidexterity. In addition, our results extended the influence boundary of high-performance human resource practices on organizational ambidexterity at the organizational level and filled the gap in the previous research (Glaister et al., 2015; Kim et al., 2023). Finally, we demonstrated the importance of understanding the status of the HR department within the organization and how closely the HR function is thought to embody the organization.

Second, the revelation of the mechanism of high-performance HR practices on organizational performance enriches the theoretical research of strategic human resource management on organizational performance. Faced with the dilemma of resource shortage, how SMEs can simultaneously pursue exploration and exploitation to achieve organizational ambidexterity, and its process and effectiveness are worth exploring (Jiang et al., 2022). Based on the theory of organizational ambidexterity, this study proposes that SMEs can achieve internal and external innovation to promote organizational performance improvement by simultaneously focusing on the characteristics of exploration and exploitation in the process of implementing human resource strategy. Therefore, this study reveals the "black box" mechanism of high performance HR practices on organizational performance, thus solving the problem of "how to apply" human resource practices in SMEs, and providing a theoretical basis for how to solve the dilemma of resource shortage.

Third, March (1991) is the first scholar to apply organizational learning to the field of organizational ambidexterity. Since then, research on organizational ambidexterity from the perspective of organizational learning has achieved fruitful results (Raisch and Birkinshaw, 2008; Brix, 2019; Arantes and Soares, 2021). However, most of these studies have directly regarded organizational learning as an antecedent of organizational ambidexterity and there are few studies on organizational learning as a moderating variable in organizational ambidexterity. This study creatively compares and analyzes the impact of organizational ambidexterity and organizational specificity on organizational performance, empirically tests the moderating effect of organizational learning, and tries to investigate the contingency effect between organizational ambidexterity and organizational performance. The results show that compared with organizational specificity, organizational ambidexterity can improve organizational performance more effectively at high-levels of organizational learning, while it is opposite in the context of low-level organizational learning. Finally, we construct a moderated mediation model between high-performance HR practices and performance, which promotes the development of the existing researches. Therefore, this study provides theoretical support for investigating the contingency effect of organizational ambidexterity to some extent.

5.2 Practical implications

For management practitioners interested in high-performance human resource management and organizational ambidexterity, this study also provides some meaningful practical insights and how these two structures can improve organizational performance. Firstly, the results clearly demonstrate that organizational ambidexterity plays a mediating role between high-performance HR practices and organizational performance. On one hand, the management mechanism that only focuses on developing a single aspect of enterprises in the traditional industrial period can no longer meet the requirements of current organizational innovation. This study provides a concrete operational scheme for SMEs in China to realize organizational ambidexterity by integrating a series of HR practices such as employees' ability, motivation and opportunity. On the other hand, through organizational ambidexterity, organizations can not only obtain organizational long-term performance by enhancing their new product R&D capabilities, that is, exploratory innovation, but also utilize their existing resources to improve and expand their existing products and services, that is, to achieve short-term performance by exploitative innovation. Ultimately, this study constructs a complete chain of high-performance HR practices, organizational ambidexterity, and organizational performance, which provides a specific solution to the contradictory problem of how to effectively coordinate short-term performance and long-term performance for SMEs in China.

Second, as our results found, a high-level of organizational learning ability will be more conducive to enhancing the positive effect of organizational ambidexterity on organizational performance. Therefore, organizations should direct their effort to building a positive learning atmosphere in the future, so that organizations and employees can timely acquire, absorb, integrate and utilize new knowledge and skills, and continuously improve the organizational learning level.

Finally, this study provides practical support for small and medium-sized enterprises (SMEs) in China on how to improve their performance and enhance their core competitiveness. Specifically, compared with large enterprises, such as state-owned enterprises in China, SMEs are obviously weak in talent training mode, organizational management level and operation stability. Especially in the current world business pattern is in the VUCA era, improving the anti-risk ability and strain capacity of SMEs is the key for Chinese enterprises to realize the transformation and upgrading. High-performance HR practices, as the initial point of enterprise performance improvement, means that enterprises should achieve organizational ambidexterity to enhance organizational short-term and long-term performance simultaneously, which will not only conducive to reduce enterprise management costs, but also help enterprises to obtain new market share. Therefore, this study has important practical implication on how SMEs can effectively improve their performance in the environment of uncertainty, complexity and dynamics within the system framework of organizational ambidexterity.

5.3 Limitations and future avenues of research

Although this research offers several theoretical and managerial implications, it also inevitably has some limitations and provides avenues for future studies. First, we choose the term "high-performance HR practices," which is considered to be the most commonly used. However, considering its various and rich conceptual meaning, previous studies have more other choices and discussions on high-performance HR practices in theory, such as high-performance work system, flexible work system High involvement human resource practices and best human resource practices, etc. Although the connotations represented by these terms are similar, it does not mean that each term is also similar in the internal impact mechanism of organizational ambidexterity. Therefore, in addition to high-performance HR practices, we can further explore the impact mechanism of other HR practices on organizational ambidexterity and organizational performance in the future.

Second, organizational ambidexterity is an extremely complex realization process. With the increasing market competition, only relying on a single level of factors to explain and verify the realization mechanism of organizational ambidexterity is far from satisfying the development requirements of enterprises in the future. Although this research examines the impact on organizational ambidexterity and organizational performance from high-performance HR practices at the organizational level, there is no further discussion on how to conduct cross-level research from multiple theoretical levels. Therefore, future researches can further expand the antecedents of organizational ambidexterity, such as building a cross-level implementation mechanism of organizational ambidexterity, and conducting empirical data verification to continuously enrich the theoretical and practical significance of organizational ambidexterity.

Third, this research operationalized organizational ambidexterity into the product of exploitative scores and explorative scores as a good proxy measure of organizational ambidexterity. However, this measurement cannot truly reflect the degree of imbalance between exploration and exploitation. It is inconsistent with the concept of organizational ambidexterity, which seeks a balance between the two. Therefore, in future research, we can adopt other methods to evaluate organizational ambidexterity, such as the addition or difference of exploratory scores and exploitative scores. Moreover, we suggest that

these measurement methods can also be used as robustness checks in future studies. Moreover, given the cross-sectional data collected in this paper, they may not fully represent dynamic causal conclusions. Therefore, longitudinal or time series data can be used in the future to investigate organizational ambidexterity.

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 Business School, Beijing Normal University. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and institutional requirements.

Author contributions

CW: Investigation, Methodology, Software, Writing – original draft, Writing – review & editing. MZ: Methodology, Writing – review & editing. HM: Data curation, Investigation, Supervision, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This paper was supported by National Social Science Foundation (22CCL051).

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.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1283637/full#supplementary-material

References

Ahammad, M., Glaister, K. W., and Junni, P. (2019). Organizational ambidexterity and human resource practices. *Int. J. Hum. Resour. Manag.* 30, 503–507. doi: 10.1080/09585192.2019.1538651

Alghamdi, F. (2018). Ambidextrous leadership, ambidextrous employee, and the interaction between ambidextrous leadership and employee innovative performance. *J. Innov. Entrep.* 7, 1–14. doi: 10.1186/s13731-018-0081-8

Arantes, A. A. R. B., and Soares, J. L. (2021). Mediating effect of management control systems in the interaction between ambidexterity and organizational learning in Brazilian NPO. *J. Technol. Manag. Innov.* 16, 56–69. doi: 10.4067/S0718-27242021000200056

Baker, W. E., and Sinkula, J. M. (1999). The synergistic effect of market orientation and learning orientation on organizational performance. *J. Acad. Market Sci.* 27, 411–427. doi: 10.1177/0092070399274002

Bamberger, P., and Meshoulam, I. (2000). *Human resource strategy*. Newbury Park, CA: Sage.

Batt, R., and Colvin, A. J. S. (2011). An employment systems approach to turnover: HR practices, quits, dismissals, and performance. *Acad. Manag. J.* 54, 695–717. doi: 10.5465/amj.2011.64869448

Brix, J. (2019). Ambidexterity and organizational learning: revisiting and reconnecting the literature. *Learn. Org.* 26, 337–351. doi: 10.1108/TLO-02-2019-0034

Caspin-Wagner, K., Ellis, S., and Tishler, A. (2012). Balancing exploration and exploitation for firm's superior performance: the role of the environment. *Acad. Manag. Ann. Meeting Proc.* 1, 1–47. doi: 10.5465/AMBPP.2012.17177abstract

Castanheira, F., and Story, J. (2016). Making good things last longer: the role of savoring on the relationship between HRM and positive employee outcomes. *Hum. Resour. Manag.* 55, 985–1000. doi: 10.1002/hrm.21704

Chen, J. H., Miller, D., and Chen, M. J. (2019). Top management team time horizon blending and organizational ambidexterity. *Strateg. Organ.* 19, 183–206. doi: 10.1177/1476127019883669

Chiang, F. F. T., and Birtch, T. A. (2012). The performance implications of financial and non-financial rewards: an Asian Nordic comparison. *J. Manag. Stud.* 49, 538–570. doi: 10.1111/j.1467-6486.2011.01018.x

Collins, C., and Clark, K. D. (2003). Strategic human resource practices, top management team social networks, and firm performance: the role of human resource practices in creating organizational competitive advantage. *Acad. Manag. J.* 46, 740–751. doi: 10.5465/30040665

Duncan, R. B. (1976). "The ambidexterity organization: designing dual structures for innovation" in *The management of organization design: strategies and implementation*. eds. R. H. Kilman, L. R. Pondy and D. P. Slevin (New York: North Holland), 167–188.

Ebben, J. J., and Johnson, A. C. (2015). Efficiency, flexibility, or both? Evidence linking strategy to performance in small firm. *Strateg. Manag. J.* 26, 1249–1259. doi: 10.1002/smj.503

el-Kassar, A. N., Dagher, G. K., Lythreatis, S., and Azakir, M. (2022). Antecedents and consequences of knowledge hiding: the roles of HR practices, organizational support for creativity, creativity, innovative work behavior, and task performance. *J. Bus. Res.* 140, 1–10. doi: 10.1016/j.jbusres.2021.11.079

Fernhaber, S. A., and Patel, P. C. (2012). How do young firms manage product portfolio complexity? The role of absorptive capacity and ambidexterity. *Strateg. Manag. J.* 33, 1516–1539. doi: 10.1002/smj.1994

Gardner, T. M., Wright, P. M., and Moynihan, L. M. (2011). The impact of motivation, empowerment, and skill-enhancing practices on aggregate voluntary turn-over: the mediating effect of collective affective commitment. *Pers. Psychol.* 64, 315–350. doi: 10.1111/j.1744-6570.2011.01212.x

Glaister, K. W., Ahammad, M. F., and Junni, P. (2015). Special issue of international journal of human resource management: organizational ambidexterity and human resource practices. *Int. J. Hum. Resour. Manag.* 26, 1785–1789. doi: 10.1080/09585192.2015.1028757

Guo, Y., Huang, P. W., Ciu, C., Fang, S. C., and Tsai, F. S. (2022). Entrepreneur hubris, organizational ambidexterity, and dynamic capability construction. *Front. Psychol.* 12, 1–13. doi: 10.3389/fpsyg.2021.717245

Gupta, A. K., Smith, K. G., and Shalley, C. E. (2006). The interplay between exploration and exploitation. *Acad. Manag. J.* 49, 693–706. doi: 10.5465/amj.2006.22083026

Hauff, S., Felfe, J., and Klug, K. (2022). High-performance work practices, employee well-being, and supportive leadership: spillover mechanisms and boundary conditions

between HRM and leadership behavior. *Int. J. Hum. Resour. Manag.* 2022, 2109–2137. doi: 10.1080/09585192.2020.1841819

He, Z., and Wong, P. (2004). Exploration vs. exploitation: an empirical test of the ambidexterity hypothesis. *Organ. Sci.* 15, 481–494. doi: 10.1287/orsc.1040.0078

Heracleous, L., Papachroni, A., Andriopoulos, C., and Gotsi, M. (2017). Structural ambidexterity and competency traps: Insights from Xerox PARC. *Technol. Forecast Soc. Change* 117, 327–338. doi: 10.1016/j.techfore.2016.11.014

Hughes, M., Hughes, P., Morgan, R. E., Hodgkinson, I. R., and Lee, Y. (2021). Strategic entrepreneurship behaviour and the innovation ambidexterity of young technology-based firms in incubators. *Int. Small. Bus. J.* 39, 202–227. doi: 10.1177/0266242620943776

Iyanda Ismail, A., Awawdeh, A., AI-Hiyari, A., and Jimba, K. I. (2021). Moderating effects of management philosophy on high Z-performance work practices-firm performance relationship. *J. Afr. Bus.* 22, 379–393. doi: 10.1080/15228916.2020.1785235

Jiang, S., Yang, J., Yu, M., Lin, H., Li, C., and Doty, H. (2022). Strategic conformity, organizational learning ambidexterity, and corporate innovation performance: an inverted U-shaped curve? *J. Bus. Res.* 149, 424–433. doi: 10.1016/j.jbusres.2022.05.023

Jiménez-jiménez, D., and Sanz-valle, R. (2008). Could HRM support organizational innovation? *Int. J. Hum. Resour. Manag.* 19, 1208–1221. doi: 10.1080/09585190802109952

Junni, P., Sarala, R. M., Taras, V., and Tarba, S. Y. (2013). Organizational ambidexterity and performance. A meta-analysis. *Acad. Manag. Perspect.* 31, 299–312. doi: 10.5465/amp.2012.0015

Kafetzopoulos, D. (2021). Organizational ambidexterity: antecedents, performance and environmental uncertainty. *Bus. Process. Manag. J.* 27, 922–940. doi: 10.1108/BPMJ-06-2020-0300

Kim, K. Y., Clark, K. D., and Messersmith, J. G. (2023). High performance work systems and perceived organizational support: the contribution of human resource department's organizational embodiment. *Hum. Resour. Manag.* 62:181. doi: 10.1002/hrm.22142

Kirkpatrick, I., and Hoque, K. (2022). Human resource professionals and the adoption and effectiveness of high-performance work practices. *Hum. Resour. Manag. J.* 32, 261–282. doi: 10.1111/1748-8583.12403

Kroff, J., Biemann, T., and Voelpel, S. C. (2017). Differentiating HR systems' impact: moderating effects of age on the HR system-work outcome association. *J. Organ. Behav.* 38, 415–438. doi: 10.1002/job.2130

Luo, B., Zheng, S. S., Ji, H. M., and Liang, L. (2018). Ambidextrous leadership and TMT-member ambidextrous behavior: the role of TMT behavioral integration and TMT risk propensity. *Int. J. Hum. Resour. Manag.* 29, 338–359. doi: 10.1080/09585192.2016.1194871

Ma, Z., Gong, Y., Long, L., and Zhang, Y. (2021). Team-level high-performance work systems, self-efficacy and creativity: different moderating roles of person-job fit and goal difficulty. *Int. J. Hum. Resour. Manag.* 32, 478–511. doi: 10.1080/09585192.2020.1854816

Mammassis, C. S., and Kostopoulos, K. C. (2019). CEO goal orientations, environmental dynamism and organizational ambidexterity: an investigation in SMEs. *Euro. Manag. J.* 37, 577–588. doi: 10.1016/j.emj.2019.08.012

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organ. Sci.* 2, 71–87. doi: 10.1287/orsc.2.1.71

Martell, K., and Carroll, S. J. (1995). Which executive human resource management practices for the top management team are associated with higher firm performance? *Hum. Resour. Manag.* 34, 497–6512. doi: 10.1002/hrm.3930340403

O'Reilly, C. A., and Tushman, M. L. (2013). Organizational ambidexterity: past, present and future. *Acad. Manag. Perspect.* 27, 324–338. doi: 10.5465/amp.2013.0025

Raisch, S., and Birkinshaw, J. (2008). Organizational ambidexterity: antecedents, outcomes, and moderators. *J. Manag.* 34, 375–409. doi: 10.1177/0149206308316058

Rao-Nicholson, R., Khan, Z., Akhtar, P., and Tarba, S. (2020). The contingent role of distributed leadership in the relationship between HR practices and organizational ambidexterity in the cross-border M&A of emerging market multinationals. *Int. J. Hum. Resour. Manag.* 31, 232–253. doi: 10.1080/09585192.2016.1216882

Richard, O. C., and Johnson, N. B. (2001). Strategic human resource management effectiveness and firm performance. *Int. J. Hum. Resour. Manag.* 12, 299–310. doi: 10.1080/09585190010015105

Solís-Molina, M., Hernández-Espallardo, M., and Rodríguez-Orejuela, A. (2022). Performance implications of organizational and interorganizational ambidexterity. *J. Technol. Manag. Innov.* 17, 38–49. doi: 10.4067/S0718-27242022000100038

Sun, L. Y., Aryee, S., and Law, K. S. (2007). High-performance human resource practices, citizenship behavior, and organizational performance: A relational perspective. *Acad. Manag. J.* 50, 558–577. doi: 10.5465/amj.2007.25525821

Tushman, M. L., and O'Reilly, C. A. (1996). Ambidextrous organizations: managing evolutionary and revolutionary change. *Calif. Manag. Rev.* 38, 8–30. doi: 10.2307/41165852

Umans, T., Smith, E., Andersson, W., and Planken, W. (2018). Top management teams' shared leadership and ambidexterity: the role of management control systems. *Int. Rev. Adm. Sci.* 86, 1–19. doi: 10.1177/0020852318783539

van Esch, E., Wei, L. Q., and Chiang, F. F. T. (2021). High-performance human resource practices and firm performance: the mediating role of employees' competencies and the moderating role of climate for creativity. *Int. J. Hum. Resour. Manag.* 29, 1683–1708. doi: 10.1080/09585192.2016.1206031

Voss, G. B., and Voss, Z. G. (2013). Strategic ambidexterity in small and medium-sized enterprises: implementing exploration and exploitation in product and market domains. *Organ. Sci.* 24, 1459–1477. doi: 10.1287/orsc.1120.0790

Wang, C. H., Jiao, H., and Song, J. Y. (2023). Wear glasses for supervisors to discover the beauty of subordinates: supervisor developmental feedback and organizational ambidexterity. *J. Bus. Res.* 158:113650. doi: 10.1016/j.jbusres.2023.113650

Wood, S., van Veldhover, M., Croon, M., and de Menezes, L. M. (2012). Enriched job design, high involvement management and organizational performance: the mediating roles of job satisfaction and well-being. *Hum. Relat.* 65, 419–445. doi: 10.1177/0018726711432476

Zhou, L. P., Michael, P. Y. P., Shao, L. J., Yen, H. Y., Lin, K. H., and Muhammad, K. A. (2021). Ambidexterity in social capital, dynamic capability, and SMEs' performance: quadratic effect of dynamic capability and moderating role of market orientation. *Front. Psychol.* 11, 1–15. doi: 10.3389/fpsyg.2020.584969

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 08 January 2024
DOI 10.3389/fpsyg.2023.1324474

Check for updates

OPEN ACCESS

EDITED BY
Mike James Mustafa,
University of Nottingham Malaysia, Malaysia

REVIEWED BY
Lutfihak Alpkan,
Istanbul Technical University, Türkiye
Muhammad Usman,
University of Sharjah, United Arab Emirates
Normala Govindarajo,
Xiamen University Malaysia, Malaysia

*CORRESPONDENCE
Beenish Arshad
✉ beenish.arshad@nu.edu.pk

RECEIVED 19 October 2023
ACCEPTED 22 December 2023
PUBLISHED 08 January 2024

CITATION
Arshad B, Hassan H and Azam A (2024) The impact of employees' experience of high-performance work systems on innovative behavior in professional service firms. *Front. Psychol.* 14:1324474. doi: 10.3389/fpsyg.2023.1324474

COPYRIGHT
© 2024 Arshad, Hassan and Azam. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

The impact of employees' experience of high-performance work systems on innovative behavior in professional service firms

Beenish Arshad*, Hamid Hassan and Akbar Azam

FAST School of Management, National University of Computer and Emerging Sciences, Lahore, Pakistan

This research examines the impact of employees' experience of high-performance work systems (HPWS) on their innovative behavior. The study draws upon social exchange theory to propose that employees' experience of HPWS influences their innovative behavior directly and through sequential mediation of social capital development and knowledge-sharing behavior. Additionally, the study uses the Elaboration Likelihood Model to highlight that individuals' need for cognition strengthens the relationship between employees' knowledge-sharing and innovative behaviors. The study employed a time-lagged quantitative research design with survey data from 262 job incumbents in professional service firms. The proposed model was tested using the PLS-SEM two-stage approach. The findings of the study confirm the proposed direct and indirect relationships. Moreover, the findings also confirm that the need for cognition strengthens the relationship between knowledge-sharing and individual innovation behaviors. The study posits that employees' experience of HRM systems can influence their innovative behavior as a reciprocal exchange toward the employer. Moreover, this study presents a comprehensive model that highlights the interplay of social and cognitive factors that can influence the relationship between HPWS and employees' innovation behavior. This study also fills a gap in the existing literature by highlighting the antecedents of innovative behavior in professional service firms.

KEYWORDS

high performance work system, innovative work behavior, knowledge sharing, need for cognition, professional service firms, social capital

1 Introduction

The Social Exchange Theory (SET) is a prominent conceptual paradigm for understanding employees' behaviors in workplaces. SET is based on the premise that individuals develop and maintain those social relationships in which benefits outweigh the costs (Blau, 1964; Cropanzano and Mitchell, 2005). Social relationships are sustained when individuals abide by the "norm of reciprocity" (Gouldner, 1960). The norm of reciprocity refers to socially accepted rules for social transactions in which one party receives a benefit and is mutually obligated to return the benefit to the other party. Also, it facilitates relationship maintenance, cooperation, and exchange behaviors between individuals (Belmi and Pfeffer, 2014).

In organizational contexts, the SET and its tenets can be used to understand norms that shape interpersonal relationships and reciprocal obligations reflected in employee behaviors (Oparaocha, 2016). In this paper, we have used the SET to investigate how employees' experience of high-performance work systems influences innovative behavior (IB) in professional service firms (PSFs). Employees' IB refers to the intentional generation, promotion, and application of novel and useful ideas in a work role, group, or organization (Janssen, 2000). Existing research has highlighted that factors such as personality traits, job design, organizational climate, and leadership styles promote innovation in organizations (Shanker et al., 2017; Woods et al., 2018; Mustafa et al., 2022; Hoang et al., 2023; Tsamantouridis et al., 2023). Despite the growing academic interest in the antecedants of innovation, there is still dearth of knowledge regarding the factors and mechanisms that drive individual level innovation particularly in PSF contexts. PSFs are knowledge-intensive firms that rely on specialized human resources to deliver customized and unique service offerings to clients. Therefore, employees' IB contributes toward improving work processes and developing innovative service offerings (Fu et al., 2015).

A high-performance work system (HPWS) is an integrated set of human resource practices that are designed to enhance employee motivation, competence, commitment, and performance (Aryee et al., 2012). HPWS inculcates practices such as selective staffing, extensive training and development, work autonomy, result-oriented reward systems, participative work designs, and employment security (García-Chas et al., 2014). Considering the tenets of SET, our first argument is that employees demonstrate IB as a reciprocal behavior in exchange for inducements received from the HPWS. Prior research indicates that HPWS shapes positive employee attitudes and behaviors through participation, autonomy, and motivation (Kehoe and Collins, 2017). Employees perceive HPWS as an organization's investment and its commitment to establishing long-term relationships with employees (Takeuchi et al., 2007; Alfes et al., 2021). Due to these perceptions, social exchange relationships evolve between employees and the organization (Zhang et al., 2019). In a social exchange relationship, employees demonstrate commitment and discretionary behaviors in exchange for benefits received from the employer (Zhang et al., 2019; Asante et al., 2023).

The objective of HPWS is improve organizational performance through a collaborative work environment, active employee participation, and involvement (Patel et al., 2013; Wang et al., 2023). When HPWS is implemented, employees perceive a mutual obligation to fulfill its objective by demonstrating commitment and social integration (Evans and Davis, 2005; Donate et al., 2020). Consequently, relationship building, cooperation and resource exchanges can result in exchange for benefits received from HPWS (Jiang and Liu, 2015; Zhang et al., 2019). We consider these arguments to propose that HPWS can influence the development of internal social capital in organizations. According to Singh et al. (2021), social capital facilitates knowledge sharing, a form of resource exchange between coworkers. Furthermore, knowledge sharing facilitates value creation through innovative idea generation and application in organizations (Radaelli et al., 2014; Pian et al., 2019). Hence, in line with these arguments, we also propose a sequential mediation model that reflects that employees' experience of HPWS facilitates IB directly and through social capital (SC) development and knowledge-sharing (KS) behaviors. Thus, this paper contributes to the debate that human resource practices create supportive social architecture that facilitates resource exchange and innovation (Oparaocha, 2016).

Prior research has shown that KS drives employees' IB (Pian et al., 2019). However, due to cognitive differences, not all individuals may demonstrate similar levels of IB. In this study, we investigate whether the relationship between KS and IB is contingent on the level of an individual's need for cognition (NFC). NFC refers to an individual's dispositional tendency to engage in analytic information processing, deep thinking, and cognitive elaboration (Cacioppo and Petty, 1982). The Elaboration Likelihood Model (ELM) (Petty and Cacioppo, 1986) is used to explain that an individual's NFC influences the range and depth of information processing. According to Wu et al. (2014), NFC aligns with the cognitive demands for the generation, evaluation, and implementation of innovative ideas. In this study, we suggest that NFC can influence IB through in-depth and analytical processing of knowledge shared during social interactions. Therefore, NFC can be considered a relevant cognitive boundary condition while studying the relationship between KS and IB. By examining the moderating role of NFC on the relationship between KS and IB, we intend to enhance the understanding of the cognitive factors that play a role in promoting IB in the workplace.

The study seeks to answer that to what extent and through which mechanisms do employees' experience of HPWS impact their innovative behavior in PSFs. Furthermore, this study addresses how individuals' need for cognition influences the relationship between knowledge sharing and innovative behavior. The motivation for this research stems from the need to understand "how" interrelated HR practices influence innovation in PSFs. The study adopts an in-depth approach and highlights the combined interplay of social and cognitive factors that link HPWS and IB. Moreover, existing studies have predominantly focused on understanding the outcomes of HPWS, using a managerial perspective. Recent studies suggest that employees have varied perceptions about human resource systems (Ali et al., 2022; Kim et al., 2023). Thus, this study takes into account employees' perspectives of human resource systems and the resultant impact on their behaviors. Furthermore, existing studies on HR practices and innovation have been widely conducted in manufacturing and high-technology companies in developed country contexts (Park et al., 2017; Bos-Nehles and Veenendaal, 2019; Yao et al., 2023). Thus, to fill the research gap, this study uses empirical data from employees in PSFs in Pakistan, an emerging Asian country. Furthermore, there is less research on the role of cognitive factors in influencing individual innovation behaviors in workplaces. Thus, this study highlights the role of NFC, a boundary condition that can strengthen the relationship between KS and IB. The findings of this study offer valuable practical understanding to managers who can leverage the benefits of HR practices and resultant employee behaviors for PSFs' competitive advantage.

2 Theoretical background and hypotheses

2.1 Employee experience of HPWS and innovative behavior

A high-performance work system (HPWS) is a set of internally coherent human resource practices designed to enhance employees'

commitment and performance (Gong et al., 2010; Van De Voorde and Beijer, 2015). The social exchange theory (SET) is often used to explain the impact of specific human resource practices on employees' behaviors (Bos-Nehles et al., 2017). Recently, Kim et al. (2023) used the SET to assert that HPWS increases employees' IB through perceived organizational support and perceived leader support as a boundary condition. Prior studies suggest that employees view HPWS as an organizational investment in their development and well-being. As a result, they reciprocate by demonstrating positive attitudes and investing their time to look for ways to improve work performance (Zhang et al., 2019; Pahos and Galanaki, 2022). HRM practices, such as employee training programs are perceived as an organization's personalized commitment toward employees' development and growth. When employees receive developmental opportunities, they demonstrate positive behaviors and attitudes which may or may not be part of job descriptions (Bos-Nehles et al., 2017).

Janssen (2000) argued that employees' perceptions of fair reward systems instill a reciprocal obligation to demonstrate IBs. Ramamoorthy et al. (2005), further extended this idea and explained that the relationship between specific HR practices (e.g., job autonomy and fair pay) and IB is mediated through perceptions of psychological contract fulfillment. Moreover, according to Zhu et al. (2022), employees develop and implement innovative ideas in the workplace in exchange for reasonable work autonomy and rewards. Employee support and employment security enhance employees' confidence to take initiative and communicate their ideas to managers (Bos-Nehles et al., 2017). Based on the these arguments, we propose the following hypothesis:

> *H1*: Employees' experience of HPWS is positively related to their innovative behavior.

2.2 Employee experience of HPWS and social capital

SC refers to the resources available through, embedded within, and derived from networks of relationships. SC is represented by three components: the strength of interpersonal relationships, interpersonal trust, and shared vision (Nahapiet and Ghoshal, 1998). According to Evans and Davis (2005), interrelated HRM practices create an enabling social context for relationship building and collaboration. Evans and Davis (2005) identified organizational social structure as a mediating variable between HPWS and organizational performance. They further highlighted specific practices such as selective staffing, training programs, and internal mobility facilitate social integration and the formation of bridging social ties between coworkers. According to Patel et al. (2013), elements of an HR system help build a workplace context characterized by coworker support and trust.

HPWS inculcates flexible and team-based work designs which increase the frequency of interactions between coworkers (Wang et al., 2023). Moreover, performance-based reward systems enhance employees' commitment to achieving the collective goals of the organization (Patel et al., 2013; Wang et al., 2023). Recently, Donate et al. (2020) studied a sample of TQM-based Spanish organizations. They assert that the TQM philosophy is linked to HPWS adoption and subsequently SC development in organizations. HPWS adoption leads to the development of social relationships, interpersonal trust, and shared vision among coworkers (Jiang and Liu, 2015; Donate et al., 2020). Given these arguments, we propose the following hypothesis:

> *H2*: Employees' experience of HPWS is positively related to the development of social capital.

2.3 Social capital and knowledge sharing

SC provides individuals with access to knowledge and expertise embedded within social relationships (Ganguly et al., 2019). According to Inkpen and Tsang (2005), SC serves as a bonding element that promotes intra-network KS behaviors. Moreover, it facilitates knowledge search activities within social networks (Alguezaui and Filieri, 2010).

Interpersonal trust, an integral component of SC prevents opportunistic behaviors and increases resource exchange between coworkers (Nahapiet and Ghoshal, 1998; Inkpen and Tsang, 2005). According to Santos et al. (2023), interpersonal trust increases an individual's inclination toward sharing knowledge with peers, while a lack of trust serves as a barrier to KS. Yen et al. (2015), argue that interpersonal trust and closely knit social relationships influence individuals' intentions to voluntarily contribute their knowledge to coworkers.

Lefebvre et al. (2016) argued that SC plays an important role in increasing KS performance in learning networks. Studies suggest that features of social networks have an impact on knowledge transfer in organizations. For example, relationship strength increases tacit KS and integration (Reagans and McEvily, 2003; Ganguly et al., 2019). Reagans and McEvily (2003) emphasized that cohesiveness within relationships affects motivation and willingness to invest time, energy, and effort toward KS. According to Singh et al. (2021), cohesive social relationships facilitate knowledge flow within organizations. Moreover, cohesive social relationships increase the frequency of KS interactions among coworkers (Al-Omoush et al., 2022). In view of these arguments, we propose the following hypothesis:

> *H3*: Social capital is positively related to employee knowledge-sharing behavior.

2.4 The mediating role of social capital between employees' experience of HPWS and knowledge sharing

We propose that SC mediates the relationship between HPWS and KS. Although there is some evidence that HPWS facilitates social interactions and cooperation among coworkers, the link between HPWS and KS through SC remains underexplored in the existing literature. Prior studies indicate that HPWS facilitates the development of social exchange relationship between employee and the employer (Zhang et al., 2019). In a social exchange relationship, employees demonstrate shared behavioral and attitudinal responses conducive to the collective achievement of organizational goals (Gong et al., 2010).

In this context, they are likely to demonstrate cooperation and coordination which drives value creation (Ganguly et al., 2019; Donate et al., 2020).

Scholars posit that HPWS facilitates the development of a social climate that encourages resource sharing (Bartram et al., 2021). According to Wang et al. (2023), when HPWS inculcates team-based reward systems, employees' are motivated to cooperate and share their resources to achieve collective goals. According to Swart and Kinnie (2003), human resource practices and policies act as facilitators of SC formation. Kehoe and Collins (2017) argued that integrated human resource systems contribute to unit performance by fostering interpersonal exchange conditions and facilitating knowledge flow within the organization. Furthermore, Singh et al. (2021) argued that knowledge-based human resource practices promote KS interactions through relationship building and networking among coworkers. HPWS enhances relational coordination, thereby allowing employees to combine and exchange knowledge (Collins and Smith, 2006; Siddique et al., 2019). Given these arguments, we propose the following hypothesis:

> *H4*: Social capital mediates the relationship between employees' experience of HPWS and their knowledge-sharing behavior.

2.5 Knowledge sharing and innovative behavior

Existing literature highlights that knowledge is a strategic resource and effective utilization of knowledge is important to drive innovation in organizations (Subramaniam and Youndt, 2005; Kmieciak, 2020). KS is a social exchange behavior that involves the collection and donation of knowledge between individuals (Van Den Hooff and Ridder, 2004).

Munir and Beh (2019) asserted that KS allows flow and integration of knowledge, which prompts new idea generation and application. KS between coworkers facilitates task accomplishment and identification of opportunities for improving products, services, and work processes. According to Pian et al. (2019), KS interactions facilitate new knowledge creation and integration which allows the generation of novel ideas and solutions at work. The process of KS drives cognitive structuring by allowing individuals to connect existing knowledge with new knowledge. Tsai and Zheng (2021) studied the mediating role of KS between employee curiosity and service creativity. They highlighted that service creativity is enhanced through collection and donation of knowledge between coworkers. According to Castaneda and Cuellar (2020), KS increases the innovativeness of sharers in terms of capacity and propensity to promote and implement new ideas. During KS interactions, individuals reflect and elaborate on diverse perspectives, thereby driving creative idea generation and application (Radaelli et al., 2014). Given these arguments, we propose the following hypothesis:

> *H5*: Employee knowledge-sharing behavior is positively related to their innovative behavior.

2.6 The mediating role of knowledge sharing between social capital and innovative behavior

Existing literature supports the notion that cohesive relationships facilitate KS and different forms of innovation in varied organizational contexts (Ganguly et al., 2019; Singh et al., 2021). However, the precise intermediary role of KS between SC and individual-level innovation needs further exploration. We argue that KS mediates the relationship between SC and IB. According to Ganguly et al. (2019), strength of social relationships and interpersonal trust drive KS and firm innovation performance.

Subramaniam and Youndt (2005) posited that innovation is a collaborative effort that is driven by the exchange of knowledge within an organization. SC drives innovation through collaborative social interactions between coworkers (Donate et al., 2020). Existing studies have used heterogeneous samples from different industries to argue that cohesive relationship ties facilitate knowledge creation and the development of employees' innovative capabilities (Akhavan and Mahdi Hosseini, 2015; Ganguly et al., 2019). Empirical evidence suggests that SC facilitates radical and incremental innovation by allowing employees to search for and share knowledge within social networks (Alguezaui and Filieri, 2010).

The process of innovation requires an enabling social context characterized by sharing and utilization of knowledge held by individuals (Yang et al., 2018). According to Al-Omoush et al. (2022), innovation is driven by strong social ties and transformation of tacit knowledge between network participants. According to Akram et al. (2020), IB depends on social support, cooperation, and knowledge acquired through social interactions. Thus, given these arguments, it can be inferred that KS acts as a mediating mechanism that influences the relationship between SC and IB. Thus, we propose the following hypothesis:

> *H6*: Employees' knowledge-sharing behavior mediates the relationship between social capital development and employees' innovative behavior.

The above arguments suggest a sequential mediation of SC and KS between employee experienced HPWS and IB. Prior studies have emphasized that integrated HR practices promote relationship building, collaboration, and resource sharing (Evans and Davis, 2005; Donate et al., 2020). HPWS acts as a catalyst for SC development in organizations. As suggested by prior studies, SC can promote employees' innovation behavior by providing an access to expertise and knowledge embedded within networks of relationships (Ganguly et al., 2019; Al-Omoush et al., 2022). Employees' experience of HPWS promote cooperative social interactions, interpersonal trust, and shared vision which drive employees' knowledge sharing and innovation behaviors in organizations (Jiang et al., 2012; Akram et al., 2020; Al-Omoush et al., 2022). In line with these arguments, we suggest a sequential link between employee experienced HPWS and IB. Thus, we propose the following hypothesis:

> *H7*: Social capital and knowledge-sharing behavior sequentially mediate the relationship between employees' experience of high-performance work systems and their innovative behavior.

2.7 The moderating role of employees' need for cognition

Need for cognition (NFC) is an individual's dispositional tendency to engage in deep thinking and analytical information processing (Cacioppo and Petty, 1982). The Elaboration Likelihood Model (ELM) (Petty and Cacioppo, 1986) can be used as a theoretical basis to explain the moderating role of NFC in influencing the relationship between KS and IB. The ELM is a dual-process model that explains how individuals process information and make decisions about the amount and nature of the mental processing they engage in. According to ELM, there are two routes of information processing: central and peripheral. The central route involves in-depth information processing, critical thinking, and deep cognitive elaboration. The peripheral route processing involves surface thinking and reliance on heuristics for decision-making (Smith and DeCoster, 2000).

Individuals with high NFC demonstrate a tendency toward central route processing. They thoroughly analyze information and consider diverse perspectives in decision-making. High NFC allows individuals to engage in and enjoy novel, complex, and uncertain situations (Cacioppo and Petty, 1982). They seek and draw information from their environment to solve complex problems. According to Pan et al. (2021), high NFC allows individuals to capitalize on the flow of knowledge to address work-related situations. These individuals connect and utilize new and existing knowledge to generate and apply creative ideas. Individuals with high NFC seek intellectually stimulating interactions in their environment. KS interactions allow individuals with high NFC to engage in intellectual debates. Intellectual stimulation leads to creative thinking and exploration of new ideas and approaches. During social interactions, individuals with high NFC demonstrate persuasiveness by presenting thoughtful arguments to support their ideas and insights (Wu et al., 2014). Although Wu et al. (2014) established a direct link between NFC and IB, this study examines NFC as a boundary condition that helps process new and existing knowledge. NFC helps in linking new and existing knowledge acquired in social interactions, which drives creativity (Evans et al., 2003). Thus, it can be argued that individuals with high NFC are expected to exhibit proactive approaches toward IB by utilizing existing and new knowledge acquired through their interactions with coworkers. Hence, we propose the following hypothesis:

> *H8*: The need for cognition strengthens the relationship between employee knowledge-sharing and innovative behavior.

Figure 1 shows the proposed conceptual framework of this study.

3 Materials and methods

3.1 Sample and procedure

This study employed quantitative research methodology to test the proposed model. Using a structured questionnaire, data were collected from a sample of PSFs' job incumbents in Pakistan's information technology, marketing, architecture, and engineering sectors. PSFs attract, retain, develop, and maintain skilled talent which delivers customized service offerings to clients. The firms chosen for this study are knowledge intensive and rely on specialized human resources to gain competitive advantage.

Initially, the authors created a list of PSFs for initial screening and preliminary communication before data collection. The chosen organizations were characterized by flat organizational structures, team-based work designs, and open communication between managers and employees. The authors used personal and professional networks to contact the managers of the listed companies. A few managers did not respond or refused to cooperate in the data collection process. Those managers who agreed to cooperate were approached for semi-structured screening interviews. The interviews included questions to assess whether the identified organizations implemented common practices of HPWS. The time duration of each interview was approximately 30 min. The study participants were chosen through convenience based sampling technique from the chosen PSFs. Covenience sampling technique helps researchers to gather data in an accessible and cost effective manner (Speak et al., 2018; Javed and Khan, 2023).

Following the initial assessment, the authors acquired permission to proceed with data collection from specialist PSF employees at different organizational levels. To increase the response rate, the authors built rapport with managers and employees to gain their support and increase cooperation. The first page of the questionnaire included a confidentiality statement which assured that all the responses would remain confidential and would be used for academic research purposes only. The questionnaire also included a statement through which participants were assured that their participation was voluntary and that they could withdraw from the study at any point in time. Furthermore, the authors ensured that the questionnaire items were concise, clear, and easy to understand.

To minimize common method variance (CMV) and create proximal separation, data were collected at three-time points 3 weeks apart. At Time 1, data on demographic characteristics (gender, age, tenure, and education) and employees' experience of high-performance work systems were collected. At Time 2, data regarding employees' perceptions of social capital, knowledge sharing, and employees' need for cognition were collected. At Time 3, data on employees' innovative behavior was collected. Each participant was assigned a unique identifier code that remained consistent across all time points. The identifier ensured that responses could be matched across different data collection time points. One to one matching of responses was carried out at the end of data collection process.

We intended to use PLS-SEM for the purpose of data analysis. PLS-SEM is used to analyze complex models and facilitates data analysis with small sample sizes (Hair et al., 2019). We reviewed recommendations from Kock and Hadaya (2018) to estimate the minimum sample size. According to Kock and Hadaya (2018), the minimum sample size for PLS-SEM is recommended to be 160 when magnitudes of path coefficients cannot be reasonably estimated. The value of the minimum sample size is based on the inverse square root method. The sample size of this study was above the minimum recommended value based on the inverse square root method. A total of 375 questionnaires were administered to the potential respondents in 45 companies. The number of administered questionnaires was significantly higher than the minimum required sample, considering response rate considerations. The response rate was approximately 70%, and 262 matched responses were retained for the analysis. Out of 262 responses, 85 responses were

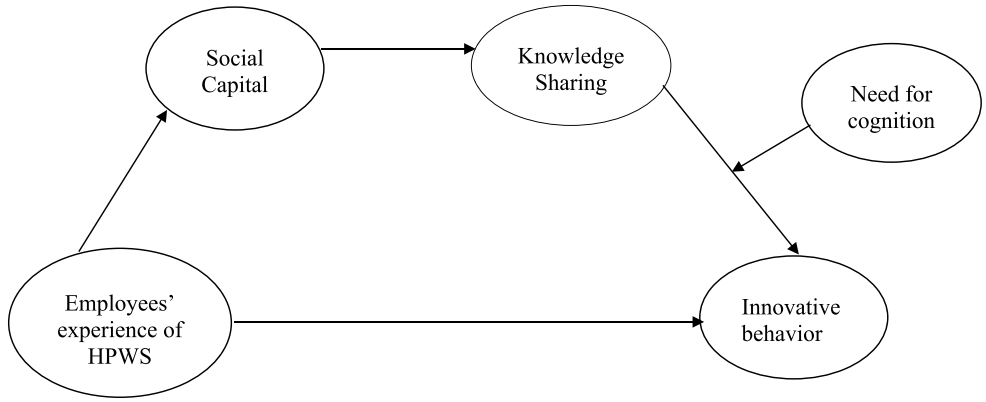


FIGURE 1
Conceptual framework.

TABLE 1 Demographic profile of respondents.

Demographic		Frequency	Percentage (%)
Gender	Male	144	55
	Female	118	45
Age	Less than 25	52	19.8
	25–34 years	136	51.9
	35–44 years	39	14.9
	45–54 years	20	7.6
	55 above	15	5.7
Qualification	Undergraduate	113	43.1
	Graduate	128	48.9
	Doctorate	6	2.2
	Other	15	5.7
Hierarchical Level	Entry	88	33.6
	Middle	139	53
	Senior	35	13.3
Tenure	Less than 5 years	99	37.8
	5 to 10 years	70	26.7
	11 to 15 years	31	11.8
	More than 15 years	62	23.6

$N = 262$.

obtained from IT companies, 63 responses were obtained from marketing companies and 114 responses were obtained from engineering and architecture companies. The demographic profile of the respondents is shown in Table 1.

3.2 Measurement scales

The measurement scales used in this study are described below. All items were measured using a 5-point Likert Scale. Some items were reworded to increase clarity and reduce ambiguity while maintaining the original meaning. The questionnaire items are provided in Appendix 1.

3.2.1 Employee experience of HPWS

A 12-item scale adapted from Edgar et al. (2021) was used to measure employee experience of HPWS. The instruments measured the extent to which employees agreed that they experienced practices, such as selective staffing, training and development, decision-making empowerment, participation, team based work designs, and compensation contingent on performance.

3.2.2 Social capital

A 12-item scale adapted and modified from Leana and Pil (2006) and Tsai et al. (2014) was used to measure employee perceptions of SC. Tantardini and Kroll (2015) recommended that SC should be measured using multiple informant surveys to capture individual perceptions of social relationships, interpersonal trust and shared vision. Furthermore, based on the recommendations of previous studies (Leana and Pil, 2006; Parzefall and Kuppelwieser, 2012), SC was measured as a unidimensional construct by averaging item scores.

3.2.3 Knowledge sharing

Employees' KS behavior was measured using a 7-item scale adapted from Lin (2007). The scale comprises items that measure the extent to which employees collect and donate knowledge from their coworkers.

3.2.4 Innovative behavior

Employee IB was measured using Janssen's (2000), 9-item scale. The scale measured respondents' agreement regarding their idea generation, promotion, and realization behaviors in the workplace.

3.2.5 Need for cognition

This study used the 6-item short Need for Cognition Scale (NFC-6) developed by Lins de Holanda Coelho et al. (2020). The scale is a shortened version of the original NFC-18 (Cacioppo et al., 1984). Lins de Holanda Coelho et al. (2020) demonstrated that the NFC-6 is a reliable, parsimonious, and valid measure of individuals' need for cognition.

3.3 Assessment of common method variance

Self-reports were used to measure the key study variables. Therefore, as recommended by Podsakoff et al. (2012), we used procedural and statistical techniques to assess and control for common method variance (CMV). The procedural remedy included ensuring anonymity and confidentiality of the responses so that biased responses could be mitigated. Moreover, we added additional variables to the questionnaire to create psychological separation and prevent respondents from inferring relationships between the constructs.

The statistical methods included the application of two statistical tests to assess the CMV. First, we conducted Harman's single-factor test. The results of this test indicated that the total variance explained by one factor was below the threshold limit of 50%, indicating that CMV was not significant. Moreover, we used a collinearity test to check variance inflation factors (VIF). According to Kock (2012), CMV is a concern when the VIF values are above 3.3. In our results, VIF values ranged from 1.35 to 2.50, which confirms that CMV was not a significant concern in this study.

4 Data analysis and results

Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to examine the proposed relationships. PLS-SEM is a variance-based structural equation modeling technique that employs a combination of indicator variables as proxies for conceptual variables (Hair et al., 2012). PLS-SEM is widely used in the social science discipline because it does not require stringent normality assumptions and can be used to analyze complex models. Anderson and Gerbing (1988) recommended a two-stage approach to analyze the measurement (outer) and structural (inner) models. The SmartPLS 4.0.9.0 software was used as the analysis tool.

4.1 Assessment of measurement model

To assess the measurement model quality, the indicator loadings, internal consistency, construct reliability, and convergent validity of the items were assessed. Item loadings demonstrate how well an item represents an underlying construct. Although the recommended value of item loadings is above 0.70 (Vinzi et al., 2010), social science researchers frequently obtain loadings below this threshold. Thus, item loadings above 0.6 were retained. Lower-loading items were deleted when there was a significant improvement in Average Variance Explained (AVE). Moreover, Cronbach's alpha (CA) and Composite reliability (CR) were assessed. The scores exceeded the minimum threshold of 0.6, indicating acceptable construct reliability and internal consistency of the items (Hair et al., 2017).

The convergent validity of the latent constructs was established by checking the Average Variance Explained (AVE) values. The results indicate that the AVE values were close to the recommended threshold of 0.5, indicating reasonable convergent validity (Hair et al., 2012). According to Fornell and Larcker (1981), the AVE is a conservative estimate of model validity. Composite reliability alone can indicate that the construct is adequate even when AVE is below 0.50. The composite reliability of all the constructs was above the recommended level; thus, the internal reliability of the measurement items is acceptable.

The results of the measurement model assessment are presented in Table 2.

The discriminant validity of the model was assessed using Fornell and Larcker's (1981) criteria. Discriminant validity is established when the square root of the AVE of each construct is higher than its correlation with other latent constructs (Fornell and Larcker, 1981). As shown in Table 3, the square root of the AVE value for each construct was higher than its correlation with the other latent constructs. The correlations between the study variables and the demographic variables are shown in Table 3. The correlations between study variables were significant at $p < 0.01$ level. The correlations between the study constructs and demographic variables were small and insignificant. The overall results confirmed that the measurement model was adequate for the structural analysis (Hair et al., 2017).

4.2 Assessment of structural model

For the structural model assessment, we followed the recommendations of Hair et al. (2017) and Ringle et al. (2020). As previously discussed, the VIF values indicated no potential collinearity, which could bias the path coefficients. Next, we checked the coefficient of determination (R^2) to determine predictive accuracy. The proposed model accounted for a 24% variance in IB ($R^2 = 0.24$). Furthermore, we checked the predictive accuracy and cross-validated the redundancy index (Q^2). All Q^2 values were above zero, indicating the predictive accuracy of the model (Hair et al., 2017).

The path coefficients and respective significance values were assessed. Hypotheses testing was conducted using a bootstrapping procedure with 5,000 sub-samples and 95% bias-corrected confidence intervals. Initially, the proposed direct relationships were analyzed. Hypothesis 1 predicted a direct and positive relationship between employees' experience of HPWS and IB. The results demonstrated a significant direct and positive relationship ($\beta = 0.14$, $p < 0.05$). Hypothesis 2 predicted a direct and positive relationship between employees' experience of HPWS and SC development. The results indicated that the relationship was positive and significant ($\beta = 0.38$, $p < 0.01$). Hypothesis 3 predicts a direct and positive relationship between SC and KS. Path coefficients are positive and significant ($\beta = 0.34$, $p < 0.01$), respectively. Furthermore, as hypothesized by Hypothesis 5, we assessed a positive and direct relationship between KS and IB. The results indicated a significant direct and positive relationship between KS and IB ($\beta = 0.26$, $p < 0.01$).

The primary focus of this study was to investigate the indirect relationships between employees' experiences of HPWS and IB. Therefore, we examined our proposed mediation hypotheses. The results revealed that SC mediates the relationship between employees' experience of HPWS and KS ($\beta = 0.13$, $p < 0.01$), as hypothesized in Hypothesis 4. Hypothesis 6 tested the mediating role of KS between SC and IB. The results confirmed the proposed mediation hypothesis ($\beta = 0.09$, $p < 0.01$). According to Hypothesis 7, SC and KS sequentially mediate the relationship between employees' experience of HPWS and IB. The results confirm the

10.3389/fpsyg.2023.1324474

TABLE 2 Assessment of measurement model.

Items	Item loadings	CA	CR	AVE
Employee experience of HPWS		0.88	0.90	0.48
At work I have opportunity to participate in decision-making	0.75			
I have a great deal of autonomy in the way I carry out my job.	0.65			
I have good job security.	0.74			
My organization gives fair performance-based rewards.	0.71			
Training and development opportunities are provided.	0.69			
My workplace sets very high standards and is very selective when recruiting staff.	0.67			
Managers provide developmental feedback to improve performance.	0.68			
I am provided with opportunities to express my ideas about how processes can be improved in this organization.	0.70			
I believe my values fit well with those of my organization.	0.69			
My organization values my ability to work well within a team environment.	0.65			
Social capital In my organization:		0.90	0.91	0.51
Employees demonstrate strong cohesiveness in workgroups.	0.63			
Employees have frequent contact with coworkers.	0.72			
Employees spend a lot of time interacting with each other.	0.68			
Employees have close social relationships with each other.	0.73			
There is a commonality of purpose among the employees.	0.69			
Employees enthusiastically pursue collective goals and mission.	0.76			
Employees are committed to the goals of the team/department/work unit.	0.68			
Employees share similar ambitions and vision.	0.72			
We can rely on co-workers and superiors, with whom we work.	0.73			
Employees have confidence in one another.	0.77			
Knowledge sharing		0.81	0.85	0.49
When I have learned something new, I share my knowledge with my colleagues.	0.60			
I share important work-related information with my colleagues.	0.70			
I regularly tell my colleagues about my skills and tasks performed at work.	0.72			
When I need certain knowledge, I ask my colleagues about it.	0.66			
I like to be informed of what my colleagues know.	0.79			
When I need to learn something, I ask my colleagues who have their technical knowhow, skills and abilities.	0.71			
Need for cognition		0.89	0.90	0.69
I would prefer complex rather than simple problems.	0.83			
I like to handle situations that require a lot of thinking.	0.85			
I find satisfaction in finding solutions to problems by thinking about them for a long time.	0.83			
I prefer my life to be filled with interesting puzzles that I must solve.	0.86			
I would prefer a task that is intellectual, challenging, and thoughtful to one that does not require much thought.	0.79			
Innovative behavior		0.85	0.88	0.53
I often generate ideas to tackle complex issues at work.	0.78			
I search out new working methods, techniques, or instruments for work.	0.75			
I generate original and effective solutions for challenges faced by my team/work unit.	0.70			
Where possible, I tend to mobilize support for innovative ideas given by my colleagues.	0.72			
When I have an innovative idea, I talk to my manager(s) for approval.	0.70			
I often encourage my colleagues to discuss new and innovative ideas for product/service/process improvements.	0.71			
I adopt systematic ways of introducing innovative ideas into the work environment.	0.72			

CA, Cronbach Alpha; CR, Composite Reliability; AVE, Average Variance Extracted. The table excludes the items that were dropped due to low loading values.

TABLE 3 Discriminant validity estimates and correlations of study variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
HPWS (1)	**0.69**								
IB (2)	0.26**	**0.72**							
KS (3)	0.24**	0.39**	**0.70**						
NFC (4)	0.23**	0.38**	0.44**	**0.83**					
SC (5)	0.38**	0.26**	0.34**	0.25**	**0.70**				
Gender (6)	−0.09	0.05	0.06	0.09	0.05	1			
Age (7)	−0.03	0.02	0.07	0.04	0.06	0.011	1		
Education (8)	−0.02	−0.06	0.02	0.02	0.08	0.027	0.264**	1	
Tenure (9)	−0.09	−0.03	0.06	0.05	0.07	0.044	0.753**	0.253**	1
Mean	3.61	3.83	4.14	4.15	3.74				
Standard deviation	0.69	0.60	0.54	0.65	0.56				

Bold and Italic elements in parenthesis are square root of AVE. **Correlation is significant at 0.01 level (2 tailed).

TABLE 4 Results of structural model evaluation.

Relationships	Path coefficients	*T* value	*p* value	Decision
Direct effects				
H1: HPWS➔IB	0.14	2.03	0.042	Supported
H2: HPWS➔SC	0.38	6.49	0.000	Supported
H3: SC➔KS	0.34	5.89	0.000	Supported
H5: KS➔IB	0.26	4.16	0.000	Supported
Indirect effects				
H4: HPWS➔SC➔KS	0.13	3.59	0.000	Supported
H6: SC➔KS➔IB	0.09	3.25	0.000	Supported
H7:HPWS➔SC➔KS➔IB	0.03	2.45	0.010	Supported
Total indirect effect				
Total effect				
HPWS➔IB	0.17	2.57	0.01	Supported
Moderation effect				
H8: NFC x KS	0.10	2.12	0.03	Supported

proposed sequential mediation ($\beta = 0.03$, $p < 0.05$). H8 sought to ascertain the moderating role of NFC between KS and IB. The results revealed that the NFC moderated the relationship between KS and IB ($\beta = 0.19$, $p < 0.05$). The results indicate that, at a high NFC, KS was found to have a stronger impact on IB. The results of the structural model evaluation are presented in Table 4. The interaction plot in Figure 2 shows that with an increase in NFC, the positive relationship between KS and IB is strengthened. The results of the hypotheses testing are shown in Figure 3.

5 Discussion

This study investigates the relationship between employees' experience of HPWS and IB. The results of the study validate our arguments based on the SET and ELM. We have used these theoretical perspectives to provide an in-depth understanding of how organizational, social, and cognitive factors interplay to influence IB. The results of the study highlight that social capital and knowledge sharing behavior sequentially mediate the relationship between HPWS and IB. Moreover, the results confirm the positive moderating influence of NFC on the relationship between KS and IB. The theoretical and practical implications of this study are presented in the following sections.

5.1 Theoretical contributions

This study makes several important contributions to the growing body of research on human resource systems and their influence on employee behaviors at the workplace. The SET suggests that employers establish long-term social relationships with employees through provision of benefits such as autonomy, rewards, and development opportunities. In exchange, employees repay the organization in the

form of reciprocal behaviors aligned with the organizational goals (Kehoe and Collins, 2017; Alfes et al., 2021; Asante et al., 2023).

Consistent with the primary hypothesis and arguments based on the SET, we found that employees' experience of HPWS promotes employees' IB as a reciprocal social exchange behavior towards employer. The results support the notion of previous researchers that the perceived benefits of HPWS inculcate social exchange relationship between employer and employees (Bos-Nehles et al., 2017; Zhang et al., 2019; Zhu et al., 2022; Asante et al., 2023).

Furthermore, this study delves into the relational consequences of HPWS. Based on the tenets of SET, there is a growing debate that HRM practices contribute to the development of a social architecture that facilitates resource exchange and innovation (Oparaocha, 2016; Singh et al., 2021). This study contributes to this growing debate and highlights the role of interrelated human resource practices for engendering organizational innovation and competitive advantage.

Our study contributes to the research on HPWS and individual level innovation by highlighting social capital development and knowledge sharing as key relational links that underly the relationship. Existing studies have indicated that interrelated practices of HPWS have the potential to drive SC development in organizations (Donate et al., 2020; Wang et al., 2023). SC serves as a catalyst for innovation by facilitating exchange and flow of information ideas in the organization (Yen et al., 2015; Santos et al., 2023). Thus, SC can be considered as relevant mediator that underlys the relationship between HPWS and KS. Furthermore, HPWS encourages cooperation and relationship maintenance. In such contexts, employees may be inclined to share knowledge due to a shared belief that their contributions are valued (Ganguly et al., 2019; Donate et al., 2020). Consequently, KS fuels creative thinking, idea generation and implementation for value creation (Pian et al., 2019). Thus, the importance of KS as a mediator between SC and IB cannot be overlooked.

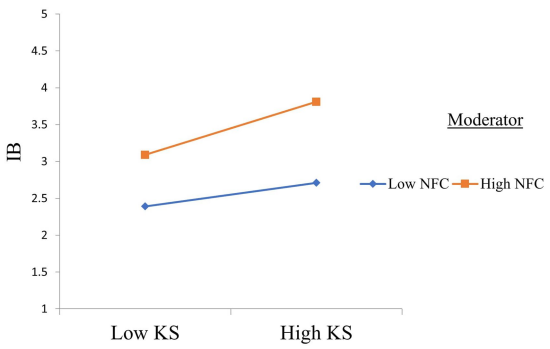


FIGURE 2
Interaction plot.

The results of the study support the argument that employees' experiences of HPWS foster the development of social assets and exchange relationships (Evans and Davis, 2005; Jiang and Liu, 2015; Donate et al., 2020; Singh et al., 2021). The results also validate the arguments in the literature that SC serves as a bonding element that allows individuals to leverage useful knowledge for innovative value creation (Inkpen and Tsang, 2005; Hair et al., 2014; Ganguly et al., 2019; Al-Omoush et al., 2022). There is a paucity of research that delves deeply into the interplay of the underlying social and cognitive factors that facilitate individual innovation, particularly in PSF contexts. Previous studies have attempted to examine direct relationships or single mediation paths and neglected possible sequential paths that can provide an in-depth understanding of the relationships. Thus, this study clarifies the nature of this relationship between HPWS and IB by delving deeply into the underlying mechanisms through which HRM practices have an impact on IB. Despite the known benefits of SC in organizations, there is limited literature that explores its antecedents. Thus, another contribution of this study is that we have identified employee experience of HPWS as an enabling factor of SC development.

This study validates the arguments that KS interactions facilitate employees' innovative behavior (Radaelli et al., 2014; Pian et al., 2019; Kmieciak, 2020). Additionally, this study is also a pioneering attempt to propose a moderating influence of individual NFC in the relationship between KS and IB. By using arguments based on ELM, we enrich the vast body of research on KS and innovation by identifying NFC as a boundary condition. NFC is a

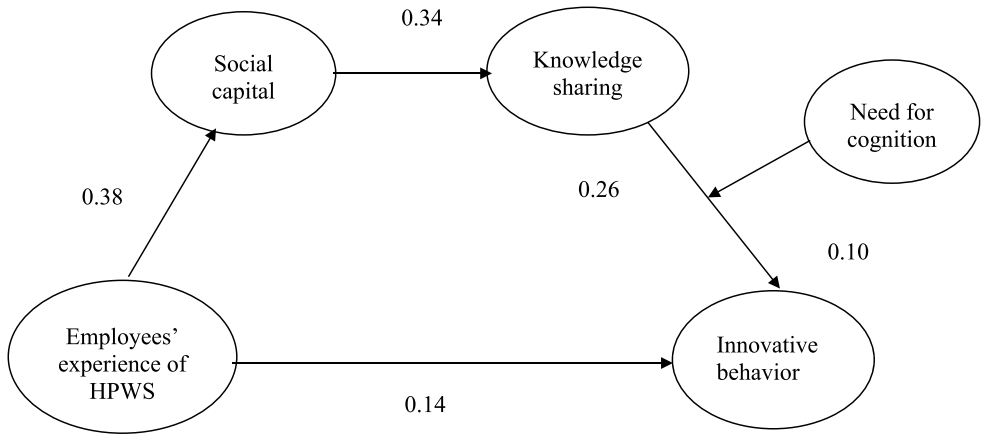


FIGURE 3
Results of hypotheses testing.

dispositional tendency to engage in in-depth information processing, cognitive elaboration, and critical thinking (Cacioppo and Petty, 1982). There is limited research that considers the influence of NFC on individual-level innovation (Wu et al., 2014; Pan et al., 2021). The results of the study posit that NFC drive IB by facilitating in-depth processing of knowledge shared during social interactions (Evans et al., 2003; Pan et al., 2021). This study suggests theoretical and practical relevance of NFC as a contextual factor that enhances employees ability to transform shared knowledge into innovative output. The current study underscores the pivotal significance of cognitive differences in amplifying the impact of KS on IB. In workplace contexts such as those which implement HPWS, individuals with high NFC can generate creative and innovative solutions through KS interactions (Wu et al., 2014). Our study suggests that individuals with high NFC are likely to contribute diverse ideas to shared knowledge pools.

Recent studies suggest that there are differences in managers' and employees' reports regarding the implementation of HRM practices in organizations. These studies suggest that an analysis of employees' individual experiences of HRM practices on their behaviors can provide a better understanding as compared to the managerial perspective (Ali et al., 2022; Kim et al., 2023). In line with these arguments, this study uses employees' reports to gauge their perceptions of HRM systems and resultant impact on their behaviors.

This study uses empirical evidence from PSFs in Pakistan, an emerging Asian country. PSFs play a vital role in the economic growth and development of emerging countries by promoting service exports. PSFs operate in a competitive business environment; therefore, employees' IB is important to promote client satisfaction and achieve competitive advantage. Earlier research has documented the influence of HR practices on employee-related outcomes in various organizational contexts, such as manufacturing and high-technology firms (Park et al., 2017; Bos-Nehles and Veenendaal, 2019; Yao et al., 2023). Furthermore, there is limited evidence regarding the outcomes of HPWS in PSFs within developing country contexts. This study fills these research gaps by providing an understanding of different factors that can determine employees' IB in PSF contexts. Although Pakistan is known as high power distance country, the results of this study dispel the widespread notion of bureaucratic culture and the lack of cooperation between employees in Pakistani organizations. Our study indicates that HPWS can provide benefits beyond cultural and societal boundaries.

5.2 Managerial implications

In addition to the above-mentioned theoretical contributions, this study also presents important practical implications. Our study highlights the relational dynamics of the HPWS, which can potentially lead to the effective utilization of knowledge utilization. This study advances the widespread understanding of managers that the HPWS not only contributes to human capital development but also influences social dynamics at workplaces. The findings illustrate that HPWS plays an important role in engendering social capital and knowledge sharing, which prompts employees to engage in IB. Thus, PSFs striving to compete in a dynamic business environment can implement HPWS to increase employees' creative involvement. Moreover, this study also guides recruitment managers to assess potential job incumbents' cognitive abilities, to promote innovation in PSFs. While this study focuses on PSFs in Pakistan, its findings can have broader implications for managers of PSFs in comparable countries in the region. This is because PSFs face similar challenges such as competitiveness and rapidly changing client demands.

5.3 Limitations and recommendations for future research

Despite its theoretical and practical implications, our study has some limitations that suggest avenues for future research. This study used employees' self-reports to measure key study variables that may engender CMV. Future research can replicate our study using a combination of supervisor-rated and self-reported measures. Nevertheless, CMV was not a significant concern in this study as we employed statistical and procedural remedies to mitigate any potential biases. Moreover, this study used empirical data from PSFs in Pakistan. Data from a single geographical context may question the generalizability of the findings. Future research could employ cross-country comparisons for an in-depth understanding of the proposed relationships. Furthermore, future research can investigate additional mediating and moderating mechanisms that explain the relationship between employees experience of HPWS and IB.

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 Dr. Mian Muhammad Atif, Chair, Research Ethics Committee, FAST School of Management, National University of Computer and Emerging Sciences, Lahore, Pakistan. 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

BA: Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. HH: Conceptualization, Methodology, Supervision, Writing – review & editing. AA: Conceptualization, Methodology, Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

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.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1324474/full#supplementary-material

References

Akhavan, P., and Mahdi Hosseini, S. (2015). Social capital, knowledge sharing, and innovation capability: an empirical study of R&D teams in Iran. *Technol. Anal. Strateg. Manag.* 28, 96–113. doi: 10.1080/09537325.2015.1072622

Akram, T., Lei, S., Haider, M. J., and Hussain, S. T. (2020). The impact of organizational justice on employee innovative work behavior: mediating role of knowledge sharing. *J. Innov. Knowl.* 5, 117–129. doi: 10.1016/J.JIK.2019.10.001

Alfes, K., Veld, M., and Fürstenberg, N. (2021). The relationship between perceived high-performance work systems, combinations of human resource well-being and human resource performance attributions and engagement. *Hum. Resour. Manag. J.* 31, 729–752. doi: 10.1111/1748-8583.12310

Alguezaui, S., and Filieri, R. (2010). Investigating the role of social capital in innovation: sparse versus dense network. *J. Knowl. Manag.* 14, 891–909. doi: 10.1108/13673271011084925/FULL/XML

Ali, M., Freeman, S., Shen, L., Xiong, L., and Chudhery, M. A. Z. (2022). High-performance work systems in public service units: examining the social capital and ambidexterity as mediating process. *Pers. Rev.* doi: 10.1108/PR-11-2021-0835/FULL/XML [ahead of print].

Al-Omoush, K. S., Ribeiro-Navarrete, S., Lassala, C., and Skare, M. (2022). Networking and knowledge creation: social capital and collaborative innovation in responding to the COVID-19 crisis. *J. Innov. Knowl.* 7:100181. doi: 10.1016/J.JIK.2022.100181

Anderson, J. C., and Gerbing, D. W. (1988). Structural equation modeling in practice: a review and recommended two-step approach. *Psychol. Bull.* 103, 411–423. doi: 10.1037/0033-2909.103.3.411

Aryee, S., Walumbwa, F. O., Seidu, E. Y. M., and Otaye, L. E. (2012). Impact of high-performance work systems on individual-and branch-level performance: test of a multilevel model of intermediate linkages. *J. Appl. Psychol.* 97, 287–300. doi: 10.1037/a0025739

Asante, D., Tang, C., Asante, E. A., Kwamega, M., and Opoku-Danso, A. (2023). Leveraging perceived HPWS to improve service encounter quality in high-contact service industries. *J. Retail. Consum. Serv.* 73:103344. doi: 10.1016/J.JRETCONSER.2023.103344

Bartram, T., Cooper, B., Cooke, F. L., and Wang, J. (2021). High-performance work systems and job performance: the mediating role of social identity, social climate and empowerment in Chinese banks. *Pers. Rev.* 50, 285–302. doi: 10.1108/PR-08-2019-0425/FULL/XML

Belmi, P., and Pfeffer, J. (2014). How "organization" can weaken the norm of reciprocity: the effects of attributions for favors and a calculative mindset. *Acad. Manag. Discov.* 1, 36–57. doi: 10.5465/AMD.2014.0015

Blau, P. M. (1964). *Exchange & Power in social life*. New York: Wiley.

Bos-Nehles, A., Renkema, M., and Janssen, M. (2017). HRM and innovative work behaviour: a systematic literature review. *Pers. Rev.* 46, 1228–1253. doi: 10.1108/PR-09-2016-0257/FULL/PDF

Bos-Nehles, A. C., and Veenendaal, A. A. R. (2019). Perceptions of HR practices and innovative work behavior: the moderating effect of an innovative climate. *Int. J. Hum. Resour. Manag.* 30, 2661–2683. doi: 10.1080/09585192.2017.1380680

Cacioppo, J. T., and Petty, R. E. (1982). The need for cognition. *J. Pers. Soc. Psychol.* 42, 116–131. doi: 10.1037/0022-3514.42.1.116

Cacioppo, J. T., Petty, R. E., and Kao, C. F. (1984). The efficient assessment of need for cognition. *J. Pers. Assess.* 48, 306–307. doi: 10.1207/S15327752JPA4803_13

Castaneda, D. I., and Cuellar, S. (2020). Knowledge sharing and innovation: a systematic review. *Knowl. Process. Manag.* 27, 159–173. doi: 10.1002/KPM.1637

Collins, C. J., and Smith, K. G. (2006). Knowledge exchange and combination: the role of human resource practices in the performance of high-technology firms. *Acad. Manag. J.* 49, 544–560. doi: 10.5465/AMJ.2006.21794671

Cropanzano, R., and Mitchell, M. (2005). Social exchange theory: an interdisciplinary review. *J. Manage.* 31, 874–900. doi: 10.1177/0149206305279602

Donate, M. J., Ruiz-Monterrubio, E., Sánchez de Pablo, J. D., and Peña, I. (2020). Total quality management and high-performance work systems for social capital development: effects on company innovation capabilities. *J. Intellect. Cap.* 21, 87–114. doi: 10.1108/JIC-07-2018-0116/FULL/XML

Edgar, F., Blaker, N. M., and Everett, A. M. (2021). Gender and job performance: linking the high performance work system with the ability–motivation–opportunity framework. *Pers. Rev.* 50, 47–63. doi: 10.1108/PR-10-2019-0577/FULL/XML

Evans, W. R., and Davis, W. D. (2005). High-performance work systems and organizational performance: the mediating role of internal social structure. *J. Manage.* 31, 758–775. doi: 10.1177/0149206305279370

Evans, C. J., Kirby, J. R., and Fabrigar, L. R. (2003). Approaches to learning, need for cognition, and strategic flexibility among university students. *Br. J. Educ. Psychol.* 73, 507–528. doi: 10.1348/000709903322591217

Fornell, C., and Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *J. Mark. Res.* 18:39. doi: 10.2307/3151312

Fu, N., Flood, P. C., Bosak, J., Morris, T., and O'Regan, P. (2015). How do high performance work systems influence organizational innovation in professional service firms? *Employee Relations* 37, 209–231. doi: 10.1108/ER-10-2013-0155/FULL/XML

Ganguly, A., Talukdar, A., and Chatterjee, D. (2019). Evaluating the role of social capital, tacit knowledge sharing, knowledge quality and reciprocity in determining innovation capability of an organization. *J. Knowl. Manag.* 23, 1105–1135. doi: 10.1108/JKM-03-2018-0190/FULL/XML

García-Chas, R., Neira-Fontela, E., and Castro-Casal, C. (2014). High-performance work system and intention to leave: a mediation model. *Int. J. Hum. Resour. Manag.* 25, 367–389. doi: 10.1080/09585192.2013.789441

Gong, Y., Chang, S., and Cheung, S. Y. (2010). High performance work system and collective OCB: a collective social exchange perspective. *Hum. Resour. Manag. J.* 20, 119–137. doi: 10.1111/J.1748-8583.2010.00123.X

Gouldner, A. W. (1960). The norm of reciprocity: a preliminary statement. *Am. Sociol. Rev.* 25:161. doi: 10.2307/2092623

Hair, J. F., Hult, G. T. M., Ringle, C. M., and Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage Publications, Thousand Oaks,CA.

Hair, J. F., Risher, J. J., Sarstedt, M., and Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *Eur. Bus. Rev.* 31, 2–24. doi: 10.1108/EBR-11-2018-0203/FULL/XML

Hair, J. F., Sarstedt, M., Hopkins, L., and Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): an emerging tool in business research. *Eur. Bus. Rev.* 26, 106–121. doi: 10.1108/EBR-10-2013-0128/FULL/XML

Hair, J. F., Sarstedt, M., Ringle, C. M., and Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *J. Acad. Mark. Sci.* 40, 414–433. doi: 10.1007/S11747-011-0261-6/TABLES/5

Hoang, G., Luu, T. T., Du, T., and Nguyen, T. T. (2023). Can both entrepreneurial and ethical leadership shape employees' service innovative behavior? *J. Serv. Mark.* 37, 446–463. doi: 10.1108/JSM-07-2021-0276/FULL/XML

Inkpen, A. C., and Tsang, E. W. K. (2005). Social capital, networks, and knowledge transfer. *Acad. Manag. Rev.* 30, 146–165. doi: 10.5465/AMR.2005.15281445

Janssen, O. (2000). Job demands, perceptions of effort-reward fairness and innovative work behaviour. *J. Occup. Organ. Psychol.* 73, 287–302. doi: 10.1348/096317900167038

Javed, A., and Khan, Z. (2023). Fostering sustainable relationships in Pakistani cellular service industry through CSR and brand love. *South Asian J. Bus. Stud.* 12, 293–314. doi: 10.1108/SAJBS-10-2020-0372/FULL/XML

Jiang, K., Lepak, D. P., Hu, J., and Baer, J. C. (2012). How does human resource management influence organizational outcomes? A Meta-analytic investigation of mediating mechanisms. *Acad. Manag. J.* 55, 1264–1294. doi: 10.5465/AMJ.2011.0088

Jiang, J. Y., and Liu, C. W. (2015). High performance work systems and organizational effectiveness: the mediating role of social capital. *Hum. Resour. Manag. Rev.* 25, 126–137. doi: 10.1016/J.HRMR.2014.09.001

Kehoe, R. R., and Collins, C. J. (2017). Human resource management and unit performance in knowledge-intensive work. *J. Appl. Psychol.* 102, 1222–1236. doi: 10.1037/APL0000216

Kim, S., Kwon, J., and Jung, D. (2023). Going beyond the firm perspective: what do employees think of high-performance work systems (HPWS)? *Asian bus. Manag.* 22, 2106–2134. doi: 10.1057/S41291-023-00243-4

Kmieciak, R. (2020). Trust, knowledge sharing, and innovative work behavior: empirical evidence from Poland. *Eur. J. Innov. Manag.* 24, 1832–1859. doi: 10.1108/EJIM-04-2020-0134/FULL/PDF

Kock, N. (2012). Common method bias in PLS-SEM: a full collinearity assessment approach. *Int. J. e-Collab.* 11, 1–10. doi: 10.4018/ijec.2015100101

Kock, N., and Hadaya, P. (2018). Minimum sample size estimation in PLS-SEM: the inverse square root and gamma-exponential methods. *Inf. Syst. J.* 28, 227–261. doi: 10.1111/ISJ.12131

Leana, C. R., and Pil, F. K. (2006). Social capital and organizational performance: evidence from urban public schools. *Organ. Sci.* 17, 353–366. doi: 10.1287/ORSC.1060.0191

Lefebvre, V. M., Sorenson, D., Henchion, M., and Gellynck, X. (2016). Social capital and knowledge sharing performance of learning networks. *Int. J. Inf. Manag.* 36, 570–579. doi: 10.1016/J.IJINFOMGT.2015.11.008

Lin, H. F. (2007). Knowledge sharing and firm innovation capability: an empirical study. *Int. J. Manpow.* 28, 315–332. doi: 10.1108/01437720710755272/FULL/XML

Lins de Holanda Coelho, G., HP Hanel, P., and J Wolf, L. (2020). The very efficient assessment of need for cognition: developing a six-item version. *Assessment* 27, 1870–1885. doi: 10.1177/1073191118793208

Munir, R., and Beh, L. S. (2019). Measuring and enhancing organisational creative climate, knowledge sharing, and innovative work behavior in startups development. *Bottom Line* 32, 269–289. doi: 10.1108/BL-03-2019-0076/FULL/XML

Mustafa, M. J., Zainal Badri, S. K., and Melanie Ramos, H. (2022). Linking middle-managers' ownership feelings to their innovative work behaviour: the mediating role of affective organisational commitment. *J. Manag. Organ.*, 1–18. doi: 10.1017/JMO.2021.67

Nahapiet, J., and Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Acad. Manag. Rev.* 23, 242–266. doi: 10.5465/AMR.1998.533225

Oparaocha, G. O. (2016). Towards building internal social network architecture that drives innovation: a social exchange theory perspective. *J. Knowl. Manag.* 20, 534–556. doi: 10.1108/JKM-06-2015-0212/FULL/XML

Pahos, N., and Galanaki, E. (2022). Performance effects of high performance work systems on committed, Long-term employees: a multilevel study. *Front. Psychol.* 13:825397. doi: 10.3389/FPSYG.2022.825397/BIBTEX

Pan, Y., Shang, Y., and Malika, R. (2021). Enhancing creativity in organizations: the role of the need for cognition. *Manag. Decis.* 59, 2057–2076. doi: 10.1108/MD-04-2019-0516/FULL/XML

Park, O., Bae, J., and Hong, W. (2017). High-commitment HRM system, HR capability, and ambidextrous technological innovation. *Int. J. Hum. Resour. Manag.* 30, 1526–1548. doi: 10.1080/09585192.2017.1296880

Parzefall, M. R., and Kuppelwieser, V. G. (2012). Understanding the antecedents, the outcomes and the mediating role of social capital: an employee perspective. *Hum. Relations* 65, 447–472. doi: 10.1177/0018726711431853

Patel, P. C., Messersmith, J. G., and Lepak, D. P. (2013). Walking the tightrope: an assessment of the relationship between high-performance work systems and organizational ambidexterity. *Acad. Manag. J.* 56, 1420–1442. doi: 10.5465/AMJ.2011.0255

Petty, R. E., and Cacioppo, J. T. (1986). *The elaboration likelihood model of persuasion*. Springer New York.

Pian, Q. Y., Jin, H., and Li, H. (2019). Linking knowledge sharing to innovative behavior: the moderating role of collectivism. *J. Knowl. Manag.* 23, 1652–1672. doi: 10.1108/JKM-12-2018-0753/FULL/XML

Podsakoff, P. M., MacKenzie, S. B., and Podsakoff, N. P. (2012). Sources of method Bias in social science research and recommendations on how to control it. *Annu. Rev. Psychol.* 63, 539–569. doi: 10.1146/ANNUREV-PSYCH-120710-100452

Radaelli, G., Lettieri, E., Mura, M., and Spiller, N. (2014). Knowledge sharing and innovative work behaviour in healthcare: a Micro-level investigation of direct and indirect effects. *Creat. Innov. Manag.* 23, 400–414. doi: 10.1111/CAIM.12084

Ramamoorthy, N., Flood, P. C., Slattery, T., and Sardessai, R. (2005). Determinants of innovative work behaviour: development and test of an integrated model. *Creat. Innov. Manag.* 14, 142–150. doi: 10.1111/J.1467-8691.2005.00334.X

Reagans, R., and McEvily, B. (2003). Network structure and knowledge transfer: the effects of cohesion and range. *Adm. Sci. Q.* 48, 240–267. doi: 10.2307/3556658

Ringle, C. M., Sarstedt, M., Mitchell, R., and Gudergan, S. P. (2020). Partial least squares structural equation modeling in HRM research. *Int. J. Hum. Resour. Manag.* 31, 1617–1643. doi: 10.1080/09585192.2017.1416655

Santos, R. F., Oliveira, M., and Curado, C. (2023). The effects of the relational dimension of social capital on tacit and explicit knowledge sharing: a mixed-methods approach. *VINE J. Inf. Knowl. Manag. Syst.* 53, 43–63. doi: 10.1108/VJIKMS-05-2020-0094/FULL/XML

Shanker, R., Bhanugopan, R., van der Heijden, B. I. J. M., and Farrell, M. (2017). Organizational climate for innovation and organizational performance: the mediating effect of innovative work behavior. *J. Vocat. Behav.* 100, 67–77. doi: 10.1016/J.JVB.2017.02.004

Siddique, M., Procter, S., and Gittell, J. H. (2019). The role of relational coordination in the relationship between high-performance work systems (HPWS) and organizational performance. *J. Organ. Eff.* 6, 246–266. doi: 10.1108/JOEPP-04-2018-0029/FULL/XML

Singh, S. K., Mazzucchelli, A., Vessal, S. R., and Solidoro, A. (2021). Knowledge-based HRM practices and innovation performance: role of social capital and knowledge sharing. *J. Int. Manag.* 27:100830. doi: 10.1016/J.INTMAN.2021.100830

Smith, E. R., and DeCoster, J. (2000). Dual-process models in social and cognitive psychology: conceptual integration and links to underlying memory systems. *Personal. Soc. Psychol. Rev.* 4, 108–131. doi: 10.1207/S15327957PSPR0402_01

Speak, A., Escobedo, F. J., Russo, A., and Zerbe, S. (2018). Comparing convenience and probability sampling for urban ecology applications. *J. Appl. Ecol.* 55, 2332–2342. doi: 10.1111/13652664.13167

Subramaniam, M., and Youndt, M. A. (2005). The influence of intellectual capital on the types of innovative capabilities. *Acad. Manag. J.* 48, 450–463. doi: 10.5465/AMJ.2005.17407911

Swart, J., and Kinnie, N. (2003). Sharing knowledge in knowledge-intensive firms. *Hum. Resour. Manag. J.* 13, 60–75. doi: 10.1111/J.1748-8583.2003.TB00091.X

Takeuchi, R., Lepak, D. P., Takeuchi, K., Takeuchi, R., Lepak, D. P., and Wang, H. (2007). An empirical examination of the mechanisms mediating between high performance work systems and the performance of Japanese organizations. *J. Appl. Psychol.* 92, 1069–1083. doi: 10.1037/0021-9010.92.4.1069

Tantardini, M., and Kroll, A. (2015). The role of organizational social Capital in Performance Management. *Public Perform. Manag. Rev.* 39, 83–99. doi: 10.1080/15309576.2016.1071163

Tsai, Y. H., Ma, H. C., Lin, C. P., Chiu, C. K., and Chen, S. C. (2014). Group social capital in virtual teaming contexts: a moderating role of positive affective tone in knowledge sharing. *Technol. Forecast. Soc. Change* 86, 13–20. doi: 10.1016/J.TECHFORE.2013.08.015

Tsai, K. H., and Zheng, L. li (2021). Bridging employee curiosity and service creativity: a new lens. *J. Serv. Theory Pract.* 31, 821–844. doi: 10.1108/JSTP-11-2020-0262

Tsamantouridis, K., Bellou, V., and Tsameti, A. (2023). Innovation in the public sector: insights into the job design that enhances public servants' innovative behavior. *Int. J. Public Adm.* 46, 1125–1136. doi: 10.1080/01900692.2022.2076110

Van De Voorde, K., and Beijer, S. (2015). The role of employee HR attributions in the relationship between high-performance work systems and employee outcomes. *Hum. Resour. Manag. J.* 25, 62–78. doi: 10.1111/1748-8583.12062

Van Den Hooff, B., and Ridder, J. A. (2004). Knowledge sharing in context: the influence of organizational commitment, communication climate and CMC use on knowledge sharing. *J. Knowl. Manag.* 8, 117–130. doi: 10.1108/13673270410567675/FULL/XML

Vinzi, V. E., Chin, W. W., Henseler, J., and Wang, H. (2010). "Perspectives on partial least squares" in *Handbook of partial least squares*. Springer. 1–20.

Wang, X. Y., Lyu, J. Q., and Cheng, D. J. (2023). Effects of high-performance work system on team ambidexterity in China: a dual path model based on emergence perspective. *Asia Pacific Bus. Rev.* 29, 184–205. doi: 10.1080/13602381.2022.2130636

Woods, S. A., Mustafa, M. J., Anderson, N., and Sayer, B. (2018). Innovative work behavior and personality traits: examining the moderating effects of organizational tenure. *J. Manag. Psychol.* 33, 29–42. doi: 10.1108/JMP-01-2017-0016/FULL/XML

Wu, C. H., Parker, S. K., and de Jong, J. P. J. (2014). Need for cognition as an antecedent of individual innovation behavior. *J. Manage.* 40, 1511–1534. doi: 10.1177/0149206311429862

Yang, Z., Nguyen, V. T., and Le, P. B. (2018). Knowledge sharing serves as a mediator between collaborative culture and innovation capability: an empirical research. *J. Bus. Ind. Mark.* 33, 958–969. doi: 10.1108/JBIM-10-2017-0245/FULL/XML

Yao, J., Marescaux, E., Ma, L., and Storme, M. (2023). A contingency approach to HRM and firm innovation: the role of national cultures. *Hum. Resour. Manag.* 62, 685–699. doi: 10.1002/HRM.22149

Yen, Y. F., Tseng, J. F., and Wang, H. K. (2015). The effect of internal social capital on knowledge sharing. *Knowl. Manag. Res. Pract.* 13, 214–224. doi: 10.1057/KMRP.2013.43

Zhang, J., Bal, P. M., Akhtar, M. N., Long, L., Zhang, Y., and Ma, Z. (2019). High-performance work system and employee performance: the mediating roles of social exchange and thriving and the moderating effect of employee proactive personality. *Asia Pacific J. Hum. Resour.* 57, 369–395. doi: 10.1111/1744-7941.12199

Zhu, F., Gao, Y., and Chen, X. (2022). Tough love: impact of high-performance work system on employee innovation behavior. *Front. Psychol.* 13:919993. doi: 10.3389/FPSYG.2022.919993/BIBTEX

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 19 January 2024
DOI 10.3389/fpsyg.2024.1278755

Check for updates

OPEN ACCESS

EDITED BY
Mike James Mustafa,
University of Nottingham Malaysia, Malaysia

REVIEWED BY
Lutfihak Alpkan,
Istanbul Technical University, Türkiye
Xiaobei Li,
Shanghai Business School, China

*CORRESPONDENCE
Syed Jameel Ahmed
✉ jameelahmed.ysu@outlook.com

RECEIVED 16 August 2023
ACCEPTED 02 January 2024
PUBLISHED 19 January 2024

CITATION
Liu H, Jameel Ahmed S, Anjum MA and Mina A (2024) Leader humility and employees' creative performance: the role of intrinsic motivation and work engagement. *Front. Psychol.* 15:1278755. doi: 10.3389/fpsyg.2024.1278755

COPYRIGHT
© 2024 Liu, Jameel Ahmed, Anjum and Mina. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Leader humility and employees' creative performance: the role of intrinsic motivation and work engagement

Haiou Liu[1], Syed Jameel Ahmed[1]*, Muhammad Adeel Anjum[2] and Azalim Mina[1]

[1]Yanshan University, Qinhuangdao, Hebei, China, [2]Balochistan University of Information Technology, Engineering and Management Sciences, Quetta, Balochistan, Pakistan

Drawing on the job demand-resource (JD-R) model and self-determination theory (SDT), this study examines the relationship between humble leadership and employees' creative performance, taking into account the sequential mediating role of intrinsic motivation and work engagement. The sequential mediation model was tested using two-wave questionnaire data collected from employees and their supervisors ($n = 350$) in the telecommunication sector of Pakistan. Data were processed and examined using SPSS and AMOS. The results revealed significant positive relationships among all variables. Further, it was found that intrinsic motivation and work engagement sequentially but partially mediated the positive relationship between humble leadership and creative performance. The theoretical and practical implications are discussed at the end.

KEYWORDS

humble leadership, creative performance, intrinsic motivation, work engagement, mediation

1 Introduction

The fast-paced technological changes and un-predictable working environment has made creativity crucial for organizations (Carmeli and Paulus, 2015). Creativity entails identifying new solutions to the existing problems (Amabile, 1988). Keeping in view the importance of creativity for individuals and organizations, scholars have dedicated considerable attention to identify factors that can influence it (Woods et al., 2018; De Clercq and Mustafa, 2023). However; there is a lack of emphasis on elucidating the means by which employees can excel and enhance their performance (Amabile, 1988; AlKayid et al., 2023) when working under the guidance of humble leadership (HL). Humble leadership is a bottom-up approach of acknowledging limitations and mistakes, recognizing followers' strengths and contributions, and modeling teachability (Owens and Hekman, 2012). Humble leadership, as a concept, originates from the seminal work of Owens and Hekman (2012), who introduced it to describe a leadership style characterized by leaders acknowledging their limitations and appreciating the contributions of others. It responds to the need for leaders to navigate complex organizational landscapes by fostering collaboration and authenticity. Humble leadership encompasses behaviors such as admitting mistakes, valuing team members' strengths, and maintaining a collective focus on success (Owens and Hekman, 2016). Recent conceptualizations highlight dimensions including self-awareness, appreciation of others, and

a commitment to creating a collaborative and inclusive work environment (Ou et al., 2014). Empirical studies by Liu et al. (2023) and Wang et al. (2018) identified key dimensions, including openness to admitting mistakes, valuing others' strengths, a willingness to learn, and a focus on collective success. Creativity on the other hand is defined as the process of idea exploration, generation, championing, and implementation (Scott and Bruce, 1994; Carmeli et al., 2006). While according to Janssen and Giebels (2013), the creative performance of employee is consist of idea generation, idea promotion, and idea realization.

These positive leadership traits/styles are some of the key factors that may foster creativity (Gilmore et al., 2013; Liu et al., 2023). Although research to date has examined the links between several leadership styles and creativity (Carmeli and Paulus, 2015; De Clercq and Mustafa, 2023), but still there is a lack of empirical evidence regarding the relationship of humble leadership with positive outcomes like employee creativity in service sector organizations and its indirect relationship (the mediation effect) on creative performance.

In the past, HL has appeared as a compelling area of study within organizational behavior, with theoretical investigations flaking light on its conceptual foundations and implications for workplace dynamics. Owens and Hekman (2012) proposed a theoretical model that re-conceptualizes leadership as a process of guidance that involves both leader humility and follower response. The model emphasizes the importance of leader humility in creating a positive working organizational climate, promoting team learning, and fostering employee engagement. Skakon et al. (2010) also contribute to the theoretical understanding of HL by exploring its role in charismatic leadership. They argue that humility, when combined into charismatic leadership, improves the follower perceptions of leader sincerity and authenticity, ultimately contributing to positive organizational outcomes. In the context of team dynamics, Owens and Hekman (2016) presented a theoretical framework highlighting the contagion effects of leader humility within teams. Their model suggests that HL positively influence team performance by promoting a collective focus on growth and development. Building on the socialized charismatic leadership perspective. Another study by Owens et al. (2011) offer a theoretical exploration of humility in organizations, discussing its relevance and implications. Their conceptual analysis highlights the potential impact of HL on employee attitudes and behaviors, providing a foundation for further empirical investigations.

In the past studies, HL has appeared as a fundamental aspect of effective organizational management, emphasizing collaboration, openness, and a genuine concern for the well-being of team members (Owens and Hekman, 2016). Simultaneously, CP stands as a critical determinant of an organization's ability to innovate and adapt in today's dynamic business environment (Shalley and Perry-Smith, 2008). HL also promotes employees' engagement and resilience, which can lead to increased job satisfaction and creativity (Liu et al., 2023). Empirical investigations underscore the positive influences of humble leadership on employee outcomes. Owens et al. (2013) found that humble leadership positively predicts engagement, job satisfaction, and performance. The mechanisms include cultivating a supportive work environment, building trust, and enhancing communication within the team (Owens et al., 2013; Owens and Hekman, 2016). Adding more to empirical studies by Chen H. et al. (2021) demonstrated that humble leadership positively influences employee proactive behavior and performance through the promotion of psychological safety and need satisfaction. Not only has this but HL in existing research also explored the motivational perspective of humble leadership. Ou et al. (2014) and Walters and Diab (2016) investigated the effects of humble leadership on employee outcomes and identified humility as a critical factor in fostering employee intrinsic motivation, psychological safety, and engagement. This study, along with others, contributes to understanding how humble leadership aligns with motivational theories and impacts employee motivation positively. As mentioned that HL is considered to be one of the vital element for employee positive outcome, the evidences can be traced in number of empirical studies like, HL has been investigated to gage the project success, where HL can provide valuable input to the get the project success (Ali et al., 2020, 2021). Not only this but HL is also considered to be one of the key factors in influencing the employee career success (Chughtai and Arifeen, 2023), work engagement (Abbas et al., 2021), psychological empowerment (Ali et al., 2020), and employee's emotional and ethical behavior (Naseer et al., 2020).

In addition, leaders who exhibit humility are more likely to create a positive work environment. However, while the separate links between humble leadership (HL), intrinsic motivation (IM), work engagement (WE), and creative performance (CP) have been explored (Al Hawamdeh, 2022; Al Hawamdeh and AL-edenat, 2022; Zheng and Ahmed, 2022; Liu et al., 2023), but on the other hand prior studies have suggested that HL's effect on performance is not only direct; instead, other variables mediate it (Janssen and Giebels, 2013). Therefore; a notable gap exists in understanding the nuanced interplay among the above mentioned variables. Specifically, the literature lacks a comprehensive investigation into the mediation and serial mediation effects of intrinsic motivation (relatedness, competence, and autonomy; Amabile et al., 1994; Ryan and Deci, 2000; Deci et al., 2017) and work engagement (vigor, dedication, and absorption at work place; Schaufeli, 2017) in the relationship between humble leadership (a bottom up approach of acknowledging limitations and mistakes, recognizing followers' strengths and contributions, and modeling teachability; Owens and Hekman, 2012) and creative performance (idea exploration, generation, championing, and implementation; Scott and Bruce, 1994; Carmeli et al., 2006). Therefore, the aim of this study is to address the above mentioned gap by providing a comprehensive understanding both empirically and theoretically.

This study seeks to integrate the research model, consisting of humble leadership, creative performance, intrinsic motivation, and work engagement, within the context of the Job Demands-Resources (JD-R) model and Self-Determination Theory (SDT). The JD-R model provides a comprehensive framework for understanding the impact of job demands and resources on employee well-being and performance. Concurrently, SDT offers insights into the role of intrinsic motivation and self-determination in fostering optimal functioning and creativity. By combining these theoretical perspectives, we aim to explore the intricate relationships among these variables and contribute to a deeper understanding of how HL influences CP through the mediating mechanisms of IM and WE.

On the other hand, the JD-R model posits that job demands and resources influence employee well-being and performance. In our research model, humble leadership serves as a key job resource, potentially mitigating job demands and fostering a positive work environment. Humble leaders are likely to create a supportive and empowering atmosphere, reducing job stressors, and enhancing

employees' overall job satisfaction. This positive influence of humble leadership aligns with the JD-R model. The JD-R model (Bakker et al., 2007) provides a framework for understanding the impact of job resources on employee well-being and performance. Humble leadership, as a job resource, is theorized to positively influence work engagement and, subsequently, creative performance.

Self-Determination Theory emphasizes the importance of intrinsic motivation and autonomy support in promoting individuals' psychological well-being and performance. Intrinsic motivation, identified as a mediator in our model, is expected to play a crucial role. Humble leaders, by acknowledging and appreciating employees' contributions, may enhance intrinsic motivation, leading to a more engaged and creative workforce. This integration allows us to explore how humble leadership, as a form of autonomy support, aligns with SDT principles and contributes to the fulfillment of basic psychological needs, fostering intrinsic motivation among employees. To elucidate the underlying processes through which humble leadership influences creative performance. By examining these mediating mechanisms within the JD-R framework and SDT, we aim to uncover the nuanced pathways that link humble leadership practices to enhanced creative performance. Understanding these processes is crucial for both theoretical development and practical implications, providing insights into how organizations can cultivate a work environment that nurtures creativity through leadership strategies and motivational factors.

Using insights from past studies showing that HL favorable outcomes such as higher work engagement (Bao et al., 2018), greater job satisfaction and happiness (Owens and Hekman, 2012), increased job performance, and superior job performance (Rego et al., 2017), this study predicts a positive relationship between employees' perceptions of leader humility and their creative performance. Further, considering the motivational potential of humble leadership (Carnevale et al., 2019), we argue that leader's humility will positively influence employees' intrinsic motivation. Similarly, consistent with past research findings showing that leaders' humility increases employee dedication and enthusiasm for work (Bakker, 2022), a positive relationship is predicted between humble leadership and work engagement. Finally, this study postulates that intrinsic motivation and work engagement will individually as well as sequentially mediate the association between humble leadership and creative performance. In particular, it is assumed that employees' positive perceptions of leader humility will increase their intrinsic motivation and work engagement, resulting in greater creative performance. These postulations are congruent with the motivation process of the job demands-resources model and self-determination theory suggesting that the abundance of job resources (positive aspects of jobs such as humble leadership) often leads to desirable work outcomes (e.g., higher levels of creativity, innovation, and productivity) through their positive impacts on employee motivation and work engagement (Ou et al., 2014; Chen et al., 2020; Sharif et al., 2021). The choice of HL as an independent variable and creative performance as dependent variable is congruent with the past researches (Chen L. et al., 2021; Kim, 2022; Liu et al., 2022; Kelemen et al., 2023) also our choice of mediation can be found in the past studies (Ryan and Deci, 2019; Urban and Urban, 2023).

This study contributes in the following ways: first, while studies examining the links between HL and employee performance abound (Rego et al., 2021), this study is among very few empirical works ascertaining the association between HL and CP; second, this study explicates how HL can culminate into increased CP. Third by incorporating Self-Determination Theory (SDT) and the Job Demands-Resources (JD-R) model, this study aim to contribute to the advancement of theoretical frameworks in organizational psychology. It will extend these theories by exploring how IM and WE, individually and serially, mediate the relationship between HL and CP. Finally the examination of serial mediation involving IM and WE represents a novel contribution. This sequential analysis will add depth to the understanding of the underlying processes, shedding light on the intricate ways in which these variables may interact and influence creative performance over time. In summary, not only does this study broaden our understanding of how employees' positive perceptions of leader humility impact their creative performance, but it also offers valuable insights for management practice. The research model has been shown in Figure 1.

2 Theory and hypotheses

2.1 Humble leadership and creative performance

Humility entails analyzing oneself fairly and accurately, appreciating the strengths of followers, and learning from others (Owens et al., 2013). Past researches have shown that leader humility can have profound effects on employees and the organization. For instance, humility of a leader can increase followers' engagement with work (Owens and Hekman, 2016), commitment to the organization and job (Basford et al., 2014), and decrease certain negative attitudes and detrimental behaviors (Owens and Hekman, 2016). This is mainly because humble leaders follow an employee-centered approach, i.e., they build/develop congenial interpersonal relationship with their followers, resulting in positive outcomes. In keeping with these findings, we contend that HL can play important role in fostering CP of their followers. We argue this based on the positive attributes of humble leadership. In a study by Ou et al. (2017), humble leadership was found to be positively related to employee learning orientation. A learning-oriented culture supports continuous improvement and innovation, contributing to enhanced creative performance. On the other hand, followers may feel enthused to show superior performance, introduce new ideas, and provide creative and out of the box solutions to the current problems while working with humble leaders (Min et al., 2007). Generating novel ideas and providing creative solutions to the current problems entails risks, i.e., all novel ideas are not be successful or accepted by everyone, leading one to feel discouraged and frustrated. However, humble behaviors (e.g., acknowledging and teachability) of a leader may steer the followers away from such negative feelings and emotions, and invoke a sense of gratitude that may prevent them to get off-tracked (Owens and Hekman, 2012).

Creativity often arises in situations that are ill-defined/unstructured and complex; therefore, one may encounter substantial challenges during the idea generation process. A humble leader can help the followers to off-set such challenges, i.e., he/she may engage in activities and teach the followers how to overcome hurdles (Carmeli et al., 2013). This may encourage followers to exert more effort and energy to engender and implement creative ideas. Therefore, it may be assumed that HL can positively influence followers' CP (Zhou and Wu, 2018). This notion is also consistent with the JD-R model, which

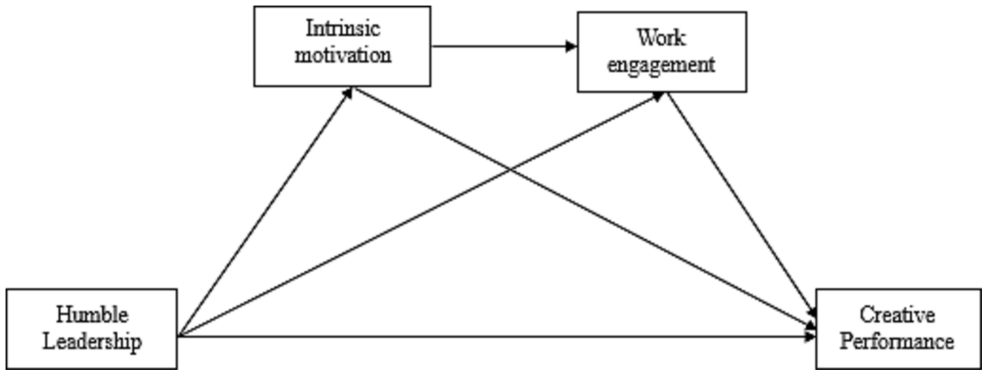


FIGURE 1
Conceptual model.

suggests that favorable job-related factors (e.g., humble leadership) can facilitate important outcomes (e.g., superior performance) (Owens et al., 2013). Therefore, the following hypothesis is proposed:

> H1: Humble leadership will be positively related to creative performance.

2.2 Humble leadership and intrinsic motivation

Motivation is a major psychological force that drives one to act and behave in certain ways (Waterhouse et al., 2014; Jensen and Bro, 2018). There are two main types of motivation: intrinsic motivation (a drive that comes from within) and extrinsic motivation (a drive that revolves around external factors) (Chen and Hsieh, 2015). Although both types of motivation are equally important, this study is focused on intrinsic motivation because it has been argued to be a major driving force of employees' effort, performance, and creativity (Park and Word, 2012; Chen and Hsieh, 2015; Demircioglu and Chen, 2019; Mussagulova and Demircioglu, 2022). Employees are motivated by three basic psychological needs as stated by Self-Determination Theory (SDT) these needs are autonomy in their job, relatedness, and competence (Deci et al., 2017). When these prerequisites are met, employees experience a sense of meaning and self-determination, which in turn, fosters intrinsic motivation and their ability to respond to work demands and overcome challenges (Mussagulova and Demircioglu, 2022). The ability of a supervisor/leader to build a supportive working environment redirects the concern for employees' feelings and needs, which helps to solve work-related problems and increases employees' self-determination and interest for the work (Deci et al., 2017).

Notwithstanding the fact that intrinsic motivation comes purely from within, we argue that leaders' humility can bolster/strengthen/reinforce it. In particular, we propose that individuals working under the guidance of a humble leader will have a stronger intrinsic motivation. We argue this based on the following reasons. First, HLs support their followers' distinctive capabilities, telling and helping them to recognize the importance of their contributions; thus boosting their sense of meaning and competence in the work (some of the fundamental conditions for intrinsic motivation). Second, humble leaders are open-minded and have a desire to learn from their followers, leading to frequent communications. The frequent communication and exchange of information builds a stronger sense of connection and affiliation among followers, satisfying their need for relatedness (a driver of intrinsic motivation). Third, HLs willingly accept their own shortcomings and appreciate the strengths of their followers. They belief in their followers' competencies and are keen to grant autonomy and power to the followers, thus raising their sense of self-determination. In summary, interactions with a humble leader satisfy employees' psychological needs for competence, relatedness, and autonomy within the organization, thereby bolstering/reinforcing their intrinsic motivation. Therefore, we posit that:

> H2: Humble leadership will be positively related to intrinsic motivation.

2.3 Humble leadership and work engagement

Work engagement is a positive work-related attitude categorized by dedication (the positive feelings in the form of personal growth, competence, and significance of work), absorption (attachment of employees with their work where they enjoy to spend more time), and vigor (the level of energy and resilience at work; Jeung and Yoon, 2016; Chen et al., 2020). We argue that leader's humility can foster this attitude. It is a well-established fact that employees engage more in positive activities when they see their leaders demonstrate humility. A humble leader has the capability to form an environment where the subordinates feel comfortable and perform their duties without any fear of undesirable consequences. Admitting his/her own weaknesses and shortcomings and appreciating the strengths of the followers may also result in greater WE (Rego et al., 2019). Researches in the past show that humble leaders can reinforce employee orientation toward learning, job satisfaction, and work engagement (Moss and Ritossa, 2007; Rego et al., 2019; Juyumaya and Torres, 2023). This is mainly because a humble leader gives value and respect to his/her followers; consequently they show greater work engagement. Further, humble leaders play a vital role in building a safe working environment that

promotes maximum performance and engagement (Walters and Diab, 2016; Liu et al., 2023). Compared with other leadership styles, humble leaders tend to be more helpful and supportive toward their followers, thus increasing their dedication, absorption, and vigor. According to a study (Juyumaya and Torres, 2023), higher the humble behavior of a leader, higher will be the work related energy and engagement of the workforce. Therefore, a positive relationship can be anticipated between humble leadership and work engagement. This notion is also consistent with the theoretical premise of the JD-R model that favorable aspects of the work (e.g., humble leadership) produce favorable outcomes (e.g., work engagement; Kahn, 1990) and also the JD-R model posits that work characteristics can be classified into two categories: job demands and job resources. Job resources, such as humble leadership in our case, can positively influence work engagement. Humble leadership, by acknowledging and supporting employees, acts as a job resource that enhances work engagement (González-Romá et al., 2006). Therefore, the following hypothesis is proposed:

> H3: Humble leadership will be positively related to work engagement.

2.4 Intrinsic motivation and creative performance

Intrinsically motivated individual can produce several favorable outcomes (Shalley and Perry-Smith, 2008) including creative performance (Amabile, 1988). Many studies have found a positive correlation between intrinsic motivation and creative performance (Shalley and Perry-Smith, 2008). For example, a study found that employees who were intrinsically motivated were more likely to generate creative ideas (Zhou and Shalley, 2003). The study by Tu and Lu (2016) reported similar findings, showing that intrinsic motivation boosts creativity. Research indicates that providing employees with autonomy and opportunities for self-expression strengthens intrinsic motivation and increases creative performance. Employees who have more job autonomy and the power to make decisions about their tasks display higher levels of creative performance compared with those with limited autonomy. Job autonomy plays a pivotal role in stimulating workers' creativity as it aligns with their innate psychological nature (Juyumaya and Torres, 2023). When employees are granted freedom and self-determination, they feel motivated to try new things and generate diverse and innovative ideas. The motivation process of the JD-R model also highlights that motivation can lead to desirable outcomes (Eisenberger et al., 2005). Therefore, we propose that:

> H4: Intrinsic motivation will be positively related to creative performance.

2.5 Work engagement and creative performance

This study postulates that work engagement can foster creative performance. Research has shown that highly engaged employees often demonstrate superior cognitive processing, which in turn, bolsters creativity (Bakker, 2022). Hence, a positive relationship may be predicted between work engagement and creative performance. Further, WE is often associated with positive affect and emotions such as enthusiasm, joy, and happiness toward work (Abdullah and Al-Abrrow, 2022). These measures of positive affect are strongly linked to heightened creativity, as they enhance cognitive processes and promote divergent thinking. Put simply, it may be asserted that engaged employees demonstrate greater performance because they experience a favorable mental state that allows them to generate innovative ideas. Therefore, the following hypothesis is proposed:

> H5: Work engagement will be positively related to creative performance.

2.6 Intrinsic motivation and work engagement

Higher level of employee intrinsic motivation leads to higher level of favorable outcomes. These favorable outcomes include creativity, job satisfaction, and work engagement (Van den Broeck et al., 2016). On the other hand, work engagement is also associated with positive organizational outcomes such as productivity, less absenteeism, and higher job satisfaction (Schaufeli, 2017). As intrinsic motivation is consist psychological factors like autonomy, relatedness, and competence (Bakker, 2022), these factors if satisfied the employees will be more dedicated and engaged in their work. According to Bakker (2022), intrinsically motivated employees are self-drive to accomplish their task. This phenomena of self-determination leads employees toward more dedication, vigor, and absorption. Job autonomy on the other hand is one of the most powerful tool for employees in their work settings. Giving power and get them involved in the decision making process ultimately increase the intrinsic motivation of the workers. This autonomy in work ultimately results in more work engagement (Deci et al., 2017). This recommends that by cultivating the intrinsic motivation an organization can increase the work engagement of employees which ultimately results in job satisfaction, OCB and affective and cognitive trust on both management and organization. It is important for the organization to understand and nurture the environment of intrinsic motivation and work engagement to foster the performance of the employees. Backing by the above arguments we therefor; posit that

> H6: Intrinsic motivation will be positively related to work engagement.

2.7 The mediation effects

The humble behavior (job resource) of a leader has the potential to influence the individual creative behavior. But there is a lack of understanding of how these behaviors through the underlying mechanism can predict the performance of the employees specifically the creative performance of the followers (Cho and Perry, 2012; Park and Word, 2012). The past researches emphasized on the direct relationship between HL and employee CP (Liu et al., 2023) and

overlooked the mediating role of intrinsic motivation. According to Amabile et al. (1994), intrinsically motivated employees are more likely to generate creative ideas. On the other hand, a leader particularly exhibiting humility can foster the self-determination of the followers, which ultimately may result in improved creative performance (Park and Word, 2012). Prior research has indicated a positive correlation between job related resources, including job autonomy and leader support, and individual resources like self-efficacy, intrinsic motivation, and CP (Demerouti et al., 2010). The provision of a creative and innovative working environment has been found to have a positive impact on employees' sense of control and resilience, thereby serving as an intrinsic motivator for them to confront and overcome challenging situations (Avolio et al., 2009). Leaders who are perceived as positive and humble can foster creative behavior among employees. This is because the display of humility through positive leadership can enhance self-confidence and reduce the fear of unfavorable feedback which may otherwise impede motivation to express novel ideas (Bass, 1985). Companies may raise the intrinsic motivation of their workers toward their job through HL by creating clear guide lines, procedures, and processes that encourage a shared commitment and a mutual receptivity to new ideas.

In the past, transformational (De Clercq and Mustafa, 2023) and transactional leadership (Juyumaya and Torres, 2023) has been the focal point of studies to predict creativity but the study of HL and its impact on employee creativity has been ignored specially its impact through mediating mechanism of intrinsic motivation (Mussagulova and Demircioglu, 2022). To address this gap we posit that,

> H7: Intrinsic motivation will mediate the relationship between humble leadership and creative performance.

The fast paced technological advancements require long-term organizational growth and creative performance, which involves creating innovative goods, services, and procedures (Tierney and Farmer, 2011). Employee engagement is important in this regard due to their motivation to exert more efforts to accomplish the tasks and to give positive output. On the other hand, disengaged employees become the hurdle for achieving excellence in performance and organizational growth (Schaufeli et al., 2006). In contrast to other leadership styles, HL adopts an employee-centered approach to inspire and incentivize their subordinates to enhance the anticipated performance levels for the betterment of the organization. Bass (1985) proposed that a HL who provides guidance, motivation, and stimulates trust can lead to increased employee effort. Such traits indicate that leaders who exhibit humility have the potential to elevate WE levels through their willingness to embrace new ideas and openness to learning, ultimately resulting in improved (CP). According to the Job Demands-Resources (JD-R) theory, employees who have a high level of engagement are likely to demonstrate increased levels of vigor, dedication, and absorption in their job-related duties (Juyumaya and Torres, 2023). Therefore, the humility of a leader assumes an essential part in stimulating the attitudes of employees, including higher levels of energy, dedication, and commitment toward accomplishing tasks (Schaufeli et al., 2006).

The majority of scholarly investigations pertaining to HL procedures focus on models that establish a relationship between leaders' attributes and their performance, while overlooking the potential mediating influence of WE. Although we have sufficient evidence about the positive relationship of WE with servant leadership (Haar et al., 2017) and transformational leadership (Kovjanic et al., 2013) but the relationship between HL and WE and its mediating role between the indirect relationship of HL and CP is still lacking. Therefore, this study will address this gap. To fill this gap in the literature and theory, we hypothesize that,

> H8: Work engagement will mediate the relationship between humble leadership and creative performance.

The past researches have consistently reported a positive relationships between different positive outcomes in the form of work engagement, and other factors, like leadership behavior, job satisfaction, personal growth, job autonomy, and creative performance (Demerouti et al., 2010). Providing a conducive environment to encourage the creative performance has been the subject of many studies (Zhu et al., 2018; Ilha Villanova and Pina e Cunha, 2021; Juyumaya and Torres, 2023). CP has been linking through different mechanism such as WE and IM to overcome the challenges that may hinder the progress of employees as well as organization (Avolio et al., 2009). Humble leadership in this connection plays a crucial role in fostering the psychological encouragement, organizational learning through experimentation of new and innovative ideas. By displaying humble behavior, these leaders can boost motivation level as well as the providing supportive environment for the employee engagement (Deci et al., 2017), which as a result may affect the creative performance. The intrinsic motivation and work engagement can be enhanced by implementing the humble leadership practices like acknowledging limitations and mistakes, recognizing followers' strengths and contributions, and modeling teachability which may ultimately increase the CP. Although we have enough literature regarding the direct relationship of HL, WE IM, and CP, but the mediating especially the sequential mediating mechanism is totally overlooked over the years. To address this gap, this study will test whether the sequential mediation mechanism works in the indirect relationship between HL and CP or not. Therefore; we posit that,

> H9: Intrinsic motivation and work engagement sequentially mediate the positive relationship between humble leadership and creative performance.

3 Methodology

3.1 Research context, sample, and data collection

Convenience sampling method was used to collect the data from the rapidly growing service sector organizations (telecommunication companies) in Pakistan for the following reasons. The telecom industry frequently faces disruptions, such as the emergence of new communication technologies, changes in consumer preferences, and regulatory shifts. Creative performance is essential for organizations to adapt swiftly and effectively to these disruptions, turning challenges into opportunities. And the ongoing digital transformation in the telecom sector requires creative solutions for adopting new technologies, optimizing operational processes, and ensuring a

seamless transition to the digital landscape. Creative performance is instrumental in shaping digital strategies and facilitating organizational change. In the context of Pakistan, leadership styles are frequently shaped by cultural values such as collectivism, respect for authority, and the significance of interpersonal relationships (Sarfraz et al., 2022). Humble leadership, which underscores cooperation and recognizing the contributions of others, aligns effectively with these cultural values. Research suggests that leadership styles underlining humility and interpersonal harmony are more likely to yield positive outcomes in Pakistani organizations (Khokhar et al., 2023). Several studies in the field of humble leadership (HL) have investigated its positive impact on project success in the Pakistani context (Ali et al., 2020, 2021; Waseem et al., 2023). Furthermore, studies in the same context have explored the role of HL in influencing career success, employee creativity, follower emotions, ethical behavior, and work engagement (Abbas and Wu, 2019; Kausar, 2020; Naseer et al., 2020; Abbas et al., 2021). These existing literatures provide a solid foundation for conducting our study within this specified context. And most importantly, the telecom sector has been a "less-researched" area in the OB/HRM research.

To increase the generalizability of this study's findings, we collected data from two provincial capitals (Karachi and Quetta). The researchers visited the designated head offices and their sub branches (franchises) several times before the formal data collection to obtain authorities' permission for data collection. The participants were then approached and informed of the nature and purpose of this study and other aspects (e.g., voluntary participation and data confidentiality).

To get most accurate responses and minimize the selection bias for our survey, the researchers visited 12 offices in telecom sector to get the preliminary information about the education, age, gender, working experience, and firm size. The data were gathered in two phases. Phase 1 comprised collecting data from employees while phase two involved obtaining supervisors' ratings of creative performance. Each supervisor was asked to rate the creative performance of all employees working under his/her supervision. Data were collected in 6 months.

We distributed 780 survey questionnaires among the employees of four major telecom companies. We collected 468 surveys in phase 1, indicating an initial response rate of 60%. After careful examination, 118 surveys were discarded for incomplete information or same responses to all questions. 350 (45%) responses were retained for final analysis, satisfying the following sample size criteria:

1. *n* should be 100 if a model comprises ≤ five variables;
2. the measurement items for each variable are not less than 3; and
3. the communalities of the items are not less than 0.60 (Hair et al., 2006; Hair and Black, 2010).

The demographic profile section of the survey obtained information for the following variables: age, gender, experience, and marital status. 141 (40.3%) employees were aged between 20 and 30 years. 181 (51.7%) were aged between 31 and 40 years. 23 (6.6%) were aged between 41 and 50 years while 5 (1.4%) were aged above 50 years. The gender-wise categorization of the sample was as follows: 218 (62.3%) male and 132 (37.7%) females. 182 (52%) respondents had a working experience of 105 years; 134 (38.3%) respondents had a working experience of 6–10 years; 33 (9.4%) has a working experience of 11–15 years; and only one respondent (0.3%) had a working experience of more than 15 years. Of the 350 respondents, 187 (53%) were unmarried, 159 were (45%) married while 4 (1%) were divorced/widowed.

3.2 Measures

Previously validated and developed scales were adopted to measure the constructs using a five point liker scale which ranged from 1 (strongly disagree) to 5 (strongly agree).

3.2.1 Humble leadership

Respondents' perceptions of humble leadership were measured using a nine-item scale (Ou et al., 2014), with sample items such as, "My leader actively seeks feedback, even if it is critical." The Cronbach alpha of the nine-item was 0.952. The confirmatory factor analysis (CFA) of the scale showed an excellent fit with the data: $\chi^2/df = 1.344$ $NFI = 0.992$, $TLI = 0.996$, $CFI = 0.998$, and $RMSEA = 0.031$ with mean of the scale $0.83\ all > 0.75$. The communalities of the items were raged from 0.659 to 0.788.

3.2.2 Creative performance

A nine-item scale (Jensen and Bro, 2018) was used to obtain employees' ratings of creative performance. The items included, for example, (e.g., "This employee creates new ideas for difficult issues"). The Cronbach alpha of the scale was 0.967. The CFA of the scale showed a good fit: $\chi^2/df = 2.181$, $NFI = 0.991$, $TLI = 0.990$, $CFI = 0.995$, and $RMSEA = 0.058$ with mean of the scale $0.84\ all > 0.82$. The communalities of the items ranged from 0.753 to 0.834.

3.2.3 Intrinsic motivation

Five items "I enjoy finding solutions to complex problems at work" by Tierney et al. (1999) were used to measure the intrinsic motivation of employees. The Cronbach alpha of the scale was 0.959. The CFA of the scale showed good results: $\chi^2/df = 1.629$, $NFI = 0.995$, $TLI = 0.996$, $CFI = 0.998$, and $RMSEA = 0.042$. The communalities of the items ranged from 0.784 to 0.897.

3.2.4 Work engagement

Respondents' work engagement was measured using a nine-item scale and included "At my work, I feel bursting with energy" (Schaufeli et al., 2006). The Cronbach alpha of the nine-item scale was 0.969. The CFA of the scale showed good results: $\chi^2/df = 1.735$, $NFI = 0.993$, $TLI = 0.993$, $CFI = 0.997$, and $RMSEA = 0.046$ with mean of the scale $0.87\ all > 0.82$. The communalities of the items ranged from 0.736 to 0.844.

4 Results

The summary of CFA results is shown in Table 1. The CFA is one of the multivariate statistical tools used to measure goodness of fit. In particular, this technique is used to check how well a particular scale represents a variable. Therefore; we initiated our analysis by running the CFA through AMOS. Results revealed that all the scales and hypothesized model fitted the data well as compare to alternative models (One factor, two factor, and three factor models).

TABLE 1 Confirmatory factor analysis.

Models	χ^2/df	NFI	TLI	CFI	RMSEA
One factor model	10.8	0.66	0.64	0.68	0.16
Two factor model IM + WE,HL + CP	7.58	0.76	0.76	0.78	0.13
Two factor model CP + IM,HL + WE	7.55	0.72	0.75	0.81	0.13
Two factor model HL + IM,WE + CP	6.41	0.8	0.81	0.83	0.12
Three facto model CP + HL,IM,WE	6.12	0.8	0.81	0.83	0.12
Three factor model HL + IM,WE,CP	4.32	0.86	0.88	0.89	0.09
Three factor model IM + WE,CP,HL	3.89	0.87	0.89	0.9	0.91
Four factor hypothesized model	1.71	0.948	0.974	0.978	0.045

χ^2, Chi-square test; df, Degrees of freedom; NFI, Normed fit index; TLI, Tucker Lewis index; CFI, Comparative fit index; and RMSEA, Root mean square error of approximation.

Table 2 represents the reliability, validity, and correlations among the variables. The results satisfied the following criteria: composite reliability (CR) ≥ 0.7, Average variance extraction (AVE) ≥ 0.50, and Maximum shared variance (MSV) < AVE (Fornell and Larcker, 1981).

To detect common method bias (CMB), Herman's single factor test was run using exploratory factor analysis (EFA) and CFA. The single factor analysis did not show a serious concern as the variance explained by a single did not exceed 50%.

Table 3 represents the summary of hypotheses testing (1–6) results. Different combinations of linear and multiple regression using the PROCESS macro for SPSS were used to test the hypothesized relationships. The results regarding hypothesis 1 revealed that the total effect of humble leadership on creative performance was significant positive ($\beta = 0.466$, $p < 0.001$, LLCI = 0.421, ULCI = 0.631), supporting hypothesis 1. Similarly, the total effect of humble leadership on intrinsic motivation was significant positive ($\beta = 0.483$, $p < 0.001$, LLCI = 0.481, ULCI = 0.709), supporting hypothesis 2. The results further revealed a statistically significant relationship between humble leadership and work engagement ($\beta = 0.378$, $p < 0.001$, LLCI = 0.280, ULCI = 0.475), supporting hypothesis 3. Further, hypothesis was also supported in that the path linking intrinsic motivation to creative performance was statistically significant ($\beta = 0.606$, $p < 0.001$, LLCI = 0.478, ULCI = 0.632). The total effect of work engagement on creative performance was significantly positive ($\beta = 0.547$, $p < 0.001$, LLCI = 0.518, ULCI = 0.717), thus hypothesis 5 was also supported. Further, the association between intrinsic motivation and work engagement was statistically significant ($\beta = 0.612$, $p < 0.001$, LLCI = 0.429, ULCI = 0.564), supporting hypothesis 6.

The total and direct and indirect effects of humble leadership intrinsic motivation and work engagement (mediators) on creative performance are shown in Table 4. The direct effect of humble leadership on creative performance was partially mediated by intrinsic motivation ($\beta = 0.2553$, $p < 0.001$, LLCI = 0.1505, ULCI = 0.3601) as the β value was less than the value of the total effect. The mediation effect of IM (Indirect effect) was also significant ($\beta = 0.2707$, $p < 0.001$, LLCI = 0.2042, ULCI = 0.3494). Thus supporting hypothesis 7. Moving toward hypothesis 8, the direct effect of humble leadership on creative performance was also partially mediated by work engagement ($\beta = 0.3415$, $p < 0.001$, LLCI = 0.2401, ULCI = 0.4430) because the β value was less than the value of the total effect. The mediation effect was also significant ($\beta = 0.1845$, $p < 0.001$, LLCI = 0.1250, ULCI = 0.2518). Moreover; the absence of non-zero between LLCI and ULCI also proves that the relationship is significant. Therefore, the above empirical evidences support our hypothesis.

Table 5 shows the total direct and indirect effects of humble leadership on creative performance mediated by intrinsic motivation and work engagement.

The study assessed the serial mediation with intrinsic motivation and work engagement serially mediating the relationship between humble leadership and creative performance. The results revealed a significant indirect effect of humble leadership on creative performance through intrinsic motivation and work engagement ($b = 0.0781$, $t = 3.64$), supporting H9. Furthermore; the direct effect of humble leadership on creative performance in presence of the mediators was also found significant ($b = 0.224$, $p < 0.001$). Hence, there is a partial serial mediation of intrinsic motivation and work engagement on the relationship between humble leadership and creative performance. The summary of the serial mediation results is presented in Table 5. While Figure 2 represents the path-coefficients (β).

5 Discussion

Humility is considered to be one of the fundamental features that leaders need to display in this ever changing global competitive and complex business environment. Therefore, the demand for research on leader humility has been growing, especially for the service sector organizations (Luu, 2021). Responding to such calls for research, this study investigated how leader humility affects followers' creativity. In particular, this study examined the humble leadership-creative performance link, taking into account the mediating roles of IM and WE using STD and the JD-R model as theoretical lens.

The study contributes to the leadership and creativity literature in several ways. This study provides an empirical evidence about the relationship between HL and CP (Mumford and Fried, 2014). It also confirms the speculative statements about the importance of leadership behavior in organizational context by supporting the underlying mechanism of intrinsic motivation and work engagement both individually and sequentially. The empirical evidence from this study furthers our understanding regarding the connection between leader's humility and employee outcomes. Humble leadership was found to be positively associated with creative performance, intrinsic motivation, and work engagement. Although these relationship were

TABLE 2 Reliability, validity, and the correlations among the variables.

	CR	AVE	MSV	MaxR(H)	HL	WE	CP	IM
HL	0.952	0.690	0.260	0.955	**0.831**			
WE	0.967	0.766	0.410	0.969	0.402**	**0.875**		
CP	0.959	0.725	0.419	0.961	0.509**	0.583**	**0.851**	
IM	0.960	0.828	0.419	0.964	0.510**	0.640**	0.647**	**0.910**

CR, Composite reliability; AVE, Average variance extracted; MSV, Maximum shared variance; and MaxR(H), Maximum reliability. The square roots of average variance extracted (AVE) are given in bold figures diagonally for each variable. $^{**}p < 0.01$.

TABLE 3 Regression analysis.

Relationship	β	*t*	Sig.	R^2	*F*	Sig.	Hypotheses
H1: HL− > CP	0.466	9.831	0.000	0.217	96.646	0.000	Supported
H2: HL− > IM	0.483	10.288	0.000	0.233	105.848	0.000	Supported
H3: HL− > WE	0.378	7.612	0.000	0.143	57.938	0.000	Supported
H4: IM− > CP	0.606	14.215	0.000	0.367	202.053	0.000	Supported
H5: WE− > CP	0.547	12.194	0.000	0.299	148.701	0.000	Supported
H6: IM− > WE	0.612	14.454	0.000	0.375	208.905	0.000	Supported

HL, Humble leadership; CP, Creative performance; IM, Intrinsic motivation; and WE, Work engagement. $^{***}p < 0.001$.

TABLE 4 Mediation analysis.

Relationship	TE	DE	IE	SE	LLCI	ULCI	Remarks
H7: HL− > IM− > CP	0.526	0.2553	0.2707	0.0371	0.2042	0.3494	Partial mediation
H8: HL− > WE− > CP		0.3415	0.1845	0.0327	0.125	0.2518	Partial mediation

TE, Total effect; DE, Direct effect; IE, Indirect effect; LLCI, Lower level confidence interval; and ULCI, Upper level confidence interval.

TABLE 5 Serial mediation analysis.

Effects of HL on CP	Effect	SE	t	LLCI	ULCI	Conclusion
Total effect (HL − > CP)	0.526	0.0535	9.8309	0.4208	0.6312	
Direct effect (HL − > CP)	0.224	0.0519	4.3267	0.1224	0.3265	
Indirect effect III (HL− > IM− > WE− > CP)	0.0781	0.0214	3.64	0.0369	0.1215	Partial serial mediation

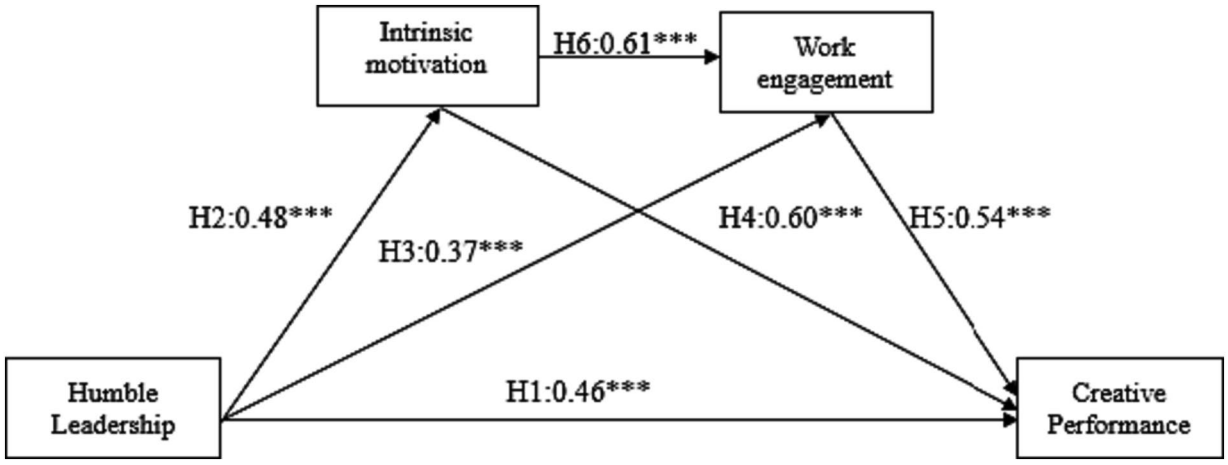


FIGURE 2
Main effects, $n = 350$, $^{***}p < 0.001$.

examined and established in previous researches (Woods et al., 2018; Zheng and Ahmed, 2022; De Clercq and Mustafa, 2023; Juyumaya and Torres, 2023; Liu et al., 2023) but the role of IM and WE (as mediators) needed a call for further investigation. The underlying mechanism through which leader humility can influence creative performance remain largely unknown (Gilmore et al., 2013). To address this gap in theory and literature, the present study provides empirical evidence in the form mediating role of IM and WE. The findings of this study are consistent with past research (Shalley and Perry-Smith, 2008) as it highlights the importance of psychological factors in linking humble leadership with performance.

The present study considerably contributes to the existing literature by evolving theoretical frameworks in organizational psychology, mainly in the realms of humble leadership (HL), creative performance (CP), and the mediation processes of intrinsic motivation (IM) and work engagement (WE). The theoretical basis of this research draw from Self-Determination Theory (SDT) and the Job Demands-Resources (JD-R) model, providing a robust framework for understanding the nuanced relationships among these variables.

While several studies have discovered the link between humble leadership and various employee outcomes (Abbas and Wu, 2019; Kausar, 2020; Ali et al., 2021; Waseem et al., 2023), our study is one of the few empirical works explicitly examining the association between humble leadership and creative performance (CP). By empirically establishing this relationship, our research extends the understanding of how humble leadership, with its focus on collaboration, openness, and acknowledging contributions, can positively influence employees' creative performance. This empirical evidence adds depth to the existing theoretical discussions on humble leadership's impact on organizational dynamics.

Integrating SDT into our research design allows us to investigate into the motivational processes underlying the relationship between humble leadership and creative performance. By explicitly examining how intrinsic motivation (IM) mediates this relationship, our study advances SDT by validating how humble leadership practices add up to employees' intrinsic motivation, thereby fostering creativity. This exploration aligns with SDT's emphasis on the importance of autonomy support and intrinsic motivation in promoting psychological well-being and optimal functioning.

Within the JD-R model, humble leadership is conceptualized as a key job resource that mitigates job demands and adds to a positive work environment. Our study extends the JD-R model by empirically testing the role of humble leadership as a resource that not only lessens job stressors but also positively influences creative performance. This expansion aligns with the JD-R model's focus on the dual impact of resources on both employee well-being and performance.

A notable contribution of our study lies in the examination of sequential mediation involving intrinsic motivation and work engagement. While previous research has examined these variables individually, our study advances the literature by demonstrating how they operate sequentially to mediate the association between humble leadership and creative performance. This sequential analysis provides a more nuanced understanding of the temporal dynamics and intricate ways in which these variables interact over time.

Finally, while most of the humble leadership research has been conducted in the western context, this study is unique in a sense that it examines the role of humble leadership in an under-studied cultural context (Pakistan); thus adding new insights to the leadership literature.

6 Implication for theory

Using JD-R model and STD as theoretical lens, our study provides a holistic framework for understanding the relationships among humble leadership, intrinsic motivation, work engagement, and creative performance. The successful application of these theories in a specific context contributes to the broader literature on organizational behavior and leadership. The acceptance of hypotheses regarding humble leadership's impact on intrinsic motivation, work engagement, and creative performance suggests a sequential mediation pathway consistent with the JD-R model and also consistent to the previous researches (Woods et al., 2018; De Clercq and Mustafa, 2023). This reinforces the idea that job resources, such as humble leadership behaviors, can positively influence employees' internal motivational processes, leading to enhanced work engagement and creative performance. The study's findings contribute to the JD-R model by providing empirical support for the role of humble leadership as a job resource. This extends the understanding of job resources beyond traditional factors, demonstrating that leadership behaviors can act as resources that foster employee well-being and positive outcomes.

The acceptance of hypotheses related to intrinsic motivation aligns with SDT, which posits that individuals have innate psychological needs for autonomy, competence, and relatedness. Our findings reinforce the idea that humble leadership can contribute to employees' satisfaction of these needs, thereby enhancing intrinsic motivation. The study's focus on creative performance as the dependent variable contributes to the literature on leadership and creativity. The positive impact of humble leadership on creative performance suggests that leaders who exhibit humility can create an environment conducive to innovation and idea generation. The study provides a theoretical foundation for leadership development programs. Organizations can leverage the insights from our research to design interventions that cultivate humble leadership qualities, recognizing their potential to positively influence intrinsic motivation, work engagement, and creative performance.

In summary, the study's theoretical implications lie in the advancement and integration of the JD-R model and SDT, providing a nuanced understanding of how humble leadership influences intrinsic motivation, work engagement, and creative performance in the telecom sector. This knowledge can inform future research and contribute to the development of effective leadership practices and interventions.

7 Implications for practice

This study offers following practical implications for the managers and organizations. First, the study emphasizes on the importance of humility of a leader in contemporary business environment where a leader faces challenges to cope up with the turbulent environment (Mao et al., 2019). The humble behavior is beneficial both for the followers and for the organization. To foster this behavior, we recommend integrating humility initiatives into daily management practices (Seidle et al., 2016). Humility can be developed through formal training and development programs. This will encourage the present day's leadership to better understand the importance of humility in current era because this behavior of a leader can lead to a number of favorable outcomes in the form of self-awareness, personality grooming, respect, knowledge sharing, and willingness to

learn. Managers should focus on enhancing intrinsic motivation among employees. Recognize and reward employees for their achievements, provide opportunities for skill development, and encourage a sense of autonomy in tasks. This can contribute to higher levels of intrinsic motivation. Humble leaders should create an open and transparent communication culture within the organization. This involves actively listening to employees' ideas, concerns, and feedback. A communication-rich environment can enhance intrinsic motivation by making employees feel valued and heard.

The findings of our study show that the impact of humble leadership on creative performance is mediated by intrinsic motivation and work engagement, therefore, these training programs should also focus to fulfill the needs of relatedness, competence, and autonomy (Intrinsic motivation) and it is also evident from the results of our study that if these psychological needs are satisfied the employees show more dedication, vigor, and absorption (work engagement) in work environment. On the other hand, the demands, personality, and way of cognitive processes of every employee are different from others. Therefore; while exhibiting the humility, the leader should learn how to behave in different conditions and with different employees. Because everyone cannot be treated in the same way. If the subordinates display more creativity the leader should encourage him and he should be given more authority in order to make more fruitful contributions to the organization. Moreover; the employees who perform below expectations, should be given more structured and guided objectives to take maximum out of him. Promoting work engagement is crucial for creative performance. Managers can foster engagement by providing challenging tasks, opportunities for skill utilization, and creating a positive work atmosphere. Encourage employees to take ownership of their work, fostering a sense of pride and commitment. Humble leaders should actively recognize and appreciate the contributions of their team members. Acknowledging individual and collective achievements fosters a positive team environment, boosting both intrinsic motivation and work engagement.

Leaders should find a balance between providing employees with autonomy in their work and offering the necessary support. Humble leaders recognize the strengths of their team members and empower them, but they also provide guidance and support when needed. Managers should recognize that individuals may respond differently to leadership styles. Tailor leadership approaches based on the unique needs and preferences of team members to enhance intrinsic motivation and work engagement. Regular feedback and development discussions are vital. Humble leaders should engage in constructive feedback sessions, helping employees understand their strengths and areas for improvement. This contributes to ongoing development and sustained intrinsic motivation. Foster a culture that values continuous learning and innovation. Humble leaders can encourage experimentation, tolerate reasonable risks, and support a learning mindset within the organization, thereby promoting creative performance. Implement mechanisms for monitoring and assessing the progress of initiatives aimed at promoting humble leadership, intrinsic motivation, and work engagement. Regular assessments can help refine strategies and ensure alignment with organizational goals.

Leaders should regularly assess and review employees' performance to ensure that they are on the right track. Further, from a personnel training perspective, organizations are advised to conduct training programs, including supportive team-building activities, particularly targeting less creative employees. These programs aim to promote their initiative and enhance their value as human capital within the organization. Finally, organizations should provide more training opportunities to develop a more conducive working environment for the employees working there in. These programs will further enhance their capabilities and will further add up in human capital within the organization. These managerial implications highlight the importance of integrating humble leadership into organizational practices while emphasizing intrinsic motivation and work engagement as critical factors in enhancing creative performance.

8 Limitations and future research

Like any other study, our study is subject to certain limitations. First, our hypothesize model based on well-established self-determination theory (Deci et al., 2017) and it is aligned with previous researches (Chen and Hsieh, 2015; Rego et al., 2017). But we could not establish a definite causal relationships. The reverse causality may be possible between the relationship of leadership and creativity. It is possible that a leader may be humble for those who are creative and it is also possible that highly creative employees influence the leader to be humble. Therefore; future research can be conducted to overcome this limitation.

Next, the chances of common method bias always exist (Hassan et al., 2015), although we asked the leaders to rate the performance of their followers but the chances of biasness are always present in such evaluations. Our analysis and measurements were based on the perception of leader rather than some objective measures (Rego et al., 2017). Humble leaders may over rate their followers due to their nature of leadership style (Bharanitharan et al., 2021). To authenticate our findings, we recommend future research to use three prong approach to evaluate the followers, i.e., to include the objective records from HR departments, self-report measures, and co-worker evaluations.

This study was conducted in Pakistan and contributes to the literature by verifying the effects of humility in non-western context. Humility is a culturally influenced phenomenon where different cultures have different concepts of humility for example the religious context and other cultural aspects so this study is limited to different cultural contexts. Therefore, we suggest the future research to investigate the humility across cultures both in eastern and western contexts in order to increase the generalizability of the findings. Further research on humble leadership and creative performance can be undertaken by considering additional variables in the form of mediators and moderators such as job satisfaction, other leadership styles, leader's political skills, effective and cognitive trust, and emotional intelligence etc. (Bharanitharan et al., 2019) Our study used a cross-sectional design, it may also limit the establishment of causal relationships. Longitudinal studies could provide more insight into the temporal nature of the relationships between humble leadership, intrinsic motivation, work engagement, and creative performance. Given that all data were collected from the same respondents, common method bias might be a concern. Respondents might have provided socially desirable responses, potentially inflating the strength of the relationships.

The reliance on self-report measures for variables such as humble leadership, intrinsic motivation, work engagement, and creative performance might introduce response biases. Consider supplementing self-reports with objective performance measures or obtaining multi-source feedback. The telecom sector may have unique characteristics that could impact the study's generalizability. Future research might explore whether similar findings emerge in

other service sectors or industries. The study's external validity may be limited to the specific organizational and cultural context of the telecom companies in Pakistan. Cautions are recommended to be taken when applying the findings to organizations with different cultural, regulatory, or economic conditions. Our study endorses the positive aspects of humble leadership but being humble does not mean to be inherently good. Future research could explore the circumstances in which leader's humility may lead from its positive effects to negative effects. Therefore, it is suggested to check the dark side of being too humble in organizational setups.

9 Conclusion

Drawing on JD-R model and SDT, this study investigated the impact of humble leadership, intrinsic motivation, and work engagement on creative performance. The results of the collected data reveled that HL is positively and significantly associated with CP, IM, and WE. While IM and WE are also positively associated with each other and CP. Furthermore; IM and WE both individually and serially mediated the positive relationship between HL and CP. The results of mediation were partially mediate it may be because the employees may respond differently to humble leadership, and individual differences in personality, skills, or experiences might influence how intrinsic motivation and work engagement mediate the relationship and the organizational culture, shaped by humble leadership, may have a direct impact on creative performance. In some cases, the culture itself, rather than intrinsic motivation and work engagement, may act as the primary driver of creativity. Some employees may be naturally more intrinsically motivated or engaged, affecting the mediation process. In conclusion, our study highlights the importance of two mediators. These mediators can influence the relationship between HL and CP. Therefore, the importance of these underlying mechanism cannot be ignored while creating conducive environment for creative performance of employees and organization.

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 Yanshan university ethics committee. 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

HL: Conceptualization, Project administration, Resources, Supervision, Formal analysis, Writing – original draft. SJ: Formal analysis, Methodology, Writing – original draft. MA: Writing – review & editing. AM: Investigation, Validation, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This research was supported by the Project of National Social Science Foundation of China (21BTQ081).

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.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

Abbas, W., and Wu, W. (2019). The moderating role of intrapreneurial personality in relation between leader humility and innovative behavior. *Hum. Syst. Manag.* 38, 329–337. doi: 10.3233/HSM-190548

Abbas, W., Wu, W., and Amin, H. (2021). Fostering innovative behaviour: does work engagement and leader humility matter? *Middle East J. Manag.* 8, 553–572. doi: 10.1504/MEJM.2021.118449

Abdullah, H. O., and Al-Abrrow, H. (2022). Impact of perceived organisational justice, support and identity on workplace behaviour through job attitudes: verification in the role of LOC. *Int. J. Organ. Anal.* doi: 10.1108/IJOA-01-2022-3099 [Epub ahead of print].

Al Hawamdeh, N. (2022). The influence of humble leadership on employees' work engagement: the mediating role of leader knowledge-sharing behaviour. *VINE J. Info. Knowledge Manag. Syst.* doi: 10.1108/VJIKMS-03-2022-0083

Al Hawamdeh, N., and AL-edenat, M. (2022). Investigating the moderating effect of humble leadership behaviour on motivational factors and knowledge-sharing intentions: evidence from Jordanian public organisations. *VINE J. Info. Knowledge Manag. Syst.* doi: 10.1108/VJIKMS-07-2021-0111

Ali, M., Li, Z., Khan, S., Shah, S. J., and Ullah, R. (2021). Linking humble leadership and project success: the moderating role of top management support with mediation of team-building. *Int. J. Manag. Proj. Bus.* 14, 545–562. doi: 10.1108/IJMPB-01-2020-0032

Ali, M., Zhang, L., Shah, S. J., Khan, S., and Shah, A. M. (2020). Impact of humble leadership on project success: the mediating role of psychological empowerment and innovative work behavior. *Leadersh. Org. Dev. J.* 41, 349–367. doi: 10.1108/LODJ-05-2019-0230

AlKayid, K., Selem, K. M., Shehata, A. E., and Tan, C. C. (2023). Leader vision, organizational inertia and service hotel employee creativity: role of knowledge-donating. *Curr. Psychol.* 42, 3382–3394. doi: 10.1007/s12144-022-02743-6

Amabile, T. M. (1988). A model of creativity and innovation in organizations. *Res. Organ. Behav.* 10, 123–167.

Amabile, T. M., Hill, K. G., Hennessey, B. A., and Tighe, E. M. (1994). The work preference inventory: assessing intrinsic and extrinsic motivational orientations. *J. Pers. Soc. Psychol.* 66, 950–967. doi: 10.1037/0022-3514.66.5.950

Avolio, B. J., Walumbwa, F. O., and Weber, T. J. (2009). Leadership: current theories, research, and future directions. *Annu. Rev. Psychol.* 60, 421–449. doi: 10.1146/annurev.psych.60.110707.163621

Bakker, A. B. (2022). The social psychology of work engagement: state of the field. *Career Dev. Int.* 27, 36–53. doi: 10.1108/CDI-08-2021-0213

Bakker, A. B., Hakanen, J. J., Demerouti, E., and Xanthopoulou, D. (2007). Job resources boost work engagement, particularly when job demands are high. *J. Educ. Psychol.* 99, 274.

Bao, Y., Li, C., and Zhao, H. (2018). Servant leadership and engagement: a dual mediation model. *J. Manag. Psychol.* 33, 406–417. doi: 10.1108/JMP-12-2017-0435

Basford, T. E., Offermann, L. R., and Behrend, T. S. (2014). Please accept my sincerest apologies: examining follower reactions to leader apology. *J. Bus. Ethics* 119, 99–117. doi: 10.1007/s10551-012-1613-y

Bass, B. M. (1985). Leadership: good, better, best. *Organ. Dyn.* 13, 26–40. doi: 10.1016/0090-2616(85)90028-2

Bharanitharan, K., Chen, Z. X., Bahmannia, S., and Lowe, K. B. (2019). Is leader humility a friend or foe, or both? An attachment theory lens on leader humility and its contradictory outcomes. *J. Bus. Ethics* 160, 729–743. doi: 10.1007/s10551-018-3925-z

Bharanitharan, D. K., Lowe, K. B., Bahmannia, S., Chen, Z. X., and Cui, L. (2021). Seeing is not believing: leader humility, hypocrisy, and their impact on followers' behaviors. *Leadersh. Q.* 32:101440. doi: 10.1016/j.leaqua.2020.101440

Carmeli, A., Gelbard, R., and Reiter-Palmon, R. (2013). Leadership, creative problem-solving capacity, and creative performance: the importance of knowledge sharing. *Hum. Resour. Manag.* 52, 95–121. doi: 10.1002/hrm.21514

Carmeli, A., Meitar, R., and Weisberg, J. (2006). Self-leadership skills and innovative behavior at work. *Int. J. Manpow.* 27, 75–90. doi: 10.1108/01437720610652853

Carmeli, A., and Paulus, P. B. (2015). CEO ideational facilitation leadership and team creativity: the mediating role of knowledge sharing. *J. Creat. Behav.* 49, 53–75. doi: 10.1002/jocb.59

Carnevale, J. B., Huang, L., and Paterson, T. (2019). LMX-differentiation strengthens the prosocial consequences of leader humility: an identification and social exchange perspective. *J. Bus. Res.* 96, 287–296. doi: 10.1016/j.jbusres.2018.11.048

Chen, C.-A., and Hsieh, C.-W. (2015). Knowledge sharing motivation in the public sector: the role of public service motivation. *Int. Rev. Adm. Sci.* 81, 812–832. doi: 10.1177/0020852314558032

Chen, H., Liang, Q., Feng, C., and Zhang, Y. (2021). Why and when do employees become more proactive under humble leaders? The roles of psychological need satisfaction and Chinese traditionality. *J. Organ. Chang. Manag.* 34, 1076–1095. doi: 10.1108/JOCM-12-2020-0366

Chen, L., Liu, S., Wang, Y., and Hu, X. (2021). Humble leader behavior and team creativity: the team learning perspective. *J. Manag. Psychol.* 36, 272–284. doi: 10.1108/JMP-09-2019-0536

Chen, L., Wadei, K. A., Bai, S., and Liu, J. (2020). Participative leadership and employee creativity: a sequential mediation model of psychological safety and creative process engagement. *Leadersh. Org. Dev. J.* 41, 741–759. doi: 10.1108/LODJ-07-2019-0319

Cho, Y. J., and Perry, J. L. (2012). Intrinsic motivation and employee attitudes: role of managerial trustworthiness, goal directedness, and extrinsic reward expectancy. *Rev. Public Pers. Administr.* 32, 382–406. doi: 10.1177/0734371X11421495

Chughtai, A. A., and Arifeen, S. R. (2023). Humble leadership and career success: a moderated mediation analysis. *Manag. Decis.* 61, 1485–1500. doi: 10.1108/MD-05-2022-0651

De Clercq, D., and Mustafa, M. J. (2023). How transformational leaders get employees to take initiative and display creativity: the catalytic role of work overload. *Pers. Rev.* doi: 10.1108/PR-02-2022-0090

Deci, E. L., Olafsen, A. H., and Ryan, R. M. (2017). Self-determination theory in work organizations: the state of a science. *Annu. Rev. Organ. Psych. Organ. Behav.* 4, 19–43. doi: 10.1146/annurev-orgpsych-032516-113108

Demerouti, E., Mostert, K., and Bakker, A. B. (2010). Burnout and work engagement: a thorough investigation of the independency of both constructs. *J. Occup. Health Psychol.* 15, 209–222. doi: 10.1037/a0019408

Demircioglu, M. A., and Chen, C.-A. (2019). Public employees' use of social media: its impact on need satisfaction and intrinsic work motivation. *Gov. Inf. Q.* 36, 51–60. doi: 10.1016/j.giq.2018.11.008

Eisenberger, R., Jones, J. R., Stinglhamber, F., Shanock, L., and Randall, A. T. (2005). Flow experiences at work: for high need achievers alone? *J. Organ. Behav.* 26, 755–775. doi: 10.1002/job.337

Fornell, C., and Larcker, D. F. (1981). *Structural Equation Models With Unobservable Variables and Measurement Error: Algebra and Statistics*. Los Angeles, CA: Sage Publications Sage CA.

Gilmore, P. L., Hu, X., Wei, F., Tetrick, L. E., and Zaccaro, S. J. (2013). Positive affectivity neutralizes transformational leadership's influence on creative performance and organizational citizenship behaviors. *J. Organ. Behav.* 34, 1061–1075. doi: 10.1002/job.1833

González-Romá, V., Schaufeli, W. B., Bakker, A. B., and Lloret, S. (2006). Burnout and work engagement: independent factors or opposite poles? *J. Vocat. Behav.* 68, 165–174. doi: 10.1016/j.jvb.2005.01.003

Haar, J. M., Brougham, D., Roche, M. A., and Barney, A. (2017). Servant leadership and work engagement: The mediating role of work-life balance. *N.Z. J. Hum. Resour. Manag.* 17, 56–72.

Hair, J. F., and Black, W. (2010) in *Multivariate Data Analysis*. eds. B. J. Babin and R. E. Anderson (New Jersey: Prentice Hall).

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., and Tatham, R. L. (2006). *Multivariate Data Analysis* (*6*). Upper Saddle River, NJ: Pearson Prentice Hall.

Hassan, S., Nadzim, S. Z. A., and Shiratuddin, N. (2015). Strategic use of social media for small business based on the AIDA model. *Procedia Soc. Behav. Sci.* 172, 262–269. doi: 10.1016/j.sbspro.2015.01.363

Ilha Villanova, A. L., and Pina e Cunha, M. (2021). Everyday creativity: a systematic literature review. *J. Creat. Behav.* 55, 673–695. doi: 10.1002/jocb.481

Janssen, O., and Giebels, E. (2013). When and why creativity-related conflict with coworkers can hamper creative employees' individual job performance. *Eur. J. Work Organ. Psy.* 22, 574–587. doi: 10.1080/1359432X.2012.669524

Jensen, U. T., and Bro, L. L. (2018). How transformational leadership supports intrinsic motivation and public service motivation: the mediating role of basic need satisfaction. *Am. Rev. Public Adm.* 48, 535–549. doi: 10.1177/0275074017699470

Jeung, C.-W., and Yoon, H. J. (2016). Leader humility and psychological empowerment: investigating contingencies. *J. Manag. Psychol.* 31, 1122–1136. doi: 10.1108/JMP-07-2015-0270

Juyumaya, J., and Torres, J. P. (2023). Effects of transformational leadership and work engagement on managers' creative performance. *Balt. J. Manag.* 18, 34–53. doi: 10.1108/BJM-11-2021-0449

Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Acad. Manag. J.* 33, 692–724. doi: 10.2307/256287

Kausar, M. A. (2020). Impact of leader-expressed humility on employee creativity with mediating role of job engagement and moderating role of psychological. Capital University of Science and Technology.

Kelemen, T. K., Matthews, S. H., Matthews, M. J., and Henry, S. E. (2023). Humble leadership: a review and synthesis of leader expressed humility. *J. Organ. Behav.* 44, 202–224. doi: 10.1002/job.2608

Khokhar, S., Nayab, G. I., Ahmed, M., Baloch, S. M., Bashir, M., and Mirwani, R. (2023). Transforming education through emotional intelligence: the impact of principals' instructional leadership on teachers' instructional strategy. *J. Pos. Sch. Psychol.* 7, 1509–1521.

Kim, J.-K. (2022). The effect of humble leadership on voice behavior and innovative behavior: focused on the mediating effect of emotional regulation. *J. Indus. Converg.* 20, 1–10. doi: 10.22678/JIC.2022.20.3.001

Kovjanic, S., Schuh, S. C., and Jonas, K. (2013). Transformational leadership and performance: an experimental investigation of the mediating effects of basic needs satisfaction and work engagement. *J. Occup. Organ. Psychol.* 86, 543–555. doi: 10.1111/joop.12022

Liu, H., Ahmed, S. J., Kakar, A. S., and Durrani, D. K. (2023). Creative performance and conflict through the Lens of humble leadership: testing a moderated mediation model. *Behav. Sci.* 13:483. doi: 10.3390/bs13060483

Liu, S., Lucy Liu, X., Wang, H., and Wang, Y. (2022). Humble leader behavior and its effects on performance at the team and individual level: a multi-perspective study. *Group Org. Manag.* 47, 1008–1041. doi: 10.1177/10596011211024429

Luu, T. T. (2021). Socially responsible human resource practices and hospitality employee outcomes. *Int. J. Contemp. Hosp. Manag.* 33, 757–789. doi: 10.1108/IJCHM-02-2020-0164

Mao, J., Chiu, C. Y., Owens, B. P., Brown, J. A., and Liao, J. (2019). Growing followers: exploring the effects of leader humility on follower self-expansion, self-efficacy, and performance. *J. Manag. Stud.* 56, 343–371. doi: 10.1111/joms.12395

Min, W., Xu, H., Jiuping, X., Hong, Y., and Kan, S. (2007). Comparative study of transactional, transformational, andpaternalistic leadership behaviors and leadership mechanism. *Sci. Res. Manag.* 28:169.

Moss, S. A., and Ritossa, D. A. (2007). The impact of goal orientation on the association between leadership style and follower performance, creativity and work attitudes. *Leadership* 3, 433–456. doi: 10.1177/1742715007082966

Mumford, M. D., and Fried, Y. (2014). Give them what they want or give them what they need? Ideology in the study of leadership. *J. Organ. Behav.* 35, 622–634. doi: 10.1002/job.1921

Mussagulova, A., and Demircioglu, M. A. (2022). What affects the turnover intention of civil servants: evidence from Bhutan. *Aust. J. Public Adm.* 82, 325–345.

Naseer, S., Syed, F., Nauman, S., Fatima, T., Jameel, I., and Riaz, N. (2020). Understanding how leaders' humility promotes followers' emotions and ethical behaviors: workplace spirituality as a mediator. *J. Posit. Psychol.* 15, 407–419. doi: 10.1080/17439760.2019.1615103

Ou, A. Y., Seo, J., Choi, D., and Hom, P. W. (2017). When can humble top executives retain middle managers? The moderating role of top management team faultlines. *Acad. Manag. J.* 60, 1915–1931. doi: 10.5465/amj.2015.1072

Ou, A. Y., Tsui, A. S., Kinicki, A. J., Waldman, D. A., Xiao, Z., and Song, L. J. (2014). Humble chief executive officers' connections to top management team integration and middle managers' responses. *Adm. Sci. Q.* 59, 34–72. doi: 10.1177/0001839213520131

Owens, B. P., and Hekman, D. R. (2012). Modeling how to grow: an inductive examination of humble leader behaviors, contingencies, and outcomes. *Acad. Manag. J.* 55, 787–818. doi: 10.5465/amj.2010.0441

Owens, B. P., and Hekman, D. R. (2016). How does leader humility influence team performance? Exploring the mechanisms of contagion and collective promotion focus. *Acad. Manag. J.* 59, 1088–1111. doi: 10.5465/amj.2013.0660

Owens, B. P., Johnson, M. D., and Mitchell, T. R. (2013). Expressed humility in organizations: implications for performance, teams, and leadership. *Organ. Sci.* 24, 1517–1538. doi: 10.1287/orsc.1120.0795

Owens, B. P., Rowatt, W. C., and Wilkins, A. L. (2011). *Exploring the Relevance and Implications of Humility in Organizations*. Oxford, UK: Oxford University Press.

Park, S. M., and Word, J. (2012). Driven to service: intrinsic and extrinsic motivation for public and nonprofit managers. *Public Person. Manag.* 41, 705–734. doi: 10.1177/009102601204100407

Rego, A., Melo, A. I., Bluhm, D. J., e Cunha, M. P., and Júnior, D. R. (2021). Leader-expressed humility predicting team psychological safety: a personality dynamics lens. *J. Bus. Ethics* 174, 669–686. doi: 10.1007/s10551-020-04622-1

Rego, A., Owens, B., Leal, S., Melo, A. I., Cunha, M. P., Gonçalves, L., et al. (2017). How leader humility helps teams to be humbler, psychologically stronger, and more effective: a moderated mediation model. *Leadersh. Q.* 28, 639–658. doi: 10.1016/j.leaqua.2017.02.002

Rego, A., Owens, B., Yam, K. C., Bluhm, D., Cunha, M. P. E., Silard, A., et al. (2019). Leader humility and team performance: exploring the mediating mechanisms of team PsyCap and task allocation effectiveness. *J. Manag.* 45, 1009–1033. doi: 10.1177/0149206316688941

Ryan, R. M., and Deci, E. L. (2000). Intrinsic and extrinsic motivations: classic definitions and new directions. *Contemp. Educ. Psychol.* 25, 54–67. doi: 10.1006/ceps.1999.1020

Ryan, R. M., and Deci, E. L. (2019). Research on intrinsic and extrinsic motivation is alive, well, and reshaping 21st-century management approaches: brief reply to Locke and Schattke. *Motiv. Sci.* 5, 291–294. doi: 10.1037/mot0000128

Sarfraz, R., Rathore, K., Ali, K., Khan, M. A., and Zubair, S. S. (2022). How level 5 leadership escalates organizational citizenship behaviour in telecom sector of Pakistan? Exploring mediatory role of organizational dissent. *PLoS One* 17:e0276622. doi: 10.1371/journal.pone.0276622

Schaufeli, W. B. (2017). Applying the job demands-resources model. *Organ. Dyn.* 46, 120–132. doi: 10.1016/j.orgdyn.2017.04.008

Schaufeli, W. B., Bakker, A. B., and Salanova, M. (2006). The measurement of work engagement with a short questionnaire: a cross-national study. *Educ. Psychol. Meas.* 66, 701–716. doi: 10.1177/0013164405282471

Scott, S. G., and Bruce, R. A. (1994). Determinants of innovative behavior: a path model of individual innovation in the workplace. *Acad. Manag. J.* 37, 580–607. doi: 10.2307/256701

Seidle, B., Fernandez, S., and Perry, J. L. (2016). Do leadership training and development make a difference in the public sector? A panel study. *Public Adm. Rev.* 76, 603–613. doi: 10.1111/puar.12531

Shalley, C. E., and Perry-Smith, J. E. (2008). The emergence of team creative cognition: the role of diverse outside ties, sociocognitive network centrality, and team evolution. *Strateg. Entrep. J.* 2, 23–41. doi: 10.1002/sej.40

Sharif, S., Tongkachok, K., Akbar, M., Iqbal, K., and Lodhi, R. N. (2021). Transformational leadership and innovative work behavior in three-star hotels: mediating role of leader-member exchange, knowledge sharing and voice behavior. VINE Journal of Information and Knowledge Management Systems. doi: 10.1108/vjikms-07-2021-0122 (Epub ahead of print).

Skakon, J., Nielsen, K., Borg, V., and Guzman, J. (2010). Are leaders' well-being, behaviours and style associated with the affective well-being of their employees? A systematic review of three decades of research. *Work Stress.* 24, 107–139. doi: 10.1080/02678373.2010.495262

Tierney, P., and Farmer, S. M. (2011). Creative self-efficacy development and creative performance over time. *J. Appl. Psychol.* 96, 277–293. doi: 10.1037/a0020952

Tierney, P., Farmer, S. M., and Graen, G. B. (1999). An examination of leadership and employee creativity: the relevance of traits and relationships. *Pers. Psychol.* 52, 591–620. doi: 10.1111/j.1744-6570.1999.tb00173.x

Tu, Y., and Lu, X. (2016). Do ethical leaders give followers the confidence to go the extra mile? The moderating role of intrinsic motivation. *J. Bus. Ethics* 135, 129–144. doi: 10.1007/s10551-014-2463-6

Urban, M., and Urban, K. (2023). Orientation toward intrinsic motivation mediates the relationship between metacognition and creativity. *J. Creat. Behav.* 57, 6–16. doi: 10.1002/jocb.558

Van den Broeck, A., Ferris, D. L., Chang, C.-H., and Rosen, C. C. (2016). A review of self-determination theory's basic psychological needs at work. *J. Manag.* 42, 1195–1229. doi: 10.1177/0149206316632058

Walters, K. N., and Diab, D. L. (2016). Humble leadership: implications for psychological safety and follower engagement. *J. Leadersh. Stud.* 10, 7–18. doi: 10.1002/jls.21434

Wang, Y., Liu, J., and Zhu, Y. (2018). How does humble leadership promote follower creativity? The roles of psychological capital and growth need strength. *Leadersh. Org. Dev. J.* 39, 507–521. doi: 10.1108/LODJ-03-2017-0069

Waseem, M., Iqbal, S., and Khan, K. (2023). Effect of humble leadership on project success: the mediating role of team engagement and the moderating role of organizational culture. *J. Facil. Manag.* doi: 10.1108/JFM-01-2023-0009

Waterhouse, J., French, E., and Puchala, N. (2014). The impact of socialisation on graduates' public service motivation–a mixed method study. *Aust. J. Public Adm.* 73, 247–259. doi: 10.1111/1467-8500.12079

Woods, S. A., Mustafa, M. J., Anderson, N., and Sayer, B. (2018). Innovative work behavior and personality traits: examining the moderating effects of organizational tenure. *J. Manag. Psychol.* 33, 29–42. doi: 10.1108/JMP-01-2017-0016

Zheng, Z., and Ahmed, R. I. (2022). Humble leadership and employee creative performance in China: the roles of boundary spanning behavior and traditionality. *Pers. Rev.* 53. doi: 10.1108/PR-10-2021-0775

Zhou, J., and Shalley, C. E. (2003). Research on employee creativity: a critical review and directions for future research. *Res. Pers. Hum. Resour. Manag.* 22, 165–217. doi: 10.1016/S0742-7301(03)22004-1

Zhou, F., and Wu, Y. J. (2018). How humble leadership fosters employee innovation behavior: a two-way perspective on the leader-employee interaction. *Leadersh. Org. Dev. J.* 39, 375–387. doi: 10.1108/LODJ-07-2017-0181

Zhu, Y.-Q., Gardner, D. G., and Chen, H.-G. (2018). Relationships between work team climate, individual motivation, and creativity. *J. Manag.* 44, 2094–2115. doi: 10.1177/0149206316638161

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 05 February 2024
DOI 10.3389/fpsyg.2024.1336120

Check for updates

OPEN ACCESS

EDITED BY
Mike James Mustafa,
Division of organisational and Applied Psychology University of Nottingham Malaysia, Malaysia

REVIEWED BY
Ahmed Hassan Abdou,
King Faisal University, Saudi Arabia
Ali Zeb,
Multimedia University, Malaysia

*CORRESPONDENCE
Honghong Zhu
✉ sdzhu2021@163.com

RECEIVED 10 November 2023
ACCEPTED 12 January 2024
PUBLISHED 05 February 2024

CITATION
Jiang D, Zhang Y, Zhu H and Wang X (2024) Effect of empowerment: how and when do high-involvement work practices influence elder employees' innovative performance? *Front. Psychol.* 15:1336120.
doi: 10.3389/fpsyg.2024.1336120

COPYRIGHT
© 2024 Jiang, Zhang, Zhu and Wang. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Effect of empowerment: how and when do high-involvement work practices influence elder employees' innovative performance?

Daokui Jiang[1], Yiting Zhang[1], Honghong Zhu[1]* and Xiaoyu Wang[2]

[1]Business School, Shandong Normal University, Jinan, China, [2]Institute of International Studies, Fudan University, Shanghai, China

Introduction: In today's fast-paced business environment, innovation from elder employees is increasingly vital to organizations. High-involvement work practices that emphasize engagement and empowerment have a significant impact on the innovation performance of these employees, harnessing their wealth of experience and fostering organizational growth. However, most of the current research on innovation performance focuses on the single factor of the individual or the organization, and most of them focus on the linear relationship; research on the factor of human resource practices, in particular high-involvement work practices, is inadequate.

Methods: Based on social exchange theory, this paper uses structural equation modeling (SEM) to examine the impact of high-involvement work practices on elder workers' innovation performance using 278 valid samples from three time points, and the non-linear effects of exploratory and exploitative innovation on elder workers' innovation performance.

Results: (1) There is no significant relationship between high-involvement work practices and elder employees' innovation performance. (2) Exploratory innovation has a significant U-shaped relationship with innovation performance, i.e., as the level of exploratory innovation increases, the innovation performance of elder employees first decreases and then increases. There is a significant inverted U-shaped relationship between exploitative innovation and innovation performance, i.e., as the level of exploitative innovation increases, innovation performance first increases and then decreases. High-involvement work practices have a U-shaped effect on elder employees' innovation performance through exploitative innovation. (3) Transformational leadership moderates the direct effects of high-involvement on exploratory innovation and elder employees' innovation performance, and transformational leadership moderates the U-shaped effect of high-involvement work practices on elder employees' innovation performance through exploratory innovation.

Discussion: The conclusion is helpful for organizations to enhance elder employees' innovation performance by enriching high-involvement work practices.

KEYWORDS

high-involvement work practices, innovation performance, exploratory innovation, exploitative innovation, transformational leadership

Introduction

In an era characterized by volatility, uncertainty, complexity and ambiguity (VUCA), organizations face unprecedented challenges and opportunities. This dynamic environment requires a heightened capacity to adapt and innovate, which is essential for both survival and growth (Bennett and Lemoine, 2014). As external competition intensifies, a critical internal dynamic is emerging within organizations - the increasing prevalence of elder employees (Gordon and Arvey, 2004). Often undervalued, these individuals possess a wealth of experience and knowledge that is proving indispensable in navigating today's complex business terrain (Jiang et al., 2021). Their deep understanding of organizational history, resilience in the midst of transformative change, and ability to mentor junior colleagues are instrumental in fostering innovation and facilitating organizational development (Jiang et al., 2021). However, the global trend toward an aging workforce is accompanied by escalating intergenerational competition (Ward et al., 2021). As Gordon and Arvey (2004) note, many organizations priorities attracting younger talent with innovative ideas and skills, often through higher salaries and positions, while overlooking the valuable expertise and experience of elder employees (Gordon and Arvey, 2004). This oversight represents a missed opportunity to harness the full innovative potential of an organization's workforce. Effectively harnessing and managing the innovation performance of elder employees can significantly enhance an organization's ability to innovate. How can the HR effectiveness of older employees be effectively developed and utilized so that they can participate more in innovation practices? Based on this problem, this study focuses on a key variable - the innovation performance of elder employees, and attempts to reveal the antecedent variables and mechanisms that affect the innovation performance of elder employees.

The existing literature has extensively investigated various factors that influence the innovation performance of elder employees. These studies have primarily focused on work experience or professional expertise (Schmader et al., 2008; Lamont et al., 2015), leadership support, and employee collaboration (Huang, 2019; Cao et al., 2022). However, a significant portion of this research has focused on the impact of individual and leadership factors on elder employees. Recognizing this gap, our study aims to explore the potential of organizational strategies in catalyzing and transforming the rich knowledge and experience of elder employees into innovative behaviors and performance. To this end, high-involvement work practices are introduced as a key variable for investigation. High-involvement work practices are a type of human resource management practice that emphasizes employee involvement and empowerment. Previous studies have confirmed that high-involvement work practices have a significant positive impact on employee innovation (Becker and Gerhart, 1996; Cao et al., 2022; Wang et al., 2022). Therefore, we have reason to believe that it still has a strong explanatory potential for the innovation performance of elder employees.

Unfortunately, most of the existing literatures on the relationship between high-involvement work practices and employees' innovation performance focus on overall innovation activities (Misnah et al., 2020; Cao et al., 2022; Wang et al., 2022; Zeb et al., 2022), but fail to specifically analyze different innovation modes. This is undoubtedly not in line with the current situation, where we urgently need to use different innovation modes to promote the development of enterprise innovation. To achieve the construction of core competitiveness and long-term sustainable development, enterprises need to combine conservatism and breakthrough in innovation activities, that is, to realize exploratory innovation based on exploitative innovation (Limaj and Bernroider, 2019). For employees, the two innovation modes, exploratory and exploitative, show significant differences in terms of implementation difficulty, time, risk, reward and motivation (Cao et al., 2022). Specifically, exploratory innovation tends to be more difficult to implement, takes longer, involves higher risks, but potentially offers greater rewards. Conversely, exploitative innovation is generally easier to implement, takes less time, carries lower risks, but offers lower rewards (Klotz et al., 2018; Tortia et al., 2022). Therefore, the impact of these two modes of employee innovation on the innovation performance of elder employees may be complex and non-linear. In light of this, it is necessary to explore the internal mechanism by which high-involvement work practices influence the innovation performance of elder employees through dual innovation.

In addition to work practices, leadership is also an important variable influencing employee innovation in organizations (Hughes et al., 2018). As leaders of organizational activities, leaders play an important role in guiding and supporting employees' innovative behaviors (Chen et al., 2022). Traditionally, transformational leadership has been viewed as having a positive impact on employee innovation, largely due to its emphasis on inspiration, intellectual stimulation and individualized consideration (Jansen et al., 2006). However, the interaction between transformational leadership and high-involvement work practices may have unintended negative effects on the innovative behavior and performance of elder employees. The inspirational and challenging nature of transformational leadership, when combined with the high degree of autonomy required in high-involvement work practices, could impose additional stress on older employees, potentially hindering their innovative capabilities (Wang and Howell, 2010). What is more, the future-oriented and big-picture goals emphasized by transformational leaders may not align with the immediate, practical concerns of elder employees in high-involvement settings, leading to a mismatch of expectations and goals (De Clercq and Mustafa, 2023). Given these potential problems, it is essential to examine the moderating role of transformational leadership in the context of high-involvement work practices, particularly with regard to the innovation behavior and performance of older employees.

The innovation of this paper is as follows: (1) Examine how high-involvement work practices influence the innovation performance of older employees, thereby extending research on the antecedents of innovation performance among this population. (2) Investigate the mediating role of dual innovation behavior in the relationship between high-involvement work practices and the innovation performance of older employees. This research clarifies the non-linear effects of dual innovation as a crucial transmission mechanism. (3) By examining the moderating role of transformational leadership, a dominant leadership style, the study delineates the boundary conditions under which high-involvement work practices affect the innovation behavior and performance of older employees.

Theoretical bases and research hypothesis

Social exchange theory

The main idea of social exchange theory is 'tangible exchange' or 'intangible exchange' between parties and groups or organizations in order to obtain returns (Valentinov and Hajdu, 2019). From the perspective of social exchange theory, the interaction of resources between subjects can be seen as reciprocal exchange behavior (Ashforth and Mael, 1989). Employees not only perform to reciprocate the good treatment they receive from the organization, such as involvement in decision making, performance rewards and training, but also exchange resources with the organization due to the high level of trust. There are two typical logics based on this theory, namely market logic and social logic. Market logic emphasizes the characteristics of equality, certainty and predictability of returns when resources are exchanged between organizations. The market logic emphasizes that the exchange of organizational resources has the characteristics of inequality, uncertainty and difficulty in measuring the return, which highlights the importance of trust in the organization.

Social exchange theory has become a common perspective for studying the impact of high-involvement work practices on employee behavior (Konovsky and Pugh, 1994; Wayne et al., 1997; Cropanzano and Mitchell, 2005). For organizations, it is true that high-involvement work practices can positively stimulate employee creativity. However, based on this perspective, employees' innovative behavior is still a passive response to organizational management measures and organizational atmosphere, which cannot reflect the concept cultivation and practice stimulation of high-involvement work practices for employees' innovative activities. In this regard, Ryan and Deci (2000) proposed that self-determination theory could be used to improve and complement the active influence of high-involvement work practices on employees' innovative behavior. According to self-determination theory, human behavior is driven by internal and external motivation (Alegría et al., 2014; Sharot and Sunstein, 2020). Specifically, an individual's behavior is mainly driven by internal motivation, but under the action of external motivation, an individual chooses to participate in a job or activity that does not interest him or her.

Based on this theoretical logic, high-involvement work practices can increase employees' work motivation and encourage them to take the initiative to innovate in two ways. First, giving employees more autonomy can increase their intrinsic motivation, satisfy their basic psychological needs for self-determination, and enhance their creativity. Second, organizations can provide more resources for employees to innovate, such as providing opportunities for employees to participate in training and providing innovative capabilities to match their high motivation to innovate. Therefore, based on social exchange theory, this paper explores the passive driving and subjective cultivation of high-involvement work practices on employees' innovative behavior, in order to improve the influence mechanism of these work practices on older employees' innovative performance, and to provide effective management methods for enterprises to enhance employees' innovative vitality and ability level.

High-involvement work practices and innovation performance

High-involvement work practices are a comprehensive and multifaceted system of work practices (Waseem et al., 2020) that includes five specific practice activities, including full empowerment, capacity development, information sharing, appreciation and recognition, and fairness in return. Compared to the individual work practice mode, high-involvement work practices can positively predict employee work outcomes. It emphasizes the long-term communication relationship between employees and the organization and encourages employees to actively participate in the organization's work practices.

This study suggests that the implementation of high-involvement work practices can effectively improve the innovation performance of elder employees. Specifically, on the one hand, based on social exchange theory, when elder employees perceive the importance and concern of the organization, they will increase their work enthusiasm and creativity out of a willingness to give back to the organization (Kehoe and Wright, 2010). First, from the perspective of full empowerment of high-involvement work practices, through high-involvement work practices, elder employees can obtain sufficient work autonomy and decision-making power (Zeb et al., 2021a,b), so that elder employees can independently arrange and plan work content and make independent decisions. This allows elder employees to maximize their limited energy and work vitality in their work tasks and to fully develop their potential and creativity. Second, from the perspective of the characteristics of high-involvement work practices, through multiple modules including knowledge and skills training, job rotation and job coaching, capacity development activities can enrich the professional knowledge and skills of elder employees, encourage elder employees to acquire new technologies and skills that control current and future development, and stimulate workers to refine existing products and services. They actively seek creative solutions to complex problems (Woodman et al., 1993; Mustafa et al., 2018). Finally, the information-sharing characteristics of high-involvement work practices can help elder employees gather work-related information and strengthen the foundation of innovation for elder employees. Finally, the information-sharing characteristics of high-involvement work practices can help elder employees to gather work-related information and strengthen the basis of innovation for elder employees. On the other hand, based on self-determination theory, high-involvement work practices can satisfy elder employees' basic psychological need for self-determination and then positively affect their creativity levels by improving their internal motivation (Shin et al., 2022). In addition, a sense of fairness directly leads to higher levels of commitment and effort, which are crucial for driving innovation (Paré and Tremblay, 2007). High-involvement work practices, characterized by their emphasis on fairness and equity, significantly enhance the innovation performance of elder employees by increasing their self-confidence, sense of control and commitment to their work. In summary, this paper proposes the following hypotheses:

> *H*1: High-involvement work practices have a significant positive impact on elder employees' innovation performance.

The mediating effect of exploratory and exploitative innovation

Exploratory innovation is radical innovation that disrupts and reconstructs existing products or services (Benner and Tushman, 2003), often involving the updating and iteration of products and services and the creation of new markets. The implementation of exploratory innovation requires employees to have both the ability to break through innovation and the power to implement innovation, which is consistent with the way employees are trained in high-involvement work practices. Firstly, organizations with high-involvement work practices pay more attention to cultivating employees' knowledge, skills and work experience than ordinary organizations; this helps elder employees to develop a sense of empowerment. In this environment, employees' abilities are developed and it is easier for them to acquire work skills that promote creativity and expand their thinking and problem-solving ideas (Kehoe and Wright, 2010), which is conducive to the generation of employees' innovative ideas. It is also conducive to encouraging employees to engage in innovative activities out of feedback to the organization (Zeb et al., 2020). Second, high-involvement work practices, particularly through their characteristic of granting full empowerment to employees (Kilroy et al., 2016), significantly promote exploratory innovation behaviors. In such organizational settings, employees are given greater autonomy over their daily work planning and decision making. This autonomy enables employees to effectively match their work challenges with their capabilities and resources, creating an optimal environment for the use of their task management skills (Jiang et al., 2012). They are more likely to venture into new areas, experiment with new ideas and take the initiative in innovative endeavors due to the trust and freedom provided by high-involvement work practices (Kilroy et al., 2020).

In conclusion, organizations that implement high-involvement work practices are conducive to employees learning more knowledge and mastering more resources, which is conducive to the cultivation of employees' creative thinking and the development of the need for self-determination. At the same time, employees perceive full empowerment and trust from the organization and are more willing to engage in exploratory innovation to give back to the organization. On this basis, this paper proposes the following hypothesis:

> *H2*: High-involvement work practices have a significant positive influence on exploratory innovation.

Exploratory innovation is when a firm deviates from existing products and markets and tries to develop new products and services for new customers or markets (Jansen et al., 2006). At the individual employee level, however, exploratory innovation involves deviating from established routines and venturing into the development of new markets (Weber et al., 2022). For elder employees, low levels of exploratory innovation may initially lead to a decline in innovation performance. This decline has been attributed to the significant investment of time and resources required in the early stages of exploratory innovation, which may not yield immediate benefits and may be particularly challenging for elder employees who may be less accustomed to rapid shifts in innovation paradigms (Chi and Lin, 2011). These initial efforts into uncharted territory often involve high levels of uncertainty and risk, which may negatively impact the short-term innovation performance of these employees (Woods et al., 2018).

However, as the level of exploratory innovation increases, elder employees gradually accumulate new knowledge, develop new competencies and begin to adopt more forward-looking and innovative approaches (Jiang et al., 2021). This development leads to an enhanced ability to identify and respond to market changes and technological advances. Over time, sustained engagement in exploratory innovation allows elder employees to break out of conventional thinking patterns and adopt more dynamic and disruptive approaches (Quintus et al., 2017). As a result, their innovation performance begins to improve, benefiting from the broader perspective and adaptability gained through sustained exploratory activity (Collins et al., 2009). In essence, while the initial stages of exploratory innovation may temporarily hamper elder employees' innovation performance, continued and increased engagement in such activities fosters an environment conducive to long-term innovation success. On this basis, this paper proposes the following hypothesis:

> *H3*: Exploratory innovation has a significant U-shaped relationship with elder employees' innovation performance, that is, with the improvement of exploratory innovation level, elder employees' innovation performance first decreases and then increases.

Organizations with high-involvement work practices emphasize the development of employees' skills and cultivate their work initiative (Song et al., 2009). In such an environment, employees are more likely to be stimulated to enhance their creativity and engage in exploratory innovation behavior. When employees engage in exploratory innovation behavior for a long time, it is easier for them to form their vision of innovation and development on the existing problems and future development of the firm, which encourages them to promote new innovation and improve the innovation performance of older employees in the firm (Woods et al., 2018). At the same time, combined with hypothesis H2 and hypothesis H3, high-involvement work practices positively affect exploratory innovation, and exploratory innovation has a U-shaped influence on innovation performance. Therefore, it can be concluded that exploratory innovation plays a mediating role in the relationship between high-involvement work practices and innovation performance. Based on this, the following hypothesis is proposed in this paper:

> *H4*: High-involvement work practices have U-shaped influence on elder employees' innovation performance through exploratory innovation.

Exploitative innovation is a progressive innovation to improve existing products and services, which often involves upgrading existing products and services, technological improvement, cost reduction and market expansion (Chen et al., 2014). As a comprehensive practice, high-involvement work practices can stimulate employees' exploitative innovation behavior from many aspects. First, creating a good atmosphere for innovation is an important way to motivate employees to innovate (García-Morales et al., 2012). Organizations with high-involvement can improve employees' perceptions of an innovative work environment by

forming an organizational innovation atmosphere, so that employees can gradually increase their intrinsic motivation to innovate in a good organizational innovation atmosphere, stimulate their enthusiasm for innovation, establish and form an innovation system of self-management and incentives, and improve their exploitative innovation efficiency. Second, employees with high-involvement in work organization have greater job autonomy, which makes them more flexible and free in carrying out exploitative innovation activities, which not only helps them to have the expectation of giving back to the organization, but also increases their need for self-determination, thus encouraging employees to give full play to their creativity, thinking and problem-solving abilities (Woodman et al., 1993). Finally, the information sharing provided by high-involvement work practices can help employees more efficiently obtain work information conducive to exploitative innovation activities, and multiple information channels and abundant information resources can lay a solid foundation for employees to carry out exploitative innovation (Chen et al., 2021). Based on this, this paper proposes the following hypothesis:

> *H5*: High-involvement work practices have a significant positive impact on exploitative innovation.

Exploitative innovation at the employee level involves refining, iterating and improving existing products and services (Jansen et al., 2006). Initially, a moderate level of exploitative innovation can lead to an increase in the innovation performance of elder employees. Older employees, with their extensive experience and familiarity with current systems and processes (Quintus et al., 2017), are particularly adept at making these incremental changes. They are able to adapt quickly to market changes and make timely adjustments to products and services, thereby maintaining organizational stability and improving their own innovation performance.

However, as the level of exploitative innovation intensifies beyond a certain point, its positive impact on the innovation performance of elder employees begins to decline. This decline is attributed to the inherent limitations of focusing too heavily on refining existing products, which can lead to stagnation in creativity and a lack of fresh, transformative ideas (Limaj and Bernroider, 2019). Older employees may feel constrained by the repetitive nature of continuous incremental improvement (Jiang et al., 2021), leading to reduced motivation and engagement in innovation activities. Consequently, while initial levels of exploitative innovation may enhance older employees' innovation performance, an excessive focus on this form of innovation may ultimately hinder their long-term innovation capabilities and contributions. On this basis, this paper proposes the following hypothesis:

> *H6*: Exploitative innovation has a significant inverted U-shaped relationship with elder employees' innovation performance, that is, with the improvement of the level of exploitative innovation, elder employees' innovation performance first increases and then decreases.

Based on the above analysis, high-involvement work practices are conducive to the formation of organizational innovation atmosphere and information sharing mode to promote exploitative innovation. To some extent, exploitative innovation can have a positive impact on organizations to identify innovation opportunities, carry out innovation activities effectively and improve the innovation performance of older employees. However, as the level of exploitative innovation increases further, it may limit employees' innovative thinking and dampen their enthusiasm for innovation, which subsequently leads to a decline in older employees' innovation performance (Limaj and Bernroider, 2019). Combined with hypotheses H5 and H6, high-involvement work practices positively influence exploitative innovation, and exploitative innovation has an inverted U-shaped influence on older employees' innovation performance. In conclusion, exploitative innovation plays a mediating role between high-involvement work practices and elder employees' innovation performance. Therefore, the following hypothesis is proposed:

> *H7*: High-involvement work practices have an inverted U-shaped effect on elder employees' innovation performance through exploitative innovation.

The moderating effect of transformational leadership

Transformational leadership is a leadership style that motivates and inspires followers through a shared vision, intellectual stimulation, individualized consideration and by being a role model (García-Morales et al., 2012; Fernet et al., 2015; Arnold, 2017; Zeb et al., 2020). Most studies consider transformational leadership as a leadership style that focuses on improving the intrinsic motivation of subordinates and emphasizes influencing subordinates through leadership charm, charisma, intellectual stimulation and personalized care (Wright and Pandey, 2009). However, transformational leadership can also have a negative impact on the innovation behavior of older employees. By frequently challenging non-conformist ideas, transformational leaders may inadvertently make subordinates overly dependent on their direction (Jiang and Chen, 2021), thus discouraging the independent and creative thinking essential for exploratory innovation. Furthermore, the pressures of transformational leadership can sometimes be overwhelming, reducing individual creative output, particularly in high-involvement work settings that require employee autonomy (Men et al., 2020). Research such as Chen et al. (2022) shows that although transformational leadership can enhance group innovation, it can have a negative impact on individual innovation (Chen et al., 2022). This suggests that in environments with high-involvement practices, strong transformational leadership may actually reduce the effectiveness of these practices in promoting individual exploratory innovation.

Conversely, in environments where transformational leadership is less pronounced, the positive effects of high-involvement work practices on exploratory innovation become more evident. In environments with lower levels of transformational leadership, employees are less influenced by a leader's vision and direction, giving them more freedom to pursue novel ideas and approaches independently. This autonomy is a key component of high-involvement work practices, which emphasize employee empowerment and participative decision making (Men et al., 2020). Without the overshadowing influence of a strong transformational

leader, employees can explore and experiment more freely, reaping the full benefits of high-involvement practices. In such contexts, these practices effectively promote a culture of exploration and creativity, as employees feel more confident and able to take the initiative in innovative endeavors (Chen et al., 2022). Therefore, the predictive effect of high-involvement work practices on exploratory innovation is likely to be stronger in scenarios characterized by lower levels of transformational leadership, allowing employees to fully engage in and benefit from the empowering and inclusive nature of these practices. Based on this, transformational leadership is introduced as a moderating variable affecting the relationship between high-involvement work practices and exploratory innovation, and the following hypotheses are proposed:

> *H*8: Transformational leadership moderates the influence of high-involvement work practices on exploratory innovation, that is, the lower the level of transformational leadership, the stronger the predictive effect of high-involvement work practices on exploratory innovation.

Similarly, transformational leadership may negatively moderate exploitative innovation. In environments where transformational leadership is less pronounced, employees may rely more on the structured, empowering aspects of high-involvement work practices that are critical for incremental and process-oriented innovation (Tipu et al., 2012). Such an environment allows for greater autonomy and decision making at the individual and team level, fostering an atmosphere in which exploitative innovation can flourish. In contrast, higher levels of transformational leadership, while beneficial in many contexts, may overshadow the process-oriented, systematic approach of high-involvement work practices, potentially reducing their impact on exploitative innovation. Transformational leaders, with their emphasis on visionary goals and radical change, may inadvertently divert focus and resources away from the incremental improvements that characterize exploitative innovation (Jansen et al., 2006). Therefore, it is proposed that the positive influence of high-involvement work practices on exploitative innovation may be more pronounced in settings with lower levels of transformational leadership, as these practices may more directly influence and shape the innovative efforts of the workforce. Based on this, transformational leadership is introduced as a moderating variable affecting the relationship between high-involvement work practices and exploitative innovation, and the following hypotheses are proposed:

> *H*9: Transformational leadership moderates the influence of high-involvement work practices on exploitative innovation, that is, the lower the level of transformational leadership, the stronger the predictive effect of high-involvement work practices on exploitative innovation.

High-involvement work practices typically promote participatory decision making, autonomy in work roles and a sense of ownership of work processes, which may be particularly effective in enhancing elder employees' innovation performance (Hauff et al., 2022). In contexts where transformational leadership is less dominant, elder employees may experience more autonomy and empowerment, key tenets of high-involvement work practices. Without the strong influence of transformational leadership, which often directs focus toward a visionary goal, elder employees may have more opportunities to use their extensive experience and knowledge in a self-directed manner, leading to increased innovative performance (Arnold, 2017). On the other hand, in environments with high levels of transformational leadership, the directive and charismatic nature of such leadership may overshadow the autonomy and empowerment provided by high-involvement work practices (Wang et al., 2022). This could potentially limit the ability of elder employees to fully engage in innovative behaviors, as their actions and decisions may become more aligned with the transformational leader's vision rather than their own creative and experiential insights (Klonek et al., 2023). This implies that the lower the presence of transformational leadership, the more pronounced the positive effects of high-involvement work practices on the innovation performance of elder employees. Based on this, this paper introduces transformational leadership as a moderator that influences the relationship between high engagement in work practices and elder employees' innovation performance, and proposes the following hypotheses:

> *H*10: Transformational leadership moderates the influence of high-involvement work practices on elder employees' innovation performance, that is, the lower the level of transformational leadership, the stronger the predictive effect of high-involvement work practices on elder employees' innovation performance.

Moderated mediation

It is hypothesized that H4 and H8 together form the moderated mediation effect, i.e., exploratory innovation mediates the influence of high-involvement work practices on elder employees' innovation performance. By moderating the positive effect of high-involvement work practices on exploratory innovation, transformational leadership moderates the effect of high-involvement work practices on elder employees' innovation performance through exploratory innovation. H7 and H9 are also hypothesized to constitute the moderated mediation effect, i.e., exploitative innovation mediates the influence of high-involvement work practices on elder workers' innovation performance. Transformational leadership moderates the positive effect of high-involvement work practices on exploitative innovation, and then moderates the effect of high-involvement work practices on elder workers' innovation performance. Therefore, the following hypothesis is proposed:

> *H*11: Transformational leadership moderates the inverted U-shaped influence of high-involvement work practices on elder employees' innovation performance through exploratory innovation.

> *H*12: Transformational leadership moderates the U-shaped influence of high-involvement work practices on elder employees' innovation performance through exploitative innovation.

To sum up, the research model in this paper is shown in Figure 1.

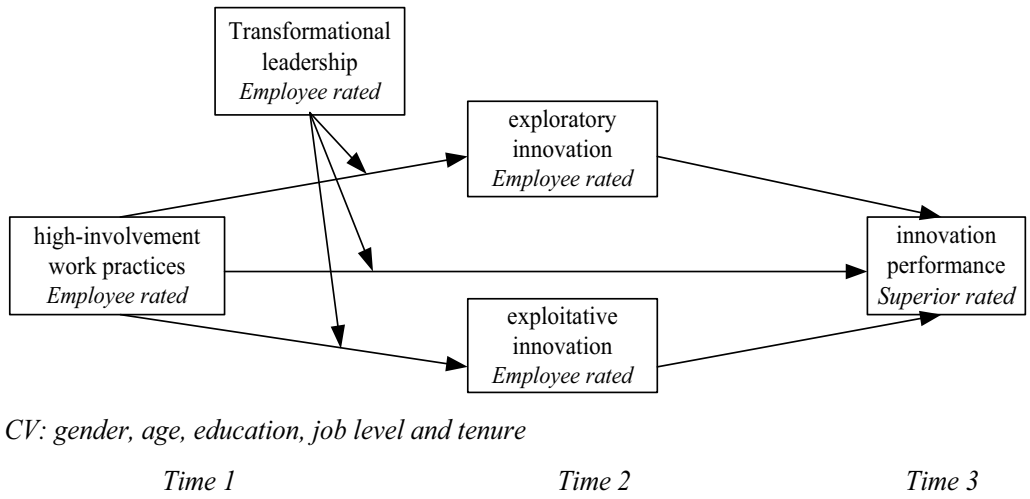


FIGURE 1
Research theoretical model.

Research design

Data

This study used a questionnaire survey method to collect data. Data was collected from elder employees in 15 technology companies in eastern China, including the software development industry, telecommunications industry, steel manufacturing industry, etc. Elder employees in these industries face a lack of innovation. Therefore, we investigate whether the implementation of high-involvement work practices in these industries can contribute to the improvement of innovation performance. Most studies define elder employees as those over the age of 35 (Collins et al., 2009), and this is the criterion used in this study. Initially, the company representative was contacted to explain the purpose of the study and to ask for volunteers to participate in the survey. The survey was conducted through a combination of online questionnaires and on-site interviews. Links to the questionnaires were distributed to individual employees. Paper questionnaires were distributed to survey participants for those who did not wish to complete them online. Each respondent was coded before completing the questionnaire and the questionnaires were matched by coding after they were returned. In order to ensure the authenticity and validity of the data as much as possible, respondents were assured that their answers would be anonymous and that a certain payment (40 yuan) would be paid to participants at the end of each survey.

To reduce potential common methodological biases (Podsakoff et al., 2003), the study was conducted in three phases. Each phase was separated by 3 weeks, as too long a time gap may obscure existing relationships and conversely, too short a time interval may inflate the relationship between variables due to memory effects (Babalola et al., 2019). In the first phase, employees reported on high-involvement work practices, transformational leadership and demographics. A total of 400 questionnaires were sent out and 367 were collected, with a return rate of 91.75%. Three weeks later, in the second phase, 367 employees who participated in the first phase of the survey were given questionnaires and employees reported on exploratory innovation, exploratory innovation, work pressure and demographic characteristics. 336 questionnaires were collected, giving a response rate of 91.55%. Three weeks later, in the third stage, questionnaires were distributed to the supervisors of the employees who had participated in the second stage of the survey. The supervisors reported on the employees' innovation performance and demographic characteristics, and 305 questionnaires were collected, giving a response rate of 90.77%. Of the 305 complete responses, a total of 278 valid questionnaires were obtained, excluding those with inconsistent demographic variables, invalid, regular and excessive missing data. We used the methods of Armstrong and Overton (1977) (Armstrong) to assess potential non-response bias. The chi-squared test and independent samples t-test were used to compare the first 85 respondents with the second 85 respondents using demographic variables such as age and gender. The results showed that there was no significant difference between the two groups ($p > 0.05$).

Measurement of variables

All scales used a seven-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). All scales used have been shown to have good psychometric properties.

High-involvement work practices: High-involvement work practices is a scale developed by Jiang et al. (2021), consisting of 29 questions from seven dimensions, including personnel, training and development, performance management and evaluation, compensation and benefits, job design, participation and autonomy, and information sharing, the internal consistency coefficients were 0.885, 0.800, 0.797, 0.921, 0.873, 0.847, 0.855, respectively. It is translated into Chinese by following the traditional translation back procedure (Bhawuk and Brislin, 2001; Kehoe and Wright, 2010; White et al., 2013). Respondents rated how often they experienced each condition on a scale of 1 (strongly disagree) to 7 (strongly agree). Items included "My workplace is able to hire people with the right skills." And "I've been given a real opportunity to improve my skills in the organization." The internal consistency coefficient of high-order

and high-participation work practices was 0.971. The second-order seven-factor confirmatory factor analysis was carried out on the high participation work practices scale. The results were as follows: $\chi^2/df = 2.570$, IFI = 0.919, TLI = 0.907, CFI = 0.918, RMSEA = 0.075. The model fitting effect was good. In line with common practice in this field, the seven dimensions are examined as a whole. Research has focused on the synergistic effects of high-involvement work practices (Vandenberg et al., 1999) and therefore, the internal consistency coefficient of the scale was 0.971.

High-involvement work practices: High-involvement work practices is a scale developed by Jiang et al. (2021). The scale consists of 29 questions from seven dimensions, including human resources, training and development, performance management and evaluation, compensation and benefits, job design, participation and autonomy, and information sharing, with internal consistency coefficients of 0.885, 0.800, 0.797, 0.921, 0.873, 0.847, and 0.855, respectively. It was translated into Chinese using the traditional translation-back procedure (Bhawuk and Brislin, 2001; Kehoe and Wright, 2010; White et al., 2013). Respondents rated how often they experienced each condition on a scale of 1 (strongly disagree) to 7 (strongly agree). Items included 'My workplace is able to recruit people with the right skills' and 'I have been given a real opportunity to develop my skills in the organization'. The internal consistency coefficient of the high order and high participation work practices was 0.971. The seven-factor second-order confirmatory factor analysis was carried out on the high participation work practices scale. The results were as follows: $\chi^2/df = 2.570$, IFI = 0.919, TLI = 0.907, CFI = 0.918, RMSEA = 0.075. The model fit was good. In line with common practice in the field, the seven dimensions are examined as a whole. Research has focused on the synergistic effects of high-involvement work practices (Vandenberg et al., 1999) and therefore the internal consistency coefficient of the scale was 0.971.

Exploitative innovation and exploratory innovation: Exploitative innovation and exploratory innovation is measured by the 8-item scale (Benner and Tushman, 2003). Respondents rated how often they experienced each condition on a scale of 1 (strongly disagree) to 7 (strongly agree). Exploitative innovation includes "often develop new market segments without relevant marketing experience" and "often adopt business strategies not used by other companies in the same industry," and the internal consistency coefficient is 0.918. Exploratory innovation includes "striving to improve the applicability of existing technologies/skills in multiple related business fields" and "frequently using existing technologies/skills to increase the diversity of functions and products/services," with an internal consistency coefficient of 0.937.

Transformational leadership: The 8-item scale of Li and Shi (2008; Guay and Choi, 2015) was used to measure transformational leadership. Respondents rated how often they experienced each condition on a scale of 1 (strongly disagree) to 7 (strongly agree). Items included "My boss can share the difficulties of my employees." And" My leader can keep employees informed about the future of the department." The internal consistency coefficient of the scale is 0.954.

Innovation performance: The 10-item scale of Janssen and Yperen (2004) was used to measure innovation performance. Respondents (superiors) rated how often the employee experienced each condition on a scale of 1 (strongly disagree) to 7 (strongly agree). Items included "At work, He or She often challenge problems that have not been solved." And" He or She is excited to come up with new ideas to improve things." The internal consistency coefficient of this scale is 0.976.

Control variables: Referring to existing research practice (Gu et al., 2015; Wang et al., 2022), gender (0 = female, 1 = male), age (1 = 35–45, 3 = 56 and above), education (1 = high school education or below, 4 = master's degree or above), job level (1 = general employee, 4 = senior managers) and tenure (1 = less than 3 years, 4 = more than 10 years) were included in the study as control variables.

Results and analysis

Descriptive analysis

SPSS 24 and Mplus 8.0 software are used for data analysis in this paper. The mean, standard deviation and correlation of all studied variables was listed in Table 1. As shown in Table 1, the correlation of the study variables is in the expected direction, and the internal consistency of the study variables is within the acceptable range. High-involvement work practices was positively correlated with exploitative innovation ($r = 0.713$, $p < 0.01$), exploratory innovation ($r = 0.340$, $p < 0.01$), and innovation performance ($r = 0.547$, $p < 0.01$). In addition, exploitative innovation and exploratory innovation were positively correlated with elder employees' innovation performance ($r = 0.608$, $p < 0.01$; $r = 0.493$, $p < 0.01$).

Measurement model

The convergence validity and discrimination validity of the measurement model were tested. The results of confirmatory factor analysis (CFA) show that the five-factor model (i.e., high-involvement work practices, exploratory innovation, exploitative innovation, innovation performance, transformational leadership) has a good fit: χ^2 (df = 1,338) =2735.984, $p < 0.01$, RMSEA = 0.062, CFI = 0.910, TLI = 0.904, IFI = 0.911 (Table 2), and the load of each factor had statistical significance ($p < 0.01$). The results of model comparisons further indicate that the hypothetical five-factor measurement model has a better fit to the data than any alternative four-factor model (i.e., combining any two of the five factors).

Common method bias

Although this study uses data from three stages, all the data are self-reported by employees, so there are inevitable endogeneity problems. To test endogeneity, Harman's single factor test and ULMC (Unmeasured Latent Method Construct) were used to test the presence of common method bias (Podsakoff et al., 2003). As shown in Table 2, the single factor model was not suitable [$\chi^2(1355) = 6336.387$, $p < 0.01$; CFI = 0.681, TLI = 0.662 and RMSEA = 0.115], while the five-factor model met the requirements [$\chi^2(1338) = 2735.984$, $p < 0.01$, CFI = 0.911, TLI = 0.905, and RMSEA = 0.061]. The χ^2 comparison showed that the single factor model was significantly worse than the five factor model.

At the same time, referring to the practice of Liang et al. (2007), the method of ULMC method factors was used to test the influence of common method bias factors. By loading all the observation indexes

TABLE 1 Matrix of mean value, variance and correlation coefficient.

	Mean value	Standard deviation	1	2	3	4	5	6	7	8	9	10
1. Gender	0.670	0.514	0.264	0.093	0.010	−0.007	0.129	−0.085	−0.068	0.093	−0.054	−0.012
2. Age	2.370	0.726	0.250**	0.527	−0.033	0.125	0.544	0.068	0.093	0.224	0.196	0.032
3. Education	2.440	0.745	0.027	−0.061	0.555	0.107	−0.241	−0.045	−0.028	0.197	−0.066	−0.001
4. Job level	1.250	0.593	−0.024	0.291**	0.241**	0.352	0.176	0.191	0.181	0.230	0.217	0.247
5. Tenure	3.380	1.202	0.208**	0.624**	−0.270**	0.247**	1.444	0.062	0.182	0.354	0.374	0.056
6. HIWPS	4.925	0.983	−0.169**	0.095	−0.061	0.328**	0.052	(0.755)	0.926	0.405	0.816	0.674
7. TL	4.990	1.079	−0.123*	0.119*	−0.035	0.283**	0.140*	0.877**	(0.871)	0.450	0.866	0.692
8. EXR	3.875	1.212	0.149*	0.254**	0.218**	0.320**	0.243**	0.340**	0.344**	(0.897)	0.859	0.673
9. EXI	4.867	1.167	−0.090	0.231**	−0.076	0.313**	0.266**	0.713**	0.687**	0.608**	(0.918)	0.722
10. IP	4.694	1.252	−0.019	0.035	−0.001	0.332**	0.037	0.547**	0.512**	0.443**	0.493**	(0.908)

*$p < 0.05$; **$p < 0.01$. The lower left matrix is the correlation coefficient, the upper right matrix is the covariance matrix, and inside the diagonal parentheses is the square root of AVE. HIWPS, high-involvement work practices; TL, transformational leadership; EXR, exploratory innovation; EXI, exploitative innovation; IP, innovation performance.

TABLE 2 Results of confirmatory factor analysis.

Model	χ^2	df	χ^2/df	RMSEA	IFI	TLI	CFI
Single factor	6336.387	1,355	4.676	0.115	0.682	0.662	0.681
Double factor	5443.227	1,347	4.041	0.105	0.739	0.721	0.737
Three factor	5085.245	1,345	3.781	0.100	0.761	0.745	0.760
Four factor	4187.304	1,342	3.120	0.088	0.818	0.805	0.817
Five factor: theoretical model	2735.984	1,338	2.045	0.062	0.911	0.904	0.910
Six factor	2718.618	1,336	2.035	0.061	0.912	0.905	0.911

Single factor, all variables; Double factor, HIWPS, TL + EXR + EXI + IP; Three factors, HIWPS, TL + EXR + EXI, IP; Four factors, HIWPS, TL, EXR + EXI, IP; Six factors, five factors plus CMV.

of five theoretical variables, a latent variable CMV was constructed, and a six-factor model including five theoretical variables and CMV was established. The results showed that the six-factor model [$\chi^2(1336) = 2718.618$, $p < 0.01$, CFI = 0.911, TLI = 0.905, RMSEA = 0.061] had no significant improvement compared with the theoretical model (five-factor model; Table 2). Based on the above judgments, the influence of common method bias in this study is not significant.

Hypothesis testing

Main effect

Regression analysis was conducted for each variable, and the results were shown in Table 3. For the sake of presentation, the results are described in the order of the hypotheses. As can be seen from model 6, the effect of high-involvement work practices on elder employees' innovation performance is not significant ($b = 0.069$, $p > 0.05$), and hypothesis H1 is not supported. As can be seen from model 3, the effect of high-involvement work practices on exploratory innovation is not significant ($b = 0.267$, $p > 0.05$), and hypothesis H2 is not supported. As can be seen from model 6, exploratory innovation has a significant U-shaped relationship with elder employees' innovation performance ($b = 0.101$, $p < 0.05$), that is, with the increase of exploratory innovation level, elder employees' innovation performance first decreases and then increases. Hypothesis H3 is supported. From model 1, it can be seen that high-involvement work practices has a significant impact on exploitative innovation ($b = 0.607$, $p < 0.01$), and hypothesis H5 is supported. From model 6, it can be seen that exploitative innovation has a significant inverted U-shaped relationship with elder employees' innovation performance ($b = -0.161$, $p < 0.01$), that is, with the increase of exploratory innovation level, innovation performance first increases and then decreases. Hypothesis H6 is supported.

Test of mediating effect

The Bootstrap sampling number was set to 5,000 and the confidence level of the confidence interval was set to 95%. The result path coefficient was shown in Table 4. The results show that high-involvement work practices has no significant effect on quadratic terms of exploratory innovation ($b = 1.983$, $p > 0.05$), high-involvement work practices has significant effect on quadratic terms of exploitative innovation ($b = 4.696$, $p < 0.000$), and exploratory innovation has significant effect on elder employees' innovation performance ($b = 0.101$, $p < 0.05$). Exploitative innovation had a significant effect on

TABLE 3 Results of regression analysis.

Variables	EXI	EXI^2	EXR	EXR^2	IP	IP
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
constant	4.026***	15.690***	1.458***	−2.086	4.275***	1.984
gender	−0.079	−0.819	0.296*	2.403*	0.071	0.059
age	0.088	1.086	0.120	1.139	−0.079	−0.057
education	0.039	0.507	0.505***	3.701***	−0.104	−0.047
job level	0.040	0.656	0.184	2.050*	0.464***	0.449***
tenure	0.174***	1.545**	0.188*	1.185*	−0.152*	−0.139*
HIWPS	0.607***	4.696***	0.267	1.983	0.234	0.069
EXI					0.012	1.555***
EXR					0.245***	−0.568
EXI^2						−0.161***
EXR^2						0.101*
TL	0.200*	2.676**	0.102	0.670	0.206	0.344***
TL × HIWPS	−0.058	−0.012	−0.183***	−1.520***	−0.285***	−0.193***
R^2	0.573	0.544	0.323	0.315	0.479	0.509
F	45.092***	40.114***	16.025***	15.440***	24.563***	22.873***

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

TABLE 4 Indirect effects of high-involvement work practices on elder employees' innovation performance.

Path	Coefficient	Standard deviation	*p* value	95% confidence interval
HIWPS→EXR^2	1.983	1.106	0.074	[−0.195, 4.160]
EXR^2 → IP	0.101	0.040	0.012	[0.023, 0.180]
HIWPS→EXI^2	4.696	1.032	0.000	[2.664, 6.728]
EXI^2 → IP	−0.161	0.042	0.000	[−0.244, −0.078]
HIWPS→EXR^2 → IP	−0.154	0.072		[−0.037, 0.623]
HIWPS→EXI^2 → IP	0.002	0.062		[−1.488, −0.288]

elder employees' innovation performance ($b = -0.161$, $p < 0.000$). High-involvement work practices has no significant influence on U-shaped innovation performance through exploratory innovation, confidence interval is [−0.037, 0.623], including 0, and hypothesis H4 is not supported. The high-involvement work practices have a significant inverted U-shaped effect on elder employees' innovation performance through exploitative innovation. The confidence interval is [−1.488, −0.288], excluding 0 and hypothesis H7 is verified.

Test of moderation effect

Model 3 in Table 3 shows that transformational leadership has a significant moderating coefficient ($b = -0.183$, $p < 0.05$) on the influence of high-involvement work practices on exploratory innovation, that is, under low level transformational leadership, high-involvement work practices has a strong influence on exploratory innovation. On the contrary, under high level transformational leadership, the positive effect of high-involvement work practices on exploratory innovation is weak, and hypothesis H8 is supported.

According to Model 1 in Table 3, the adjustment coefficient of transformational leadership on the influence of high-involvement work practices on exploitative innovation is not significant ($b = -0.058$, $p > 0.05$), that is, the prediction effect of high-involvement work practices level on exploitative innovation will not be affected by the level of transformational leadership, and hypothesis H9 is not supported.

Model 6 in Table 3 shows that transformational leadership moderates the impact of high-involvement work practices on elder employees' innovation performance ($b = -0.193$, $p < 0.05$), that is, the lower the level of transformational leadership, the stronger the predictive effect of high-involvement work practices on elder employees' innovation performance, and hypothesis H10 is supported.

To further explain the moderating effects of transformational leadership, simple slope estimates were performed (Figures 2, 3). As shown in Figure 2, under low-level transformational leadership, the influence of high-involvement work practices on exploratory innovation is stronger; on the contrary, under high-level transformational leadership, the influence of high-involvement work practices on exploratory innovation is weaker. Therefore,

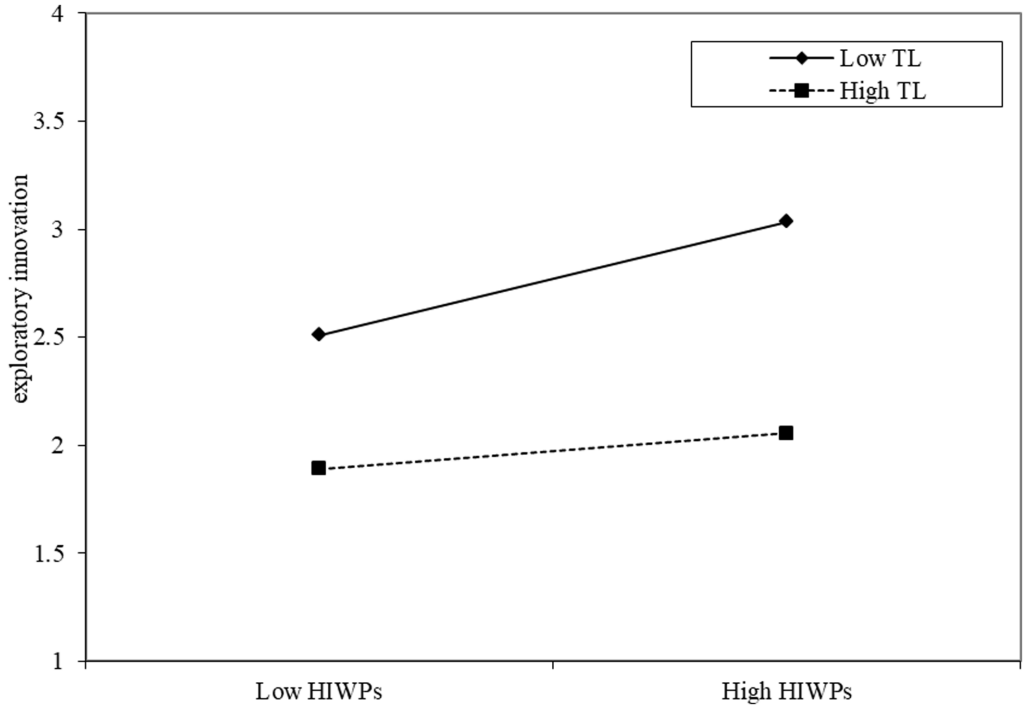


FIGURE 2
Moderating effects of transformational leadership.

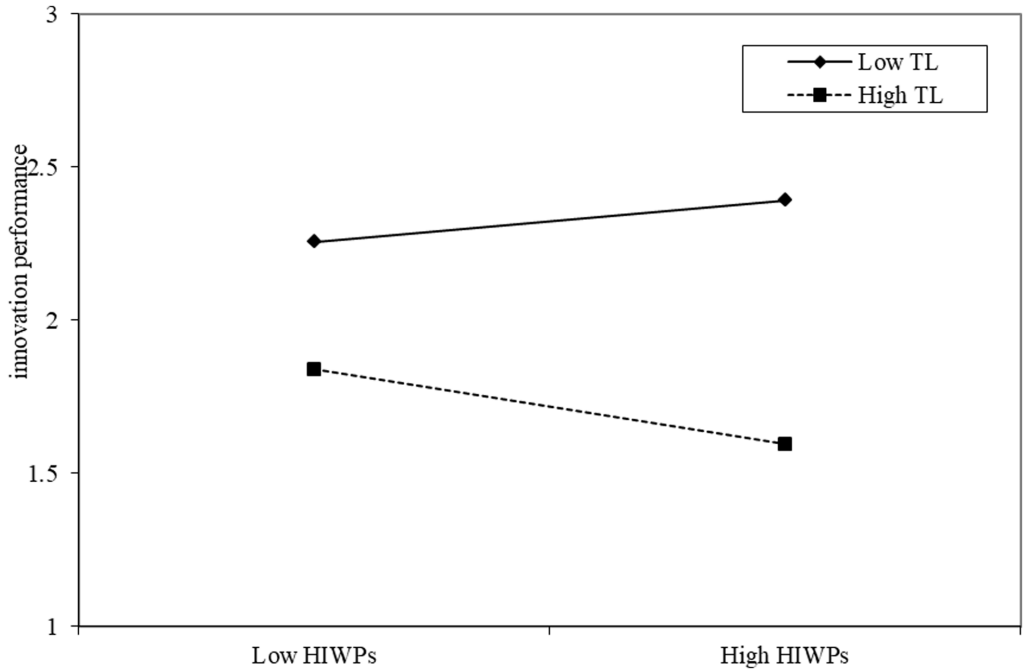


FIGURE 3
Moderating effects of transformational leadership.

transformational leadership weakens the predictive effect of high-involvement work practices on exploratory innovation to some extent. As shown in Figure 3, under low-level transformational leadership, high-involvement work practices positively influences elder employees' innovation performance, while under high-level transformational leadership; high-involvement work practices negatively influence elder employees' innovation performance. Therefore, transformational leadership moderates the influence of

high-involvement work practices on elder employees' innovation performance.

Test of moderated mediation

Table 5 shows the indirect effect of high-involvement work practices on elder employees' innovation performance under different levels of transformational leadership. If the 95% confidence interval does not include 0, the indirect effect can be judged to be significant. The results show that through exploratory innovation, the indirect effect of high-involvement work practices on elder employees' innovation performance is not significant (confidence interval [−0.037, 0.623]). Through exploitative innovation, the indirect curve effect of high-involvement work practices on elder employees' innovation performance is significant (confidence interval [−1.488, −0.288]). It can be concluded that transformational leadership moderates the high-involvement work practices through the inverted U-shaped influence of exploratory innovation on elder employees' innovation performance (confidence interval: [−0.328, −0.040]). Meanwhile, Figure 4 also shows the moderating effect of transformational leadership on the inverted U-shaped influence, and hypothesis H11 is supported. The U-shaped effect of exploitative innovation on elder employees' innovation performance (confidence interval: [−0.110, 0.142]) of transformational leadership in regulating high-involvement work practices is not supported, and hypothesis H12 is not supported.

Conclusion

Based on social exchange theory, 278 valid samples from three time points were used to investigate the influence of high-involvement work practices on older employees' innovation performance, as well as the non-linear effects of exploratory innovation and exploitative innovation on older employees' innovation performance (see Figure 5). The results show that: First, high-involvement work practices do not have a significant effect on elder employees' innovation performance.

TABLE 5 Indirect effects of high-involvement work practices on elder employees' innovation performance.

Indirect effect	Innovation performance	Indirect effect	Innovation performance
Exploratory innovation		Exploitative innovation	
Average level of indirect effects	[−0.548, 0.011]	Average level of indirect effects	[0.414, 1.796]
High level	[−0.403, 0.166]	High level	[0.277, 1.671]
Low level	[−0.717, −0.032]	Low level	[0.470, 1.833]
Exploratory innovation^2		Exploitative innovation^2	
Average level of indirect effects	[−0.037, 0.623]	Average level of indirect effects	[−1.488, −0.288]
High level	[−0.311, 0.437]	High level	[−1.568, −0.227]
Low level	[0.087, 0.839]	Low level	[−1.432, −0.318]

The meaning of the number 2 is square.

Second, high-involvement work practices have no significant effect on exploratory innovation; exploratory innovation has a significant U-shaped effect on older employees' innovation performance, i.e., as the level of exploratory innovation increases, older employees' innovation performance first decreases and then increases. High-involvement work practices have no significant effect on the innovation performance of older employees through exploratory innovation; high-involvement work practices have a significant positive effect on exploitative innovation; exploitative innovation has a significant inverted U-shaped effect on the innovation performance of older employees, i.e., as the level of exploitative innovation increases, the innovation performance of older employees first increases and then decreases. High-involvement work practices have an inverted U-shaped effect on innovation performance through exploitative innovation. Third, transformational leadership moderates the influence of high-involvement work practices on exploratory innovation, that is, the lower the level of transformational leadership, the stronger the predictive effect of high-involvement work practices on exploratory innovation; transformational leadership has no significant effect on the process of exploitative innovation in high-involvement work practices; transformational leadership moderates the influence of high-involvement work practices on older employees' innovation performance, that is, the lower the level of transformational leadership, the stronger the predictive effect of high-involvement work practices on older employees' innovation performance. Fourth, transformational leadership moderates the U-shaped influence of high-involvement work practices on older employees' innovation performance through exploratory innovation; the effect of transformational leadership on older employees' innovation performance through exploitative innovation in high-involvement work practices is not significant.

Theoretical implications

First, the main contribution of this research lies in its in-depth examination of how high-involvement work practices influence the innovation performance of older employees, thereby broadening the scope of research on the antecedents of innovation performance within this specific demographic group. Previous research in this area has primarily focused on the influence of individual (e.g., work experience and expertise) and leadership factors (e.g., managerial support) on elder employees' innovation performance (Jiang et al., 2021), often overlooking the important role that organizational practices play in shaping these outcomes. This research fills this gap by focusing on high-involvement work practices as a critical organizational factor. By exploring the ways in which these practices influence elder employees, this study provides a comprehensive understanding of the pathways of influence and the boundary conditions under which high-involvement work practices operate. This research highlights the importance of organizational practices in nurturing and capitalizing on the unique skills and experiences of elder employees.

Second, this study examines the mediating role of dual innovation - exploratory and exploitative innovation - in the relationship between high-involvement work practices and elder employees' innovation performance. Previous studies exploring the mechanisms of innovation performance formation often treat innovation as a singular concept (Mustafa et al., 2018; Rehman et al., 2019; De Clercq and Mustafa, 2023). However, exploratory innovation,

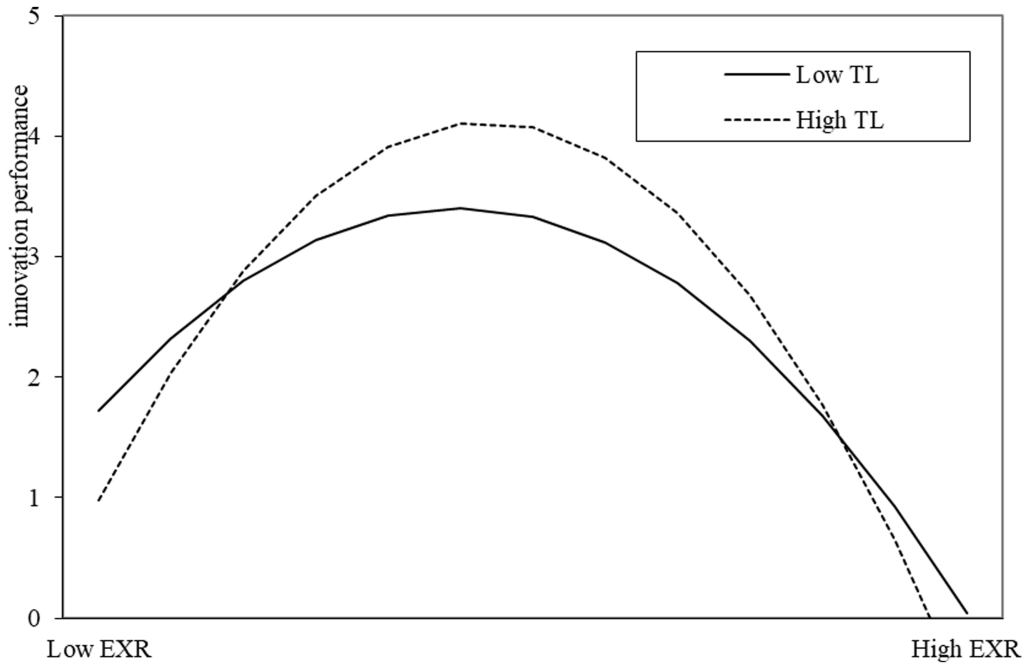


FIGURE 4
Inverted U-shaped moderating effect of transformational leadership.

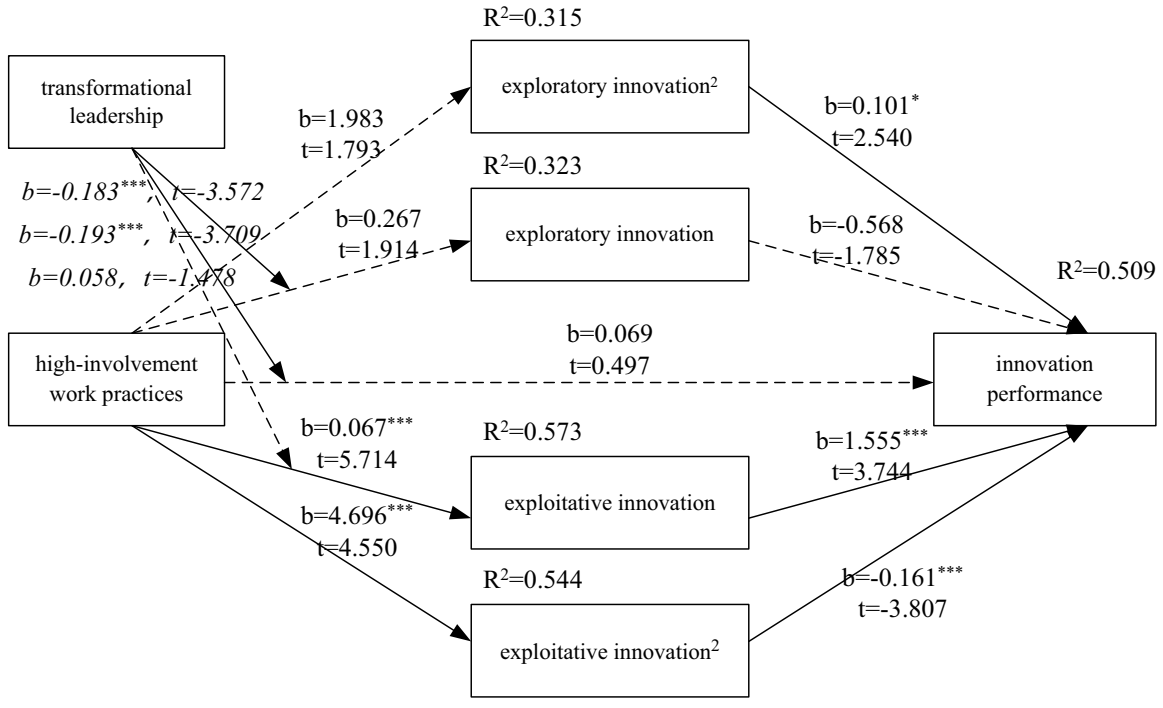


FIGURE 5
Research conclusion.

characterized by experimentation and venturing into new territories, and exploitative innovation, which focuses on refining and improving existing processes and products (Martínez-Del-Río et al., 2012), differ significantly in both approach and impact on innovation performance. This study recognizes and addresses these differences by moving away from the traditional linear research approach (Camps and Luna-Arocas, 2009; Prieto and Pilar Pérez Santana, 2012; Kilroy et al., 2020; Misnah et al., 2020b). It clarifies the non-linear effects of dual

innovation, thereby establishing a new link between high-involvement work practices and innovation performance, and highlights dual innovation as a critical transmission mechanism.

Finally, this study finds that transformational leadership moderates the influence of high-involvement work practices on exploratory innovation and innovation performance. Previous research has extensively documented that transformational leadership generally has a positive influence on employee behavior and organizational performance (Laursen and Salter, 2006). Such studies have highlighted how transformational leaders, through their inspirational vision, intellectual stimulation and individualized consideration, can increase employee motivation (Fernet et al., 2015), job satisfaction (Arnold, 2017) and ultimately organizational productivity (Kilroy et al., 2020). However, the current study takes a more nuanced approach by examining the role of transformational leadership within the specific context of human resource activities, with a particular focus on high-involvement work practices and their impact on elder employees' innovation performance. The results of this study present a more complex picture, suggesting that the effects of transformational leadership are not universally positive. This is consistent with the arguments of some scholars who have suggested potential limitations and drawbacks of transformational leadership (Guay and Choi, 2015; Arnold, 2017; Jiang and Chen, 2021). In high-involvement work settings, transformational leadership may inadvertently dampen the autonomy and creativity that these practices aim to enhance, particularly among elder employees. This finding provides further evidence for the contextual application of high-involvement work practices in enhancing the innovation performance of elder employees.

Practical implications

First and foremost, it is important to recognize that the high-involvement work practices adopted by organizations have a significant impact on the innovation behavior and performance of employees, especially older ones. This means devoting more time and resources to fostering a high-involvement work environment. Organizational leaders should set clear and achievable goals for elder employees encourage them to actively engage in intergenerational communication with other team members, and provide targeted training programs (Miao and Wu, 2021). These programs should be designed to equip elder employees with the necessary knowledge and skills that are aligned with their job roles and innovation opportunities (Bosch-Farré et al., 2020). In addition, managers should continuously seek ways to stimulate elder employees' innovation motivation by recognizing their unique experiences and insights. In this way, organizations can fully utilize the potential of elder employees, thereby enriching the overall innovation capacity of the organization.

Second, the study shows the importance of innovative ways to employees' innovative performance and different innovative ways have different effects on performance. The enterprise management personnel can combine own resources, the condition choice suitable innovation way. For enterprises with weak resources and capabilities, in order to improve short-term innovation efficiency, they can first choose utilization-type innovation, and gradually turn to explore the way of innovation with the improvement of resources and capabilities, improve competitiveness and increase revenue from innovation income.

Finally, companies can improve their management style to play a positive role in high-involvement work practices. For example, companies should pay attention to the choice of leadership style and develop their own innovation behavior to promote elder employees' innovation performance according to different management and innovation situations. For example, improving transformational leadership for exploitative innovation and reducing transformational leadership for exploratory innovation. Master the coordination of innovation and leadership in innovation management practice.

Limitations

Although this study follows scientific procedures in terms of model construction and research design, there are still some shortcomings due to resource constraints and other factors: First, due to geographical constraints, this study selected only some enterprises in Shandong Province for questionnaire survey, and the empirical results of enterprises in different regions may be different. Future studies can expand the distribution channels of questionnaires, increase the sample size and further analyze more random, diverse and universal samples to improve the universality of the study. Second, the employee self-assessment method was used to conduct the questionnaire survey. Although the three-stage questionnaire design can reduce the homogeneity error to some extent, the influence of individual subjective factors cannot be completely excluded. Future studies could try to use other assessments than the questionnaire survey and the up-down matching survey to reduce the homogeneity error through more objective data. Finally, methodological limitations lead to results that may not be convincing. Future studies can further explore the influence mechanism of high-involvement work practices on elder employees' innovation performance by combining experimental studies and full sample surveys, and by comparing data at different stages.

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.

Author contributions

DJ: Conceptualization, Methodology, Writing – review & editing. YZ: Data curation, Investigation, Writing – original draft. HZ: Writing – review & editing. XW: Resources, Supervision, Writing – original draft.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

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.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

Alegría, M., Carson, N., Flores, M., Li, X., Shi, P., Lessios, A. S., et al. (2014). Activation, self-management, engagement, and retention in behavioral health care. *JAMA Psychiatry* 71:557. doi: 10.1001/jamapsychiatry.2013.4519

Armstrong, J. S., and Overton, T. S. (1977). Estimating nonresponse bias in mail survey. *J. Mark. Res.* 14, 396–402. doi: 10.1177/002224377701400320

Arnold, K. A. (2017). Transformational leadership and employee psychological well-being: a review and directions for future research. *J. Occup. Health Psychol.* 22, 381–393. doi: 10.1037/ocp0000062

Ashforth, B. E., and Mael, F. (1989). Social identity theory and the organization. *Acad. Manag. Rev.* 14, 20–39. doi: 10.2307/258189

Babalola, M. T., Stouten, J., Camps, J., and Euwema, M. (2019). When do ethical leaders become less effective? The moderating role of perceived leader ethical conviction on employee discretionary reactions to ethical leadership. *J. Bus. Ethics* 154, 85–102. doi: 10.1007/s10551-017-3472-z

Becker, B., and Gerhart, B. (1996). The impact of human resource management on organizational performance: progress and prospects. *Acad. Manag. J.* 39, 779–801. doi: 10.2307/256712

Benner, M. J., and Tushman, M. L. (2003). Exploitation, exploration, and process management: the productivity dilemma revisited. *Acad. Manag. Rev.* 28, 238–256. doi: 10.2307/30040711

Bennett, N., and Lemoine, G. J. Data from: What VUCA really means for you. (2014). Available at: https://go.exlibris.link/wF3TPrPW

Bhawuk, D., and Brislin, R. (2001). Cross-cultural training: a review. *Appl. Psychol.* 49, 162–191. doi: 10.1111/1464-0597.00009

Bosch-Farré, C., Malagón-Aguilera, M. C., Ballester-Ferrando, D., Bertran-Noguer, C., Bonmatí-Tomàs, A., Gelabert-Vilella, S., et al. (2020). Healthy ageing in place: enablers and barriers from the perspective of the elderly. A qualitative study. *Int. J. Environ. Res. Public Health* 17:6451. doi: 10.3390/ijerph17186451

Camps, J., and Luna-Arocas, R. (2009). High involvement work practices and firm performance. *Int. J. Hum. Resour. Manag.* 20, 1056–1077. doi: 10.1080/09585190902850273

Cao, T. T., Le, P. B., and Nguyen, N. T. M. (2022). Impacts of high-involvement HRM practices on organizational innovation capability: the mediating mechanism of tacit and explicit knowledge sharing. *Int. J. Innov. Sci.* 14, 733–749. doi: 10.1108/IJIS-05-2021-0091

Chen, Y., Chang, C., and Lin, Y. (2014). The determinants of green radical and incremental innovation performance: green shared vision, green absorptive capacity, and green organizational ambidexterity. *Sustain. For.* 6, 7787–7806. doi: 10.3390/su6117787

Chen, C., Feng, J., Liu, X., and Yao, J. (2021). Leader humility, team job crafting and team creativity: the moderating role of leader–leader exchange. *Hum. Resour. Manag. J.* 31, 326–340. doi: 10.1111/1748-8583.12306

Chen, J., Simsek, Z., Liao, Y., and Kwan, H. K. (2022). CEO self-monitoring and corporate entrepreneurship: a moderated mediation model of the CEO-TMT interface. *J. Manag.* 48, 2197–2222. doi: 10.1177/01492063211048436

Chi, N., and Lin, C. Y. (2011). Beyond the high-performance paradigm: exploring the curvilinear relationship between high-performance work systems and organizational performance in Taiwanese manufacturing firms. *Br. J. Ind. Relat.* 49, 486–514. doi: 10.1111/j.1467-8543.2010.00778.x

Collins, M. H., Hair, J. J. F., and Rocco, T. S. (2009). The older-worker-younger-supervisor dyad: a test of the reverse Pygmalion effect. *Hum. Resour. Dev. Q.* 20, 21–41. doi: 10.1002/hrdq.20006

Cropanzano, R., and Mitchell, M. S. (2005). Social exchange theory: an interdisciplinary review. *J. Manag.* 31, 874–900. doi: 10.1177/0149206305279602

De Clercq, D., and Mustafa, M. J. (2023). How transformational leaders get employees to take initiative and display creativity: the catalytic role of work overload. *Pers. Rev.* doi: 10.1108/PR-02-2022-0090

Fernet, C., Trépanier, S., Austin, S., Gagné, M., and Forest, J. (2015). Transformational leadership and optimal functioning at work: on the mediating role of employees' perceived job characteristics and motivation. *Work Stress.* 29, 11–31. doi: 10.1080/02678373.2014.1003998

García-Morales, V. J., Jiménez-Barrionuevo, M. M., and Gutiérrez-Gutiérrez, L. (2012). Transformational leadership influence on organizational performance through organizational learning and innovation. *J. Bus. Res.* 65, 1040–1050. doi: 10.1016/j.jbusres.2011.03.005

Gordon, R. A., and Arvey, R. D. (2004). Age bias in laboratory and field settings: a meta-analytic investigation. *J. Appl. Soc. Psychol.* 34, 468–492. doi: 10.1111/j.1559-1816.2004.tb02557.x

Gu, Q., Tang, T. L., and Jiang, W. (2015). Does moral leadership enhance employee creativity? Employee identification with leader and leader–member exchange (LMX) in the Chinese context. *J. Bus. Ethics* 126, 513–529. doi: 10.1007/s10551-013-1967-9

Guay, R. P., and Choi, D. (2015). To whom does transformational leadership matter more? An examination of neurotic and introverted followers and their organizational citizenship behavior. *Leadersh. Q.* 26, 851–862. doi: 10.1016/j.leaqua.2015.06.005

Hauff, S., Krick, A., Klebe, L., and Felfe, J. (2022). High-performance work practices and employee wellbeing-does health-oriented leadership make a difference? *Front. Psychol.* 13:833028. doi: 10.3389/fpsyg.2022.833028

Huang, F. (2019). Will senior employees be willing to voluntarily transfer their knowledge to younger employees? The effect of perceived age discrimination and organizational identification. *J. Human Resource and Sustain. Stud.* 7, 244–260. doi: 10.4236/jhrss.2019.72015

Hughes, D. J., Lee, A., Tian, A. W., Newman, A., and Legood, A. (2018). Leadership, creativity, and innovation: a critical review and practical recommendations. *Leadersh. Q.* 29, 549–569. doi: 10.1016/j.leaqua.2018.03.001

Jansen, J. J. P., Van Den Bosch, F. A. J., and Volberda, H. W. (2006). Exploratory innovation, exploitative innovation, and performance: effects of organizational antecedents and environmental moderators. *Manag. Sci.* 52, 1661–1674. doi: 10.1287/mnsc.1060.0576

Janssen, O., and Yperen, N. W. V. (2004). Employees' goal orientations, the quality of leader-member exchange, and the outcomes of job performance and job satisfaction. *Acad. Manag. J.* 47, 368–384. doi: 10.2307/20159587

Jiang, D., and Chen, Z. (2021). Innovative enterprises development and employees' knowledge sharing behavior in China: the role of leadership style. *Front. Psychol.* 12:747873. doi: 10.3389/fpsyg.2021.747873

Jiang, K., Lepak, D. P., Hu, J., and Baer, J. C. (2012). How does human resource management influence organizational outcomes? A meta-analytic investigation of mediating mechanisms. *Acad. Manag. J.* 55, 1264–1294. doi: 10.5465/amj.2011.0088

Jiang, K., Zhang, Z., Hu, J., and Liu, G. (2021). Retirement intention of older workers: the influences of high-involvement work practices, individual characteristics, and economic environment. *Pers. Psychol.* 75, 929–958. doi: 10.1111/peps.12480

Kehoe, R. R., and Wright, P. (2010). The impact of high performance HR practices on employees' attitudes and behaviors. *J. Manag.* 39, 366–391. doi: 10.1177/0149206310365901

Kilroy, S., Bosak, J., Flood, P. C., and Peccei, R. (2020). Time to recover: the moderating role of psychological detachment in the link between perceptions of high-involvement work practices and burnout. *J. Bus. Res.* 108, 52–61. doi: 10.1016/j.jbusres.2019.10.012

Kilroy, S., Flood, P. C., Bosak, J., and Chênevert, D. (2016). Perceptions of high-involvement work practices and burnout: the mediating role of job demands: HIWPs in health care. *Hum. Resour. Manag. J.* 26, 408–424. doi: 10.1111/1748-8583.12112

Klonek, F. E., Gerpott, F. H., and Parker, S. K. (2023). A conceptual replication of ambidextrous leadership theory: an experimental approach. *Leadersh. Q.* 34:101473. doi: 10.1016/j.leaqua.2020.101473

Klotz, A. C., Bolino, M. C., Song, H., and Stornelli, J. (2018). Examining the nature, causes, and consequences of profiles of organizational citizenship behavior. *J. Organ. Behav.* 39, 629–647. doi: 10.1002/job.2259

Konovsky, M. A., and Pugh, S. D. (1994). Citizenship behavior and social exchange. *Acad. Manag. J.* 37, 656–669. doi: 10.2307/256704

Lamont, R. A., Swift, H. J., and Abrams, D. (2015). A review and meta-analysis of age-based stereotype threat: negative stereotypes, not facts, do the damage. *Psychol. Aging* 30, 180–193. doi: 10.1037/a0038586

Laursen, K., and Salter, A. (2006). Open for innovation: the role of openness in explaining innovation performance among U.K. manufacturing firms. *Strateg. Manag. J.* 27, 131–150. doi: 10.1002/smj.507

Liang, H., Saraf, N., Hu, Q., and Xue, Y. (2007). Assimilation of enterprise systems: the effect of institutional pressures and the mediating role of top management. *MIS Q.* 31, 59–87. doi: 10.2307/25148781

Li, C., and Shi, K. (2008). The structure and measurement of transformational leadership in China. *Front. Bus. Res. China.* 2, 571–590. doi: 10.1007/s11782-008-0032-5

Limaj, E., and Bernroider, E. W. N. (2019). The roles of absorptive capacity and cultural balance for exploratory and exploitative innovation in SMEs. *J. Bus. Res.* 94, 137–153. doi: 10.1016/j.jbusres.2017.10.052

Martínez-del-Río, J., Céspedes-Lorente, J., and Carmona-Moreno, E. (2012). High-involvement work practices and environmental capabilities: how HIWPS create environmentally based sustainable competitive advantages. *Hum. Resour. Manag.* 51, 827–850. doi: 10.1002/hrm.21505

Men, C., Fong, P. S. W., Huo, W., Zhong, J., Jia, R., and Luo, J. (2020). Ethical leadership and knowledge hiding: a moderated mediation model of psychological safety and mastery climate. *J. Bus. Ethics* 166, 461–472. doi: 10.1007/s10551-018-4027-7

Miao, J., and Wu, X. (2021). Subjective wellbeing of Chinese elderly: a comparative analysis among Hong Kong, urban China and Taiwan. *Ageing Soc.* 41, 686–707. doi: 10.1017/S0144686X19001272

Misnah, M., Abdullah, N. H., Zeb, A., and Othayman, M. B. (2020). Competing value framework model of organizational culture and job performance an examination of the mediating role of HPHR practices. *Int. J. Services and Operations Manag.* 1:1. doi: 10.1504/IJSOM.2020.10030852

Mustafa, M., Gavin, F., and Hughes, M. (2018). Contextual determinants of employee entrepreneurial behavior in support of corporate entrepreneurship: a systematic review and research agenda. *J. Enterp. Cult.* 26, 285–326. doi: 10.1142/S0218495818500115

Paré, G., and Tremblay, M. (2007). The influence of high-involvement human resources practices, procedural justice, organizational commitment, and citizenship behaviors on information technology professionals' turnover intentions. *Group Org. Manag.* 32, 326–357. doi: 10.1177/1059601106286875

Podsakoff, P. M., MacKenzie, S. B., Lee, J., and Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J. Appl. Psychol.* 88, 879–903. doi: 10.1037/0021-9010.88.5.879

Prieto, I. M., and Pilar Pérez Santana, M. (2012). Building ambidexterity: The role of human resource practices in the performance of firms from Spain. *Hum. Resour. Manag.* 51, 189–211. doi: 10.1002/hrm.21463

Quintus, M., Egloff, B., and Wrzus, C. (2017). Predictors of volitional personality change in younger and older adults: response surface analyses signify the complementary perspectives of the self and knowledgeable others. *J. Res. Pers.* 70, 214–228. doi: 10.1016/j.jrp.2017.08.001

Rehman, W. U., Ahmad, M., Allen, M. M. C., Raziq, M. M., and Riaz, A. (2019). High involvement HR systems and innovative work behaviour: the mediating role of psychological empowerment, and the moderating roles of manager and co-worker support. *Eur. J. Work Organ. Psychol.* 28, 525–535. doi: 10.1080/1359432X.2019.1614563

Ryan, R. M., and Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am. Psychol.* 55, 68–78. doi: 10.1037/0003-066X.55.1.68

Schmader, T., Johns, M., and Forbes, C. (2008). An integrated process model of stereotype threat effects on performance. *Psychol. Rev.* 115, 336–356. doi: 10.1037/0033-295X.115.2.336

Sharot, T., and Sunstein, C. R. (2020). How people decide what they want to know. *Nat. Hum. Behav.* 4, 14–19. doi: 10.1038/s41562-019-0793-1

Shin, D., Woodwark, M. J., Konrad, A. M., and Jung, Y. (2022). Innovation strategy, voice practices, employee voice participation, and organizational innovation. *J. Bus. Res.* 147, 392–402. doi: 10.1016/j.jbusres.2022.04.015

Song, L. J., Tsui, A. S., and Law, K. S. (2009). Unpacking employee responses to organizational exchange mechanisms: the role of social and economic exchange perceptions. *J. Manag.* 35, 56–93. doi: 10.1177/0149206308321544

Tipu, S. A. A., Ryan, J. C., and Fantazy, K. A. (2012). Transformational leadership in Pakistan: an examination of the relationship of transformational leadership to organizational culture and innovation propensity. *J. Manag. Organ.* 18, 461–480. doi: 10.5172/jmo.2012.18.4.461

Tortia, E. C., Sacchetti, S., and López-Arceiz, F. J. (2022). A human growth perspective on sustainable HRM practices, worker well-being and organizational performance. *Sustain. For.* 14:11064. doi: 10.3390/su141711064

Valentinov, V., and Hajdu, A. (2019). Integrating instrumental and normative stakeholder theories: a systems theory approach. *J. Organ. Chang. Manag.* 34, 699–712. doi: 10.1108/JOCM-07-2019-0219

Vandenberg, R. J., Richardson, H. A., and Eastman, L. J. (1999). The impact of high involvement work processes on organizational effectiveness. *Group Org. Manag.* 24, 300–339. doi: 10.1177/1059601199243004

Wang, Z., Cui, T., Cai, S., and Ren, S. (2022). How and when high-involvement work practices influence employee innovative behavior. *Int. J. Manpow.* 43, 1221–1238. doi: 10.1108/IJM-11-2020-0531

Wang, X. H., and Howell, J. M. (2010). Exploring the dual-level effects of transformational leadership on followers. *J. Appl. Psychol.* 95, 1134–1144. doi: 10.1037/a0020754

Ward, M., May, P., Normand, C., Kenny, R. A., and Nolan, A. (2021). Mortality risk associated with combinations of loneliness and social isolation. Findings from the Irish longitudinal study on ageing (TILDA). *Age Ageing* 50, 1329–1335. doi: 10.1093/ageing/afab004

Waseem, M., Ali, S., Bilal, H., and Khan, A. A. (2020). High involvement management practices and employees' OCBs in banking sector of Pakistan. *J. Account. Finance in Emerg. Econ.* 6, 529–538. doi: 10.26710/jafee.v6i2.1229

Wayne, S. J., Shore, L. M., and Liden, R. C. (1997). Perceived organization support and leader-member exchange: a social exchange perspective. *Acad. Manag. J.* 40, 82–111. doi: 10.2307/257021

Weber, E., Büttgen, M., and Bartsch, S. (2022). How to take employees on the digital transformation journey: an experimental study on complementary leadership behaviors in managing organizational change. *J. Bus. Res.* 143, 225–238. doi: 10.1016/j.jbusres.2022.01.036

White, S. F., Pope, K., Sinclair, S., Fowler, K. A., Brislin, S. J., Williams, W. C., et al. (2013). Disrupted expected value and prediction error signaling in youths with disruptive behavior disorders during a passive avoidance task. *Am. J. Psychiatry* 170, 315–323. doi: 10.1176/appi.ajp.2012.12060840

Woodman, R. W., Sawyer, J. E., and Griffin, R. W. (1993). Toward a theory of organizational creativity. *Acad. Manag. Rev.* 18, 293–321. doi: 10.2307/258761

Woods, S. A., Mustafa, M. J., Anderson, N., and Sayer, B. (2018). Innovative work behavior and personality traits: examining the moderating effects of organizational tenure. *J. Manag. Psychol.* 33, 29–42. doi: 10.1108/JMP-01-2017-0016

Wright, B. E., and Pandey, S. K. (2009). Transformational leadership in the public sector: does structure matter? *J. Publ. Adm. Res. Theory* 20, 75–89. doi: 10.1093/jopart/mup003

Zeb, A., Akbar, F., Hussain, K., Safi, A., Rabnawaz, M., and Zeb, F. (2021a). The competing value framework model of organizational culture, innovation and performance. *Bus. Process. Manag. J.* 27, 658–683. doi: 10.1108/BPMJ-11-2019-0464

Zeb, A., Goh, G. G. G., Javaid, M., Khan, M. N., Khan, A. U., and Gul, S. (2022). The interplay between supervisor support and job performance: implications of social exchange and social learning theories. *J. Appl. Res. High. Educ.* 15, 429–448. doi: 10.1108/JARHE-04-2021-0143

Zeb, A., Rehman, F. U., Imran, M., Ali, M., and Almansoori, R. G. (2020). Authentic leadership traits, high-performance human resource practices and job performance in Pakistan. *Int. J. Public Leadersh.* 16, 299–317. doi: 10.1108/IJPL-02-2020-0011

Zeb, A., Ur Rehman, F., Arsalan, Y., and Usman Khan, M. (2021b). Does organizational justice enhance job performance through high-performance human resource practices? WPOM-working pap. *Oper. Manag.* 12, 16–40. doi: 10.4995/wpom.15497

frontiers | Frontiers in Psychology

TYPE Hypothesis and Theory
PUBLISHED 08 March 2024
DOI 10.3389/fpsyg.2024.1278996

Check for updates

OPEN ACCESS

EDITED BY
Mike James Mustafa,
University of Nottingham Malaysia, Malaysia

REVIEWED BY
Sheng Huang,
University of Nottingham Malaysia Campus, Malaysia
Siti Khadijah Zainal Badri,
University of Nottingham Malaysia Campus, Malaysia

*CORRESPONDENCE
Zixuan Meng
✉ zixuameng4-c@my.cityu.edu.hk

RECEIVED 18 August 2023
ACCEPTED 20 February 2024
PUBLISHED 08 March 2024

CITATION
Yang X, Zhang M, Meng Z, Shen Y and Du X (2024) Cross-level transformation of creativity from entrepreneurs to organizations. *Front. Psychol.* 15:1278996. doi: 10.3389/fpsyg.2024.1278996

COPYRIGHT
© 2024 Yang, Zhang, Meng, Shen and Du. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Cross-level transformation of creativity from entrepreneurs to organizations

Xiu Yang[1], Meng Zhang[2], Zixuan Meng[3]*, Yingxian Shen[4] and Xiaomin Du[5]

[1]Accounting and Auditing College, Guangxi University of Finance and Economics, Nanning, China, [2]Business School, Shandong Normal University, Jinan, China, [3]Management Science Department, City University of Hong Kong, Hong Kong, Hong Kong SAR, China, [4]Management School, Hainan University, Haikou, China, [5]International Business School, Hainan University, Haikou, China

With the intensification of competition in the business environment, organizational creativity is increasingly becoming crucial for organizations to build competitive advantages and promote organizational development. For innovative enterprises, their entrepreneurs largely determine the development orientation of the enterprise. They are one of the most critical factors determining the level of corporate innovation, but there need to be more effective creativity transformation path to pursue innovation development. The findings in this study show that entrepreneurial individual creativity has a significant positive effect on organizational creativity, platform leadership mediates the path of creativity transformation across hierarchical levels, and organizational culture has positive moderating effect between platform leadership and organizational creativity. The study results explain the transformation mechanism of creativity from the entrepreneur's perspective, expand the potential transformation path of organizational creativity, and are instructive for enhancing organizational creativity.

KEYWORDS

entrepreneurial individual creativity, organizational creativity, platform leadership, organizational culture, cross-level transformation of creativity

1 Introduction

In an innovation-driven society, creativity is increasingly becoming the critical element in driving organizational development (Makri and Scandura, 2010; Woods et al., 2018). More and more organizations seek to create unique competitive advantages through innovation to survive and thrive in the competitive business environment (Parjanen, 2012; Blomberg et al., 2017). Most innovative companies are still in the early stage of development and need more significant certainty and clarity. The level of organizational creativity largely determines the development prospects of innovative companies (Chang and Chen, 2020). Entrepreneurial individual creativity is the source of innovation, and organizational creativity is the key to maintaining innovation drive and competitive advantage, which together determine the level of innovation of the firm (Pirola-Merlo and Mann, 2004; Yeh-Yun Lin and Liu, 2012). Therefore, it is important to explore the transformation path from entrepreneurial individual creativity to organizational creativity to develop innovative industries (Chang and Chen, 2020).

However, there are still three areas for improvement in the current research on organizational creativity. First, existing research is more concerned with the transformation path of creativity from employees to the organization, but recruiting only creative employees does not meet the organization's need in terms of innovation

(Blomberg et al., 2017). And entrepreneurs are employees with special status and positions, with far more power and influence than ordinary employees (Hughes et al., 2018). Still, only some have explored the extent to which the individual creativity traits of entrepreneurs affect the level of innovation in the company, which is not conducive to the further improvement of the level of organizational creativity (Moultrie and Young, 2009; Gao et al., 2020). Second, scholars have explored the mechanisms of their effects on creativity in terms of leadership types, such as Lutz Allen et al. (2013) and Herrmann and Felfe (2014), who explored the relationship between transformational as well as aissez-faire leadership and organizational creativity (Lutz Allen et al., 2013; Herrmann and Felfe, 2014). However, platform leadership still lacks an effective transformation path in the process of transformation from individual creativity to organizational creativity. There needs to be research to confirm whether platform leadership can carry the transformation between the two, and this research situation is not conducive to further expanding the potential paths and transformation mechanisms of creativity from the perspective of leadership types. Finally, organizational culture is usually studied as a driver of organizational creativity. Still, existing studies paid less attention to whether organizational culture interacts with other drivers in the transformation path of creativity, and the role of organizational culture in the path from leadership type to organizational creativity still needs to be further studied (Chitsazan et al., 2017).

To address the research gaps mentioned above, the main tasks of this study are as follows: First, due to the special status and influence of entrepreneurs, this paper explored the mechanism of their roles in the transformation path of organizational creativity from the perspective of entrepreneurial individual creativity, and confirmed that they are the direct drivers of organizational creativity and can motivate entrepreneurs to adopt a platform leadership thus further contributing to the enhancement of organizational creativity. Secondly, platform leadership emphasizes equality and shared relationships among members of the organization, which is conducive to employees following the leader to achieve the company's objective and enhance the organization's creativity. Moreover, because of its role as a link between the upper and lower levels of the organization, platform leadership can take over the transformation of entrepreneurial individual creativity to organizational creativity, i.e., platform leadership plays a mediating role in the transformation path of creativity. Finally, this paper reveals the mechanism between platform leadership, organizational culture and organizational creativity, and explores the moderating role of organizational culture. In transforming from platform leadership to organizational creativity, organizational culture plays a positive moderating role, leading to the further improvement of organizational creativity. The theoretical foundations of this study include Social Cognitive Theory and Social Information Processing Theory. Social Cognitive Theory emphasizes that behavior can shape the environment and that individuals can adjust their attitudes and behaviors based on signals released in the environment. Namely, individuals are not only the shaper of organizational environment, but also the product of organizational environment at the same time (Schunk and DiBenedetto, 2020). And Social Information Processing Theory highlights how individuals adjust themselves to be congruent with the environment based on the information they gather from it. The prerequisite of Social Information Processing Theory is that individual would adjust their behavior and attitude based on social environment, which means we can predict and manage the behavior of organizational member based on organizational environment (Meyer, 1994).

This study aims to explore the pathways of creativity transformation through a survey conducted among members of innovative Chinese enterprises. By investigating this specific organizational context, the research seeks to gain valuable insights into the process of converting creativity into innovation. This study established and improved a cross-level transformation model of organizational creativity from an entrepreneurial perspective, explored entrepreneurial individual creativity as an antecedent factor, and confirmed the positive moderating role of organizational culture in the transformation path of platform leadership and organizational culture. Through the questionnaire survey administered to organizational members and entrepreneur, this study aims to examine the factors and mechanisms that facilitate or hinder the transformation of creative ideas into tangible outcomes within Chinese companies. By identifying the unique pathways and challenges in this context, this research can contribute to a better understanding of the dynamics of creativity transformation and inform strategies to promote innovation in Chinese enterprises.

2 Research framework and hypothesis

According to existing researches, the level of organizational creativity depends on entrepreneurial individual creativity, platform leadership, and organizational culture (Andleeb et al., 2019; Schunk and DiBenedetto, 2020; Yang et al., 2022). Based on Social Cognitive Theory and Social Information Processing Theory, this paper established a cross-level creativity transformation model from entrepreneurs to organizations, this study's theoretical model and hypotheses are shown in Figure 1.

Creativity is a kind of intangible asset without specific measurements, which is the source of organizational innovation and the key to winning in competition (Baron and Tang, 2011; Andleeb et al., 2019). For innovative firms, it is even more important to rely on creativity to attract potential customers, (Ramos et al., 2022) and thus increase the market share of the firm to win in the business competition (Pagano et al., 2018). Entrepreneurial individual creativity refers to the ability of entrepreneurs to produce new ideas of practical significance through appropriate information and knowledge (Zampetakis and Moustakis, 2006). According to the Social Cognitive Theory, individuals will pursue innovative entrepreneurial goals if they believe their creativity can achieve the desired results (Schunk and DiBenedetto, 2020). According to the Social Information Processing Theory, entrepreneurs, as leaders of innovative enterprises, are important sources of information in the organization, able to provide a variety of information and

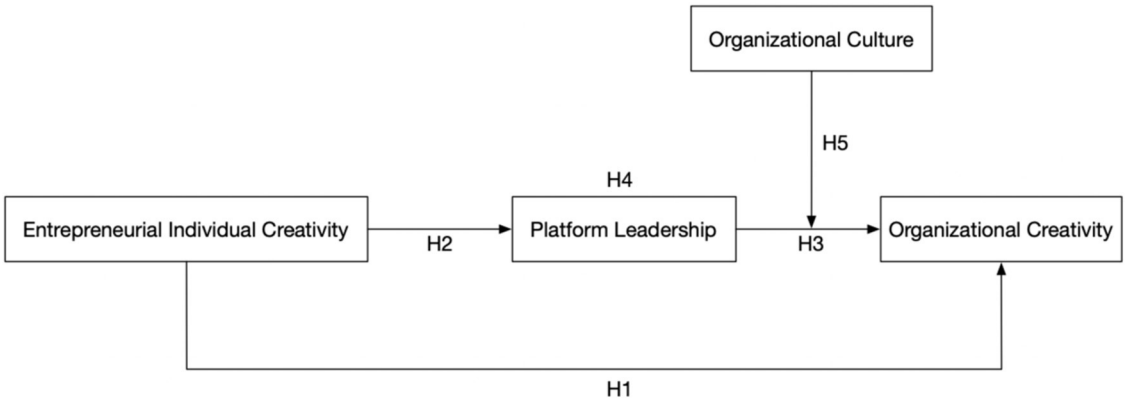


FIGURE 1
Cross-level creativity transformation model from entrepreneurs to organizations.

resources to organizational members, and able to influence the attitudes and behaviors of organizational members (Meyer, 1994). As entrepreneurs are different from ordinary employees in terms of influence and power, their creativity largely affects the overall level of creativity of the organization, the higher the individual creativity of entrepreneurs, the higher the organizational creativity and innovation potential that they can unleash (Yeh-Yun Lin and Liu, 2012; Xu and Zhao, 2020). Therefore, this paper proposes the following hypotheses:

H1: Entrepreneurial individual creativity is positively correlated with organizational creativity.

Platform leadership is grounded on the construction of digital information platform, highlighting the importance of entrepreneurs dynamically stimulating the inherent qualities of their employees through their inclusive attributes and personal charisma in a top-down fashion (Yang et al., 2022). Platform leadershipaims to foster change-oriented behaviors, ultimately leading to the collective development of employees, entrepreneurs, and the organization (Yang et al., 2022). According to Social Information Processing Theory, entrepreneurs are important sources of information in organizational contexts and can provide various information resources within the organization (Xu and Zhao, 2020). Since the risks faced in the process of innovation and entrepreneurship are unknown, the material resources, information resources , and organizational support provided by the organization can help organizational members to reduce their fear and aversion to risk (Catalano et al., 2018). To allow organizational members to give full play to their creativity, and to form the organizational atmosphere of proactive change within the organization, entrepreneurs tend to send signals of innovation to organizational members utilizing the digital information platform. These platforms have powerful data integration capabilities, which can positively influence the performance of creativity within the organization (Benitez et al., 2022). By leveraging these platforms, entrepreneurs can send signals of innovation to organizational members, encouraging them to embrace and contribute to a culture of creativity and change, which will help them to form a benign atmosphere of innovation (Yang et al., 2022). Therefore, this paper proposes the hypothesis:

H2: Entrepreneurial individual creativity is positively correlated with platform leadership.

Organizational creativity refers to the innovative perspectives implemented to achieve the enhancement of production, processes, and services, which can improve organizational performance and increase the core competitiveness of the enterprise to achieve substantial development of the enterprise (OUARI and Lefkir, 2022). Existing studies have shown that, at the organizational level, leadership type is an important factor influencing organizational innovation behavior (Khedhaouria et al., 2015). While the platform leadership emphasizes the equal and shared relationship between organizational members, it can adopt a bottom-top approach to lead employees, respond to changes in the external environment of the organization, and ultimately promote the achievement of organizational goals (Morris et al., 2005). Organizations adopting platform leadership can establish an information platform that integrates resources from all parties, shapes the organizational learning atmosphere, and thus motivates organizational members to share information, which is conducive to the implementation of innovation at the organizational level (Yang et al., 2022). Therefore, this paper proposes the hypothesis:

H3: Platform leadership is positively correlated with organizational creativity.

Entrepreneurial individual creativity is the ability of entrepreneurs to find new opportunities, or to transform ideas into actual organizational outputs (Fillis and Rentschler, 2010). At present, there is a lack of effective transformation mechanism between entrepreneurial individual creativity and organizational creativity, so this paper introduces platform leadership to explore its role in the transformation path from entrepreneurial creativity to organizational creativity. With the development of information network technology, the external environment faced by innovation-oriented enterprises has become more unpredictable, and to seek survival and development in

this environment, entrepreneurs expect organizations to show a trend of decentralization and de-leadership (Vaara et al., 2021). Platform leadership focuses on building a digital information platform within the organization, which is characterized by inclusiveness, personal charisma, platform building, change planning, platform optimization, and common growth, and can achieve the mutual development of employees, entrepreneur, and organization, as well as integrating more high-quality resources to enhance the level of creativity of the entire organization (Yang et al., 2022). According to the Social Exchange Theory, the two parties who establish a social exchange relationship follow the principle of reciprocity. If the organization can give enough authorization, resources, and platform to its members, in exchange, the employees will also enhance their sense of responsibility and belonging to the organization, which will stimulate the initiative of the organization members to innovate, and further enhance the organization's overall level of creativity (Fuller et al., 2006). Platform leadership emphasizes support, tolerance, and understanding of organizational members, and when organizational members feel organizational support, it can reduce their negative emotions such as fear and dissatisfaction about the risks involved in innovation work (Eisenberger et al., 2020). According to the Social Information Processing Theory, within an organization, information affects the behavior of organizational members by influencing individual perceptions (Meyer, 1994). Therefore, platform leadership can enhance the power of entrepreneurial individual creativity , which is conducive to the development of innovation within the organization, and the further enhancement of the organization's overall level of creativity. Therefore, this paper proposes the hypothesis:

H4: Platform leadership mediates between entrepreneurial individual creativity and organizational creativity.

Organizational culture is a kind of umbrella term for beliefs about shared values that can shape behavioral norms within an organization and create an organizational way of life (Al Shehri et al., 2017). Organizational culture can play a supportive, interactive, sharing role within the organization, which can motivate organizational members to think creatively and be oriented to work creatively, a strong organizational culture is the key to motivating organizational members to think and act creatively (Andleeb et al., 2019). If the organization expects to be able to form an the innovative atmosphere within the organization, it is necessary to make its organizational culture sufficiently flexible to provide the organization members with the opportunity to think and behave creatively. If the organization expects to form an innovative atmosphere within the organization, it is necessary to make its organizational culture flexible enough to provide a comfortable and flexible working environment and atmosphere for the members, to enhance their sense of responsibility and sense of belonging to the organization (De Clercq and Mustafa, 2023), which is conducive to the development of innovative work within the organization, and thus enhance the level of organizational creativity for the whole (Jeong et al., 2017). According to Bandura's Reciprocal Determinism, organizational culture is one of the key factors driving the innovative and entrepreneurial behaviors of organizational members (Zhao et al., 2020). Under the influence of the robust organizational culture, entities that embrace platform leadership can exhibit heightened inclusiveness in navigating the challenges associated with innovation and entrepreneurship (De Clercq and Mustafa, 2023). This fosters an environment conducive to alleviating employees' feelings of insecurity and fear associated with the risks posed by innovation. Guided by platform leadership, the organization becomes more dedicated to the strategic planning and execution of innovative initiatives, thereby bolstering the overall level of organizational creativity (Carmeli et al., 2014). Therefore, this paper proposes the hypothesis:

H5: Organizational culture positively regulates the relationship between platform leadership and organizational creativity.

3 Materials and methods

3.1 Data collection

In the competitive business environment, creativity is the key for enterprises, especially innovative enterprises, aiming to build core competitiveness and realize their survival and development. Therefore, in this paper, entrepreneurs and organization members of innovative enterprises were selected as survey respondents, encompassing different developing levels of enterprises located in representative cities in the north, middle, and southeast of China. And online questionnaires were generated using the Questionnaire Star platform, corresponding links and QR codes of the questionnaires were sent through social platforms, such as WeChat and QQ, to invite the respondents to access the questionnaires. The questionnaire collection lasted ten months from January 2023 to November 2023, and 458 valid samples were obtained. The descriptive statistics of the samples are shown in Table 1.

3.2 Variable measurement

In order to guarantee the reliability and validity of the measurement scales, the items of the mature measurement scales were selected for this study and refined with the context and characteristics of the study. The scales in this paper are all scored on Likert 5-point scale, with 1–5 indicating from fully inconsistent to fully consistent.

1. Entrepreneurial individual creativity.
   According to Gao et al. (2021), entrepreneurial individual creativity contains five items (Gao et al., 2021).
2. Platform leadership.
   Drawing on the scale of Yang et al. (2022) and other scholars, platform leadership is measured in six dimensions: tolerance, charisma, platform building, revolution planning, platform optimization, and mutual growth (Yang et al., 2022). In total, this measure contains 25 items..
3. Organizational creativity.
   Drawing on the scale of Gao et al. (2021) to measure organizational creativity, the measure contains a total of five items (Gao et al., 2021).

10.3389/fpsyg.2024.1278996

TABLE 1 Characteristics of research sample (N = 458).

Control variables	Item	Frequence	Percentage	Control variables	Item	Frequence	Percentage
Gender	Male	239	52.18	Industry	Advertising	57	12.45
	Female	219	47.82		Design	85	18.56
Age	<=30	122	26.64		Software	65	14.19
	30–35	94	20.52		Filming and TV	53	11.57
	36–40	91	19.87		Music and painting	51	11.14
	41–45	76	16.59		Publishing and performing arts	47	10.26
	>=46	75	16.38		Others	100	21.83
Educational background	High school	80	17.47	Years of establishment	<=1	71	15.50
	Bachelor	138	30.13		1–3	80	17.47
	Master and Doctor	126	27.51		3–5	94	20.52
	Others	114	24.89		5–10	111	24.24
Working Seniority	<=2	110	24.02		>=10	102	22.27
	2–4	106	23.14	Firmsize	<=100	81	17.69
	5–8	85	18.56		101–200	109	23.80
	9–15	66	14.41		201–300	98	21.40
	>=16	91	19.87		301–500	67	14.63
					>500	103	22.49

4. Organizational culture.
   Based on Anne Kennan et al. (2006), this study measured organizational culture in five dimensions, development of employees, interpersonal harmony, customer orientation, social responsibility, and dare to innovate (Anne Kennan et al., 2006; Tsui et al., 2006). Organizational culture contains a total of 23 items.

3.3 Reliability and validity tests

Descriptive statistics and correlation coefficients are shown in Table 2. The results show that there is a positive correlation between entrepreneurial individual creativity and platform leadership (cor = 0.195, p<0.01), a positive correlation between entrepreneurial individual creativity and organizational creativity (cor = 0.228, p<0.01), and a positive correlation between platform leadership and organizational creativity (cor = 0.302, p<0.01), and that the above results initially validate the hypotheses H1, H2, and H3.

According to Table 3, the Cronbach's α values for the four variables were >0.9, making them suitable for further confirmatory factor analysis.

As shown in Table 4, the confirmatory factor analysis was conducted using SPSS 27.0 for scales of this study and the validity test was performed directly. The results showed that the standardized load factors were all within the acceptable range (>0.600), which indicates that there is a strong correlation between the latent variables and the analytic item measures. The value of CR>0.900, indicating high convergent validity, and KMO>0.70, which indicates that the validity of the study data is feasible.

4 Empirical testing and analysis

4.1 Research method selection

The purpose of this study is to explore the cross-level transformation path and mechanism from entrepreneurial individual creativity to organizational creativity. According to the existing research, this paper explores the transformation of organizational creativity from entrepreneurial individual creativity, platform leadership and organizational culture. This paper adopts multilevel regression analysis to analyze the correlation between variables, the core of multilevel regression analysis is still regression analysis, but it can be divided into multiple layers, which is conducive to exploring whether the newly put variables have explanatory strength for the model. In this paper, the PROCESS tool is used to test the mediating effect and moderating effect, and the Bootstrap method is adopted to sample the mediating effect, and an estimated confidence interval is constructed by

TABLE 2 Descriptive statistics results with correlation coefficients.

Variable	Average	Standard deviation	1	2	3	4
1 Entrepreneurial individual creativity	3.697	1.024	1			
2 Platform leadership	3.620	0.718	0.195**	1		
3 Organizational culture	3.661	0.681	0.228**	0.302**	1	
4 Organizational creativity	3.722	0.838	0.458**	0.411**	0.211**	1

**p<0.01(two-tailed test).

TABLE 3 Reliability Test Results.

Variables	Items	Cronbach α	CR
Entrepreneurial Individual Creativity	5	0.920	0.925
Platform Leadership	25	0.957	0.957
Organizational Culture	23	0.949	0.949
Organizational Creativity	4	0.842	0.851

sampling with put-back, which is a more efficient method and has no restriction on the distribution of mediating samples.

4.2 Correlation test

In this paper, hypotheses were tested using multilevel regression using SPSS 27.0 software. As shown in Table 5, the multilevel regression analysis for organizational creativity involves a total of three models. The explained variable of the model is organizational creativity, and the independent variables of model 1 are control variables (gender, age, educational background, working seniority, industry, years of establishment, and firmsize), and model 1 examines the effects of the control variables. Model 2 adds entrepreneurial individual creativity on the basis of model 1, and the results show that there is a significant positive correlation between entrepreneurial individual creativity and organizational creativity (β = 0.376, p <0.001), and H1 is proved. Model 3 adds platform leadership on the basis of model 2, and the results show that there is a significant positive correlation between platform leadership and organizational creativity (β=0.387, p <0.001), and H3 is proved.

As shown in Table 5, the multilevel regression analysis for platform leadership involves two models. Among them, the independent variables in Model 4 are control variables (gender, age, educational background, working seniority, industry, years of establishment, firmsize), and Model 5 adds entrepreneurial individual creativity on the basis of Model 4. The explained variable of this model is platform leadership, and the results show that there is a significant positive correlation between entrepreneurial individual creativity and platform leadership (β= 0.148, p <0.01), and H2 is proved.

4.3 Mediation effect test

This paper was validated using the PROCESS tool in SPSS 27.0. The results are shown in Table 6, under the measurement of Bootstrap method with 5,000 times of repeated sampling, the coefficient of entrepreneurial individual creativity to platform leadership is 0.1374, and the coefficient of platform leadership to organizational creativity is 0.3895 in 95% confidence range, after calculating 0.1379*0.3892 $\approx$ 0.0537, which is consistent with the results of the analysis results, and together with the confidence interval (LLCI=0.0256, ULCI=0.0846) does not contain 0, which means that it is proved that platform leadership can act as a mediating variable and play a significant mediating effect between entrepreneurial individual creativity and organizational creativity, and H4 is confirmed.

4.4 Moderation effect test

In this paper, the multilevel regression in SPSS 27.0 was used to conduct the effect test with moderated mediating utility, and the control variables were tested together, and the results are shown in Table 7, the effect value of the interaction term (platform leadership × organizational culture) is 0.108, and the p-value is 0.047 which is less than 0.05, indicating that organizational culture has a significant effect on the relationship between in platform leadership and organizational creativity is significant.Therefore, organizational culture can play a positive moderating role between platform leadership and organizational creativity, H5 has been proved.

5 Discussion

This study established a cross-level creativity transformation model from entrepreneurs to organizations based on social cognitive theory and social information processing theory. Overall, the cross-level creativity transformation model expands the potential paths of creativity transformation and improves the research on platform leadership and organizational culture in the mechanism of creativity transformation. This study presents a robust predictive ability for organizational creativity, which can well reflect the formation causes and transformation paths of organizational creativity. The research findings of this study are threefold:

10.3389/fpsyg.2024.1278996

TABLE 4 Scale items and validity tests.

Factor (latent variable)	Measurement items (significan variables)	Standard load factor
Entrepreneurial individual creativity (KMO=0.885, CR=0.925)		
EIC1	I usually search out new creative elements and inspiration, and then utilize those ideas in my creative business.	0.861
EIC2	I am not afraid to take risks.	0.903
EIC3	I usually suggest new ways to achieve goals and objectives.	0.899
EIC4	I often have a fresh approach to problems.	0.907
EIC5	In general, I am a good source of creative ideas.	0.620
Platform leadership (KMO=0.955, CR=0.957)		
Tolerance		
PL1	My leader does not mind if his subordinates are better than himself in some aspects.	0.616
PL2	My leader does not mind occasional mistakes in his subordinates' work.	0.622
PL3	My leader does not mind sharing honors and opportunities with his subordinates.	0.610
PL4	My leader does not mind and often encourages his subordinates to give him advice.	0.668
PL5	My leader respects his subordinates' differences in personalities and abilities.	0.654
Charisma		
PL6	My leader always stays positive in good times and bad.	0.629
PL7	My leader can put himself in his subordinates' shoes.	0.679
PL8	My leader does not give up when things get tough.	0.686
PL9	My leader can make decisions quickly and accurately when encountering emergencies or important cases.	0.625
PL10	My leader can deal with problems objectively and fairly.	0.650
Platform Building		
PL11	My leader has full confidence in his subordinates' work ability and personal character.	0.646
PL12	My leader believes that the interests of his subordinates agree with those of the organization.	0.718
PL13	My leader is committed to continuous improvement of existing organizational systems.	0.709
PL14	My leader has sufficient socio-economic resources to help the organization achieve its goals.	0.748
Revolution Planning		
PL15	My leader has a long-term plan for developing the company or team.	0.717
PL16	My leader can quickly identify and summarize the essence of problems.	0.741
PL17	My leader can clearly set and describe the vision of the organization.	0.746
Platform Optimization		
PL18	My leader is good at motivating subordinates to pursue higher goals.	0.700
PL19	My leader encourages subordinates to embrace and learn all the knowledge beneficial to organizational development and personal improvement.	0.734
PL20	My leader encourages subordinates to constantly seek new ideas and approaches in solving problems.	0.729
PL21	My leader communicates frequently and proactively with subordinates emotionally.	0.747
Mutual Growth		
PL22	My leader often pays attention to their growth and gives his subordinates guidance and education.	0.740
PL23	My leader continues to learn advanced professional knowledge and leadership skills.	0.626
PL24	My leader creates opportunities to fully empower subordinates to take charge of a project.	0.797
PL25	My leader often communicates with subordinates about new technologies and knowledge to help them grow.	0.603

(Continued)

TABLE 4 (Continued)

Factor (latent variable)	Measurement items (significan variables)	Standard load factor
Organizational culture (KMO=0.947, CR=0.949)		
Development of employees		
OCU1	My organization pays attention to the personal development of employees.	0.672
OCU2	My organization develops the potential of employees.	0.677
OCU3	My organization trusts its employees.	0.711
OCU4	My organization values employee opinions.	0.666
OCU5	My organization provides knowledge and skills training.	0.634
InterpersonalI Harmony		
OCU6	My organization attaches great importance to team building.	0.694
OCU7	My organization supports the spirit of cooperation.	0.673
OCU8	My organization promotes feelings/sharing among employees.	0.709
OCU9	My organization encourages cooperation.	0.692
OCU10	My organization's employees care about each other.	0.693
Customer orientation		
OCU11	My organization can meet the needs of customers to the maximum extent.	0.621
OCU12	My organization emphasizes customer benefits.	0.628
OCU13	My organization can provide first-class service.	0.635
OCU14	My organization believes that customers come first.	0.664
OCU15	My organization provides sincere service.	0.669
Social responsibility		
OCU16	My organization demonstrates social responsibility.	0.697
OCU17	My organization has a sense of mission to serve the society.	0.708
OCU18	My organization emphasizes social benefits as well as economic benefits.	0.698
OCU19	My organization promotes the development of society.	0.718
Dare to innovate		
OCU20	My organization is open to change.	0.655
OCU21	My organization can continuously develop new products and services.	0.642
OCU22	My organization encourages innovation.	0.629
OCU23	My organization boldly adopted high technology.	0.620
Organizational creativity (KMO=0.784, CR=0.851)		
OCR1	The work (including business ideas, products, services) my firm produces is creative.	0.625
OCR2	The work (including business ideas, products, services) my firm produces is novel and original.	0.855
OCR3	The work (including business ideas, products, services) my firm produces is characteristic.	0.885
OCR4	The work (including business ideas, products, services) my firm produces satisfies market demands in creative industry.	0.683

First, this paper validated the positive impact of entrepreneurial individual creativity on organizational creativity. Individual creativity is the source of innovation, however, exploring the transformational path of organizational creativity only from the perspective of employees cannot meet the needs of organizational innovation (Blomberg et al., 2017). Existing research suggests that entrepreneurs are superior to ordinary employees in terms of power, status, and influence (Hughes et al., 2018), therefore, entrepreneurial individual creativity is an important driver of organizational creativity, and can positively influence the enhancement of organizational creativity (Yeh-Yun Lin and Liu, 2012; Xu and Zhao, 2020). This paper confirms the cross-level transformation path of creativity from entrepreneurs to organizations through empirical tests, verifies the important role

TABLE 5 Correlation results of multilevel rgression tests.

Category	Variable	Organizational creativity			Platform leadership	
		Model 1	Model 2	Model 3	Model 4	Model 5
Control variables	Gender	-0.004	-0.022	-0.029	0.026	0.019
	Age	0.072**	0.065**	0.063**	0.008	0.005
	Educational background	-0.051	-0.034	-0.039	0.006	0.013
	Working seniority	-0.005	-0.017	-0.006	-0.022	-0.027
	Industry	-0.009	-0.013	-0.002	-0.029	-0.030
	Years of establishment	-0.002	-0.031	-0.009	-0.046	-0.057*
	Firmsize	0.012	0.012	0.004	0.019	0.019
Explanatory variables	Entrepreneurial individual creativity		0.376**	0.319**		0.148**
	Platform Leadership			0.387**		
	R^2	0.020	0.228	0.331	0.018	0.062
	Adjusted R^2	0.005	0.214	0.318	0.002	0.045
	F Value	1.300	16.562***	24.654***	1.160	3.679***

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

TABLE 6 Summary of intermediating role test results.

Items	Path coefficients	Standard deviation	P-value	LLCI	ULCI
EIC → PL → OCR	0.3747	0.0341	0.0000	0.3078	0.4417
EIC → PL	0.1379	0.0322	0.0000	0.0746	0.2011
PL → OCR	0.3892	0.0461	0.0000	0.2985	0.4789
EIC → OCR	0.3211	0.0323	0.0000	0.2575	0.3846
EIC → OCR (Control of PL)	0.0537	0.0150	0.0000	0.0255	0.0850

of entrepreneurial individual creativity in the transformation of creativity, indicating its contribution to the further enhancement of organizational creativity.

Second, this study explored the mechanism of leadership type from the perspective of creativity transformation. Existing studies mostly focus on the relationship between leadership type and organizational creativity (Herrmann and Felfe, 2014; Sirkwoo, 2015), but lack research on whether it can undertake the transformation of creativity from individuals to organizations across hierarchical levels (Ozsahin and Sudak, 2015). Drawing on the social information processing theory and the social exchange theory, platform leadership can transfer information and resources across hierarchical levels by building a digital information platform (Yang et al., 2022). Platform leadership owns the nature of equality and sharing, which can establish the innovative working atmosphere within organization, allowing organization members to give full play to their creativity (Benitez et al., 2022). Constructing digital platofrm helps individuals to carry out the innovative and creative work at the organizational level, and enhances the innovative atmosphere of the whole organization (Xu and Zhao, 2020; Yang et al., 2022). On the basis of the above research, this paper confirms that platform leadership can undertake the transformation of creativity between entrepreneurs and organizations, therefore, entrepreneurs with platform leadership, specifically in entrepreneurial enterprise, are able to utilize digital platform to assist the enhancing for the level of organizational creativity.

Finally, this paper explored the interacting role of organizational culture in the path of creativity transformation. Organizational culture is the important motivator of innovative behavior (Zhao et al., 2020). The emotional value provided by organizational culture to organizatinal members can enhance their emotional commitment to organization (Tsui et al., 2006), showing a stronger sense of responsibility and belonging, and driving them to carry out innovative and entrepreneurial behaviors (Jeong et al., 2017). This paper explained the deepening role of organizational culture for platform leadership, explored the transformational path of organizational creativity in the perspective of organizational culture, and confirmed the effectiveness of the path through empirical data. Namely, this study validated the significant positive moderating effect of organizational culture, which is of strong practical significance for enhancing the level of organizational innovation from the level of organizational culture.

In summary, this study expanded the existing research about organizational creativity from several perspectives and confirmed the validation in the context of entrepreneurial enterprise in China. Particularly, a cross-level creativity transformation model was established from entrepreneurs to organizations, confirming the validity of the creativity transformation path from entrepreneurs to organizations. Furthermore, this study supplemented the gaps

TABLE 7 Multilevel Regression result of moderation effect test.

Category	Variable	Organizational creativity		
		Model 1	Model 2	Model 3
Control variables	Gender	-0.004	-0.018	-0.024
	Age	0.072**	0.067**	0.064**
	Educational background	-0.051	-0.055	-0.053
	Working seniority	-0.005	0.007	0.010
	Industry	-0.009	0.005	0.005
	Years of establishment	-0.002	0.019	0.020
	Firmsize	0.012	0.001	0.000
Explanatory variables	Platform leadership		0.451**	0.058
	Organizational culture		0.113**	-0.285
	Platform leadership ×Organizational Culture			0.108*
	R^2	0.020	0.196	0.203
	Adjusted R^2	0.005	0.180	0.185
	F value	1.300	12.136***	11.391***

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

of the existing creativity research in the platform leadership perspective, expanded the transformation path of organizational creativity, improved the application space of the existing theories to a certain extent, which has practical significance for further enhancement of the level of organizational creativity from the entrepreneurial perspective , specifically in the context of China. From a practical perspective, entrepreneurs can implement a series of measures to enhance the creativity of their organizations. This includes supporting the construction of a digital information platform, promoting the engagement in creative activities, and integrating elements of Chinese traditional culture to create a more syncretic organizational culture aligned with the context of China. The cross-level creativity model developed in this study identifies the transformation path of creativity from entrepreneurs to the organization. This model proves valuable in effectively harnessing the positive impact of platform leadership and organizational culture, enhancing creative activities and thinking. It provides a practical methodology for organizations to establish a creative environment, offering concrete steps for entrepreneurs to foster innovation within their organizations. In future research, it would be beneficial to explore universal transformational approaches that can be applied to enhance organizational creativity, which can be universally applied across different organizational contexts to foster and improve creativity.

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 in accordance with local legal and institutional requirements. 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

XY: Funding acquisition, Writing—original draft, Writing—review & editing. MZ: Investigation, Funding acquisition, Writing— original draft. ZM: Investigation, Writing—original draft, Data curation, Methodology, Software, Writing—review & editing. YS: Data curation, Writing—original draft. XD: Writing—review & editing, Methodology, Formal analysis.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This work was supported by Guangxi First-class Discipline statistics Construction Project Fund, Cultivation Program for 1,000 Young and Middle-aged Backbone Teachers in Guangxi Colleges and Universities Humanities and Social Sciences Project (2023QGRW042), Hainan Provincial Natural Science Foundation of China (724QN241, 724RC489), Social Science Planning Project of Shandong Province (No. 22DTQJ03), and Natural Science Foundation of Shandong Province (ZR2020QG017).

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.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

Al Shehri, M., McLaughlin, P., Al-Ashaab, A., and Hamad, R. (2017). The impact of organizational culture on employee engagement in saudi banks. *J. Hum. Resour. Manag.* 1, 1–23. doi: 10.5171/2017.761672

Andleeb, N., Chan, S. W., and Nazeer, S. (2019). Triggering employee creativity through knowledge sharing, organizational culture and internal marketing. *Int. J. Innov. Technol. Exp.Eng.* 8, 2–6.

Anne Kennan, M., Cole, F., Willard, P., Wilson, C., and Marion, L. (2006). "Changing workplace demands: what job ads tell us," in *Aslib Proceedings* (Bradford: Emerald Group Publishing Limited), 179–196. doi: 10.1108/00012530610677228

Baron, R. A., and Tang, J. (2011). The role of entrepreneurs in firm-level innovation: Joint effects of positive affect, creativity, and environmental dynamism. *J. Busi. Vent.* 26, 49–60. doi: 10.1016/j.jbusvent.2009.06.002

Benitez, J., Arenas, A., Castillo, A., and Esteves, J. (2022). Impact of digital leadership capability on innovation performance: the role of platform digitization capability. *Inform. Manage.* 59, 103590. doi: 10.1016/j.im.2022.103590

Blomberg, A., Kallio, T., and Pohjanpää, H. (2017). Antecedents of organizational creativity: drivers, barriers or both? *J. Innovat. Manage.* 5, 78–104. doi: 10.24840/2183-0606_005.001_0007

Carmeli, A., Sheaffer, Z., Binyamin, G., Reiter-Palmon, R., and Shimoni, T. (2014). Transformational leadership and creative problem-solving: the mediating role of psychological safety and reflexivity. *J. Creat. Behav.* 48, 115–135. doi: 10.1002/jocb.43

Catalano, A. S., Redford, K., Margoluis, R., and Knight, A. T. (2018). Black swans, cognition, and the power of learning from failure. *Conserv. Biol.* 32, 584–596. doi: 10.1111/cobi.13045

Chang, Y.-Y., and Chen, M.-H. (2020). Creative entrepreneurs' creativity, opportunity recognition, and career success: Is resource availability a double-edged sword? *Eur. Manag. J.* 38, 750–762. doi: 10.1016/j.emj.2020.03.004

Chitsazan, H., Bagheri, A., and Yusefi, A. (2017). Intellectual, psychological, and social capital and business innovation: the moderating effect of organizational culture. *Iran. J. Manage. Stud.* 10, 307–333. doi: 10.22059/ijms.2017.215054.672249

De Clercq, D., and Mustafa, M. J. (2023). How transformational leaders get employees to take initiative and display creativity: the catalytic role of work overload. *Personnel Rev.* 53, 488–507. doi: 10.1108/PR-02-2022-0090

Eisenberger, R., Rhoades Shanock, L., and Wen, X. (2020). Perceived organizational support: Why caring about employees counts. *Annu. Rev. Organ. Psychol. Organ. Behav.* 7, 101–124. doi: 10.1146/annurev-orgpsych-012119-044917

Fillis, I., and Rentschler, R. (2010). The role of creativity in entrepreneurship. *J. Enterpr. Culture* 18, 49–81. doi: 10.1142/S0218495810000501

Fuller, J. B., Marler, L. E., and Hester, K. (2006). Promoting felt responsibility for constructive change and proactive behavior: Exploring aspects of an elaborated model of work design. *J. Organizat. Behav.* 27, 1089–1120. doi: 10.1002/job.408

Gao, Y., Zhang, D., Ma, H., and Du, X. (2020). Exploring creative entrepreneurs' ieo: extraversion, neuroticism and creativity. *Front. Psychol.* 11, 2170. doi: 10.3389/fpsyg.2020.02170

Gao, Y., Zhao, X., Xu, X., and Ma, F. (2021). A study on the cross level transformation from individual creativity to organizational creativity. *Technol. Forecast. Soc. Change* 171, 120958. doi: 10.1016/j.techfore.2021.120958

Herrmann, D., and Felfe, J. (2014). Effects of leadership style, creativity technique and personal initiative on employee creativity. *Br. J. Manage.* 25, 209–227. doi: 10.1111/j.1467-8551.2012.00849.x

Hughes, D. J., Lee, A., Tian, A. W., Newman, A., and Legood, A. (2018). Leadership, creativity, and innovation: a critical review and practical recommendations. *Leadersh. Q.* 29, 549–569. doi: 10.1016/j.leaqua.2018.03.001

Jeong, S., McLean, G. N., McLean, L. D., Yoo, S., and Bartlett, K. (2017). The moderating role of non-controlling supervision and organizational learning culture on employee creativity: the influences of domain expertise and creative personality. *Eur. J. Train. Dev.* 41, 647–666. doi: 10.1108/EJTD-03-2017-0025

Khedhaouria, A., Gurău, C., and Torrès, O. (2015). Creativity, self-efficacy, and small-firm performance: the mediating role of entrepreneurial orientation. *Small Busi. Econ.* 44, 485–504. doi: 10.1007/s11187-014-9608-y

Lutz Allen, S., Smith, J. E., and Da Silva, N. (2013). Leadership style in relation to organizational change and organizational creativity: perceptions from nonprofit organizational members. *Nonprofit Manage. Leadersh.* 24, 23–42. doi: 10.1002/nml.21078

Makri, M., and Scandura, T. A. (2010). Exploring the effects of creative ceo leadership on innovation in high-technology firms. *Leadersh. Q.* 21, 75–88. doi: 10.1016/j.leaqua.2009.10.006

Meyer, G. W. (1994). Social information processing and social networks: a test of social influence mechanisms. *Hum. Relat.* 47, 1013–1047. doi: 10.1177/001872679404700901

Morris, J. A., Brotheridge, C. M., and Urbanski, J. C. (2005). Bringing humility to leadership: antecedents and consequences of leader humility. *Hum. Relat.* 58, 1323–1350. doi: 10.1177/0018726705059929

Moultrie, J., and Young, A. (2009). Exploratory study of organizational creativity in creative organizations. *Creat. Innovat. Manage.* 18, 299–314. doi: 10.1111/j.1467-8691.2009.00536.x

OUARI, H., and Lefkir, A. (2022). The effect of positive psychological capital dimensions on organizational creativity. *Soc. Sci. J.* 16, 986–997. doi: 10.34118/ssj.v16i1.1988

Ozsahin, M., and Sudak, M. K. (2015). The mediating role of leadership styles on the organizational citizenship behavior and innovativeness relationship. *J. Busi. Econ. Finance* 4, 3. doi: 10.17261/Pressacademia.2015313065

Pagano, A., Petrucci, F., and Bocconcelli, R. (2018). A business network perspective on unconventional entrepreneurship: a case from the cultural sector. *J. Bus. Res.* 92, 455–464. doi: 10.1016/j.jbusres.2018.07.012

Parjanen, S. (2012). Experiencing creativity in the organization: From individual creativity to collective creativity. *Interdisc. J. Inform. Knowl. Manage.* 7, 109–128. doi: 10.28945/1580

Pirola-Merlo, A., and Mann, L. (2004). The relationship between individual creativity and team creativity: aggregating across people and time. *J. Organ. Behav.* 25, 235–257. doi: 10.1002/job.240

Ramos, H. M., Mustafa, M., and Badri, S. K. Z. (2022). Job and work context elements in fostering employee creative behavior: exploring the moderating role of work passion. *J. Manage. Organizat.* 2022, 1–20. doi: 10.1017/jmo.2022.52

Schunk, D. H., and DiBenedetto, M. K. (2020). Motivation and social cognitive theory. *Contemp. Educ. Psychol.* 60, 101832. doi: 10.1016/j.cedpsych.2019.101832

Sirkwoo, J. (2015). Leading employee creativity: the relationship between leadership styles and employee creativity. *Rev. Gen. Manage.* 21, 17–28.

Tsui, A. S., Wang, H., and Xin, K. R. (2006). Organizational culture in china: an analysis of culture dimensions and culture types. *Manage. Organizat. Rev.* 2, 345–376. doi: 10.1111/j.1740-8784.2006.00050.x

Vaara, E., Harju, A., Leppälä, M., and Buffart, M. (2021). *How to Successfully Scale a Flat Organization*. (Brighton: Harvard Business Review).

Woods, S. A., Mustafa, M. J., Anderson, N., and Sayer, B. (2018). Innovative work behavior and personality traits: examining the moderating effects of organizational tenure. *J. Manag. Psychol.* 33, 29–42. doi: 10.1108/JMP-01-2017-0016

Xu, W., and Zhao, S. (2020). The influence of entrepreneurs' psychological capital on their deviant innovation behavior. *Front. Psychol.* 11, 1606. doi: 10.3389/fpsyg.2020.01606

Yang, X., Jin, R., and Zhao, C. (2022). Platform leadership and sustainable competitive advantage: the mediating role of ambidextrous learning. *Front. Psychol.* 13, 836241. doi: 10.3389/fpsyg.2022.836241

Yeh-Yun Lin, C., and Liu, F.-C. (2012). A cross-level analysis of organizational creativity climate and perceived innovation: the mediating effect of work motivation. *Eur. J. Innovat. Managem.* 15, 55–76. doi: 10.1108/14601061211192834

Zampetakis, L. A., and Moustakis, V. (2006). Linking creativity with entrepreneurial intentions: a structural approach. *Int. Entrepren. Manage. J.* 2, 413–428. doi: 10.1007/s11365-006-0006-z

Zhao, Y., Lin, S., and Liu, J. (2020). Employee innovative performance in science and technology-based small and medium-sized enterprises: a triadic reciprocal determinism perspective. *Soc. Behav. Person.* 48, 1–17. doi: 10.2224/sbp.9440

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 30 May 2024
DOI 10.3389/fpsyg.2024.1378217

Check for updates

OPEN ACCESS

EDITED BY
Mike James Mustafa,
Division of organizational and Applied Psychology University of Nottingham Malaysia, Malaysia

REVIEWED BY
Sheng Huang,
University of Nottingham Malaysia Campus, Malaysia
Mandy Sim,
University of Nottingham Malaysia Campus, Malaysia

*CORRESPONDENCE
Chulwoo Kim
✉ cwkim@gachon.ac.kr

RECEIVED 29 January 2024
ACCEPTED 06 May 2024
PUBLISHED 30 May 2024

CITATION
Lee G and Kim C (2024) Antecedents of innovative behavior in public organizations: the role of public service motivation, organizational commitment, and perceived innovative culture.
Front. Psychol. 15:1378217.
doi: 10.3389/fpsyg.2024.1378217

COPYRIGHT
© 2024 Lee and Kim. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Antecedents of innovative behavior in public organizations: the role of public service motivation, organizational commitment, and perceived innovative culture

Geon Lee[1] and Chulwoo Kim[2]*

[1]Department of Public Administration, Hanyang University, Seoul, Republic of Korea, [2]Department of Public Administration, Gachon University, Seongnam, Republic of Korea

Introduction: This study examines the dynamics of public service motivation (PSM), organizational commitment, and perceived innovative culture and their collective influence on innovative behavior in public organizations. It uniquely focuses on intrinsic motivational factors, extends the scope of motivational studies to the public sector, and highlights the crucial role of organizational culture in fostering innovation.

Methods: A web-based survey was administered to 1,021 public servants in the central government of the Republic of Korea. Structured questionnaires were used to collect data, and structural equation modeling (SEM) was employed to analyze the relationships between the variables.

Results: The SEM results confirmed positive correlations between PSM and both organizational commitment and innovative behavior. However, contrary to expectations, organizational commitment did not significantly predict innovative behavior. Additionally, no mediating effect of organizational commitment was observed. Notably, perceived innovative culture was found to moderate the relationship between PSM and organizational commitment, and between organizational commitment and innovative behavior, particularly in environments with a strong innovation focus.

Discussion: These findings underscore the significance of PSM in spurring innovative behavior in the public sector, broadening our understanding of intrinsic motivation. This study also accentuates the influence of organizational culture on these dynamics. In practical terms, this suggests the importance of nurturing individuals with high PSM and fostering an environment that balances perceived innovative culture. While contributing to the fields of organizational psychology and public administration, this study has certain limitations and indicates the need for further research in various contexts.

KEYWORDS

public service motivation, innovative behavior, organizational commitment, perceived innovative culture, innovative work behavior

1 Introduction

The rapidly evolving global landscape, characterized by technological innovation, demographic shifts, and changing societal expectations, presents unique challenges and opportunities for public organizations (Northcott and Taulapapa, 2012; Hansen and Pihl-Thingvad, 2019; Nguyen et al., 2023). More specifically, innovations in digital public services are vital for addressing social and economic inequalities and ensuring universal access to services (Osborne and Brown, 2011; Bertot et al., 2016; Khorakian et al., 2019). Challenges such as climate change, public health crises, and social inequality further necessitate creative and innovative solutions beyond traditional bureaucratic approaches (Bernier et al., 2015; Brunetto et al., 2021). Moreover, periods of economic constraint and increasing demands for accountability and transparency compel public organizations to find innovative ways to maintain or enhance service delivery (Moore and Hartley, 2008; Agostino et al., 2020; Heinonen and Strandvik, 2020).

Therefore, the agility and adaptability of these institutions are paramount for addressing these complexities. Central to this adaptability is the innovative behavior of individuals within these organizations (Bysted and Hansen, 2015). To make an organization more efficient, innovative behavior has become important not only in the private sector but also in the public sector (Park and Jo, 2018). Innovative behavior can be a strategy for long-term organizational survival in response to rapidly changing internal and external environments. Public sector innovation, traditionally perceived as conservative and procedurally rigid, is not merely a function of technological adoption or procedural overhaul, but represents a profound shift in organizational ethos and behavior, encompassing a holistic approach to service design, delivery, and policy development (Miao et al., 2018). This necessitates a re-evaluation of the factors that drive innovative behavior in public sector employees (Zandberg and Morales, 2019), particularly focusing on psychological constructs.

Innovative behavior in the public sector is influenced by a constellation of factors, with recent literature underscoring the critical roles of leadership styles, public service motivation (PSM), organizational culture, psychological empowerment, learning orientation, and both intrinsic and extrinsic motivations (Gu et al., 2017; Klaeijsen et al., 2018; Ritala et al., 2019; Venketsamy and Lew, 2024). Transformational leadership, emphasizing inspirational motivation and intellectual stimulation, is pivotal in fostering an innovative environment (Askaripoor et al., 2020; Mahmood et al., 2020). PSM, the intrinsic desire to serve the public good, directly drives innovative efforts aimed at enhancing public welfare (Miao et al., 2018; Khan and Burdey, 2021). An organizational culture that prioritizes innovation, coupled with a climate that supports risk-taking and values flexibility, further catalyzes innovative behaviors (Nguyen et al., 2023). Psychological empowerment, reflecting employees' perceptions of autonomy and significance (Miao et al., 2018), along with a strong learning orientation within the organization (Nguyen et al., 2023), are also instrumental in promoting innovation. Moreover, the balance between intrinsic motivation, derived from the joy of work itself, and extrinsic motivation, influenced by rewards and recognition (Liu et al., 2016; Fischer et al., 2019), plays a significant role in encouraging innovative behavior.

Recent studies have shed light on the relationship between PSM and innovative behavior in the public sector, highlighting the importance of mediating factors and the influence of leadership and cultural context. Miao et al. (2018) found that psychological empowerment mediates the relationship between PSM and innovative behavior in China, suggesting that empowerment is crucial for converting PSM into innovative actions. Askaripoor et al. (2020) in Iran and Mahmood et al. (2020) in Pakistan both emphasized the significant role of leadership in enhancing the PSM-innovation link. Khan and Burdey (2021) established a direct positive association between PSM and innovative behavior in Pakistan, a finding echoed by Vuong (2023) who also highlighted how leadership strengthens the PSM-innovation relationship. Suryani et al. (2023) and Rafique et al. (2023) further confirmed the positive impact of PSM on innovation in Pakistan, with Rafique et al. pointing out specific PSM dimensions like compassion and self-sacrifice as key drivers. Lastly, Nguyen et al. (2023) identified learning goal orientation as a mediator in Vietnam, underlining the role of a learning mindset in facilitating innovation through PSM. These studies collectively illustrate PSM's pivotal role in driving public sector innovation, mediated by empowerment, leadership, and a culture of continuous learning.

The significance of innovative behaviors in driving administrative reform within public organizations is widely acknowledged. However, there is a shortage of research delving into the link between PSM and innovative behaviors, with a consideration of organizational culture. The limited empirical studies available are constrained by their focus on the cultural context of a specific country (i.e., Pakistan) as shown in Table 1. This study endeavors to address this gap by meticulously observing empirical data to elucidate the intricate relationship between PSM and the inclination toward innovative conduct, taking into account organizational culture within the Korean context.

Organizational commitment, the psychological attachment and loyalty employees feel toward their organization, has emerged as a potential mediator between public officials' PSM and its positive outcomes (Vandenabeele, 2009; Im et al., 2016). When public officials are deeply committed to their organization, they are more likely to channel their altruistic motivations toward initiatives that not only align with the organization's goals but also push the boundaries of traditional public service methods. Moreover, an perceived innovative culture characterized by an emphasis on creativity, openness to new ideas, and support for risk-taking may amplify or attenuate the effects of PSM and organizational commitment on innovative behavior (Austen and Zacny, 2015).

As a result, the literature points to a critical need for further exploration into the mechanisms through which PSM influences innovative behavior, with specific attention to the roles of organizational commitment and culture. This study aims to address these gaps by examining the mediating effect of organizational commitment and the moderating role of perceived innovative culture on the PSM-innovation nexus within public organizations.

This research provides significant theoretical contributions to the literature on PSM, organizational behavior, and innovation within public organizations. Our study makes three primary theoretical advancements:

First, it deepens the PSM literature by elucidating the direct influence of PSM on innovative behavior in the public sector. Unlike previous studies that have predominantly focused on PSM's impact on job satisfaction and organizational commitment, our research explores its role as a catalyst for innovation, revealing how intrinsic motivation tied to public service can drive employees toward innovative behavior. This expands the understanding of PSM beyond traditional outcome

TABLE 1 Recent studies addressing the relationship between PSM and innovative behavior.

Authors	Year	Relationship	Main findings
Miao et al.	2018	Indirect	Psychological empowerment mediates the relationship between PSM and innovative behavior of bureau directors in China.
Askaripoor et al.	2020	Mediation	PSM mediates between leadership and innovative work behavior in the public sector in Iran.
Mahmood et al.	2020	Mediation	PSM mediates between transformational leadership and innovative behavior of teachers in Pakistan.
Khan and Burdey	2021	Direct	PSM is positively associated with innovative behavior in Pakistan.
Vuong	2023	Direct and Moderation	PSM positively affected innovative work behavior and strengthens the relationship between leadership and innovative behavior in the public sector in Pakistan.
Suryani et al.	2023	Direct	PSM positively affect innovative behavior of civil servants in Pakistan.
Rafique et al.	2023	Direct	Attraction to policymaking, compassion, and self-sacrifice are associated with the innovative behaviors of educators in Pakistan.
Nguyen et al.	2023	Indirect	Learning goal orientation mediates between PSM and innovative behaviors among public sector employees in Vietnam.

variables, highlighting its critical role in fostering a culture of innovation in public organizations.

Second, our findings contribute to the organizational commitment literature by dissecting the mediating role of organizational commitment in the PSM-innovation nexus. By delineating the conditions under which organizational commitment acts as a bridge between PSM and innovative behavior, this study adds complexity to our grasp of commitment dynamics. This insight is particularly valuable for crafting targeted strategies that leverage organizational commitment to stimulate innovation, offering a refined perspective on managing employee engagement in the public sector.

Lastly, by examining the moderating effect of perceived innovative culture, this study enriches the organizational culture literature. We demonstrate how the presence of an perceived innovative culture can amplify or mitigate the effects of PSM and organizational commitment on innovative behavior. This underscores the critical importance of aligning organizational culture with employee motivations to enhance innovative outcomes, offering a novel viewpoint on the strategic role of culture in driving public sector innovation. Overall, we propose the conceptual model in Figure 1.

2 Theoretical background and research hypotheses

2.1 Public service motivation

Although Rainey (1982) first coined the term "PSM" in his article published in *American Review of Public Administration* in 1982, Perry and Wise (1990) elaborated the concept of PSM. Before PSM had been posited, it was widely accepted that bureaucrats or those who work in the government are utility maximizers pursuing selfish ends in their workplace, and their motivation is the same as that of those who act in the market. Kelman (1987) was critical of this trend, stating that "*this account of the operation of the political process is a terrible caricature of reality. It ignores the ability of ideas to defeat interests, and the role of that public spirit plays in motivating the behavior of participants in the political process*" (p. 81). The origins of such positive views of a bureaucrat can be traced to the traditional intellectual approach to bureaucracy initiated by Max Weber. He envisaged those who work in the bureaucratic system (or bureaucrats) as sincere servants, suggesting that the bureaucrat is an impartial implementer in pursuit of organizational goals who does not place his personal goals over organizational goals in a bureaucratic system, even if his claims were empirically unproven.

For more than four decades, public administration scholars have identified differences between public and private organizations in terms of the behaviors and work-related attitudes of organizational members and organizational characteristics (Bozeman, 1987; Scott and Falcone, 1998; Rainey and Bozeman, 2000). Research on public-private sector differences has yielded fruitful empirical results, showing that the characteristics and behaviors of public organizations are sharply distinct from those of their private counterparts (Wright and Grant, 2010; Ingrams, 2020). One strand of these findings is that employees in public organizations (or bureaucrats) have different motivations and reward preferences from those in private organizations; numerous studies have reported identical findings. Rainey (1982), for example, compared middle managers in the public and private sectors, revealing that while the latter place a high importance on "higher pay" and "making a good deal of money," the former focus on "engaging in meaningful public service" and "doing work that is helpful to other people" (p. 292). Based on these findings, he suggests developing the concept of PSM in research on public administration.

Full-scale PSM research has been conducted since the work of Perry and Wise (1990), who define PSM as "an individual's predisposition to respond to motives grounded primarily or uniquely in public institutions and organizations" (p. 368). Perry and Wise propose three types of motives that lay the foundation for PSM: affective, norm-based, and rational. The affective motive refers to actions grounded in emotional responses to various social situations, the norm-based motive involves actions caused by endeavors to conform to social norms or rules, and the rational motive refers to behavior based on an individual's desire to participate in policymaking. To measure the construct of PSM at the empirical level, Perry (1996) suggested four dimensions–public policymaking, public interest, compassion, and self-sacrifice–with 24 measurement items through survey-based observation of graduate students. Since the development

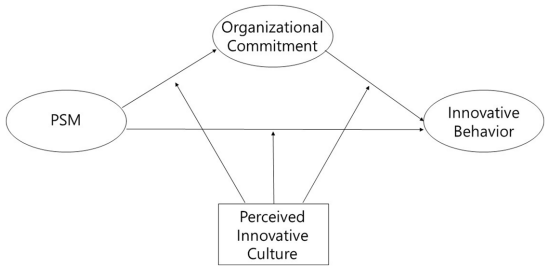


FIGURE 1
Conceptual model.

of Perry's PSM measurement items, ample empirical findings have been produced, constituting the bulk of evidence in the field.

The concept of PSM has two important implications for academia. First, there are two types of motivations–intrinsic versus extrinsic––in organization theory, which do not reflect or account for individuals' motivation to serve the public. Thus, PSM fills this knowledge gap. Second, self-interest was recognized as a universal motivation of bureaucrats at a time before the concept of PSM when public choice theory dominated the territories of knowledge.

PSM has been studied extensively in the context of public administration and organizational behavior, with research highlighting its positive impacts on job satisfaction, commitment, and performance (Perry and Vandenabeele, 2015; Ritz et al., 2016).

Table 2 provides a synthesis of recent empirical investigations concerning the correlations between PSM and positive outcomes in organizational settings. Despite the multitude of empirical inquiries conducted thus far, they can be classified into several thematic clusters regarding these favorable outcomes. Chief among these outcomes are job attitudes, with job satisfaction and turnover intentions being notably significant in organizational contexts (Bright, 2020). High levels of PSM among public servants have been consistently linked to heightened job satisfaction during task performance (Naff and Crum, 1999; Andersen and Kjeldsen, 2013; Roh et al., 2016; Prysmakova and Vandenabeele, 2020; Zhang, 2023), consequently mitigating turnover intentions (Naff and Crum, 1999; Shim et al., 2017; Gan et al., 2020; Wang et al., 2024).

PSM fosters socially desirable conduct both within and beyond organizational boundaries, stemming from individuals' altruistic inclinations and commitment to public goods (Walton et al., 2017). Houston (2006) observed a higher propensity for charitable volunteering and blood donation among government agency employees, attributed to elevated levels of PSM compare to their private sector counterparts. Subsequent empirical studies have explored the association between PSM and volunteering behaviors, consistently affirming his relationship (Walton et al., 2017; Leisink et al., 2021).

Furthermore, PSM positively influences altruistic behaviors within organizations, exemplified by organizational citizenship behaviors which surpass formal role expectations, thereby enhancing organizational effectiveness and performance (Kim, 2006). Notably, a robust correlation between PSM and organizational citizenship behaviors has been observed in public administration studies. For instance, Koumenta (2015) demonstrated a significant promotion of organizational citizenship behaviors by PSM among British civil servants, concurrently reducing organizational deviance. Various empirical inquiries have replicated and reinforced these findings (Campbell and Im, 2016; Shim and Faerman, 2017; Abdelmotaleb and Saha, 2019; Ingrams, 2020; Li and Wang, 2022). Additionally, PSM serves as a precursor to prosocial and altruistic behaviors beyond organizational citizenship behaviors (Esteve et al., 2016; Piatak and Holt, 2020; Gans-Morse et al., 2022).

PSM is also under scrutiny as a driver of ethical conduct such as anti-corruption measures and whistleblowing within organizations. Despite conceptual overlaps with ethics, empirical studies have discerned a distinct positive association between PSM and ethical outcomes (Choi, 2004; Kwon, 2014; Stazyk and Davis, 2015; Wright et al., 2016). Particularly, whistleblowing, an ethical imperative in combating corruption and misconduct, is notably influenced by PSM (Cho and Song, 2015; Potipiroon and Wongpreedee, 2021; Prysmakova and Evans, 2022).

Lastly, research on PSM has explored its impact on individual and organizational performance within diverse settings. PSM emerges as a significant determinant of performance across various domains. Drawing on the field experimental method, Bellé (2013), for instance, showed nurses with higher levels of PSM achieved higher job performance in hospitals. Andersen et al. (2014) revealed that the students taught by teachers with high level of PSM exhibited higher academic achievement in school. Numerous studies affirm PSM's role as a performance determinant (Naff and Crum, 1999; Ritz, 2009; Vandenabeele, 2009; Zhu and Wu, 2016; Lim et al., 2022; Thuy and Phinaitrup, 2023).

2.2 Innovative behavior and public service motivation

Janssen (2000) defined innovative behavior as a complex behavior that includes the generation, promotion, and idealization of ideas, specifically focusing on the individual creation of novel and useful ideas in the workplace across various domains. Innovation goes beyond performing tasks in a routine manner according to standard business procedures. It is an activity that voluntarily improves work methods, incorporates new technologies, views phenomena from a different perspective, and attempts to solve problems through new ideas (Woods et al., 2018). Furthermore, it is a continuous effort to spread experience and change fundamental work methods and systems (Scott and Bruce, 1994).

Innovative behavior is regarded as an important form of capital that enables an organization to effectively achieve its goals (Kanter, 1983; West and Far, 1990; Yuan and Woodman, 2010). In general, public organizations are not considered innovative because they do not operate within a market mechanism and are characterized by excessive rules and controls that constrain the innovative behavior of public servants (Miao et al., 2018). However, there has been recent emphasis on innovation that aims to improve efficiency and performance in the public sector (Fernandez and Moldogaziev, 2013; Waheed et al., 2017; Park and Yun, 2022).

While various factors, including organizational culture and climate, influence an individual's innovation behavior, the psychological aspect of intrinsic motivation has been emphasized as an antecedent of innovative behavior (Yuan and Woodman, 2010). Given that innovation involves changing both the way people do

TABLE 2 Examples of the relationship between PSM and positive outcomes in pubic organizations.

Authors	Year	Positive outcomes	Main findings
Carpenter et al.	2012	Attraction to the public sector	Individuals with higher PSM levels are more likely to choose the public sector as their job preference.
Belle	2013	Job performance	PSM has been found to be positively associated with individual job performance among Italian nurses.
Anderson et al.	2014	Student performance	Students with higher PSM achieved academic performance.
Chen and Hsieh	2015	Knowledge sharing	There is positive association between PSM and knowledge sharing.
Koumenta	2015	Organizational citizenship behavior	PSM positively influences organizational citizenship behavior in UK government agencies.
Esteve et al.	2015	Collaborative behavior	PSM is positively associated with collaborative behavior in an organization.
Stazyk and Davis	2015	Ethical obligations	PSM is positively correlated with ethical obligations.
Cho and Song	2015	Whistleblowing	PSM increases public managers' whistleblowing intention in U.S. federal government agencies.
Roh et al.	2016	Job satisfaction	Employees with high levels of commitment to public interest have high levels of personal satisfaction in an organization.
Campbell and Im	2016	Turnover intention	PSM has been linked to reduced turnover intention in 16 central government ministry headquarters in Korea.
Tepe	2016	Trust behavior	PSM is positively associated with trust behavior among college students.
Esteve et al.	2016	Prosocial behavior	PSM is positively related correlated with prosocial behavior among college students in the Netherlands.
Cooke et al.	2019	Work engagement	Positive relationship between PSM and work engagement has been found.
Yudiatmaja	2019	Service orientation	PSM positively influences employee service orientation.
Asseburg and Homberg	2020	Public sector choice	Individuals with higher PSM levels tend to choose a public sector job.
Sun	2021	Affective commitment	PSM is positively related to affective commitment to change in Chinese government agencies.
Ki	2021	Willingness to learn in an organization	PSM is positively associated with government officials' willingness to learn.
Leisink et al.	2021	Volunteering activities	PSM positively affects employees' participation in voluntary activities.
Weißmüller et al.	2021	Prosocial rule-breaking behavior	High-PSM individuals tend to engage in prosocial rule-breaking behavior within an organization.
Lim et al.	2022	Organizational performance	Public employees with higher PSM levels are more likely to contribute to organizational performance.
Park and Lee	2022	Morale	The higher the level of PSM, the higher the level of moral.
Gams-Morse et al.	2022	Anti-corruption, Bribe, cheat rates	Higher levels of PSM are associated with lower rates of anti-corruption, bribery, and cheating.
Nguyen et al.	2023	Learning goal orientation	Employees' PSM is positively associated with employees' learning goal orientation in Vietnamese government agencies.
Ripoll et al.	2023	Ethical behavior	Highly public service-motivated individuals tend to behave ethically.

things and the processes themselves, public sector employees are agents who facilitate and implement the innovative process (Nguyen et al., 2023). In public organizations, the outcome of innovation is an increase in the quality of public services, which benefits citizens. Public servants' motivation to enhance the quality of their lives is a precondition for innovative behavior in public organizations.

The positive impact of intrinsic motivation on innovative or creative behavior has been well-documented in organizational studies (Liu et al., 2016; Fischer et al., 2019). Intrinsically motivated individuals tend to be curious, which facilitates creative ideas when they are at work (Devloo et al., 2015). In addition to intrinsic motivation, extrinsic motivation contributes to innovative or creative performance in organizations (Chen et al., 2010). For instance, extrinsic or monetary rewards are widely utilized as incentives for employees to promote innovative behavior in private-sector organizations.

As a type of motivation, PSM is understudied in the psychology or management domains, but it is regarded as a driving force that enables individuals to produce positive outcomes in public-sector organizations (Perry and Vandenabeele, 2015; Ritz et al., 2016). PSM is an important psychological resource that drives innovative behavior in public organizations, and it is an important factor in organizational innovative behavior because members of public organizations are motivated by the ideal of serving the public interest and are committed

to serving the people rather than monetary rewards. One of the most important factors in innovative behavior is the voluntary participation of organizational members. This indicates that innovative behavior is driven by individuals' attitudes, psychology, and motivation, which are intrinsic to the organization, rather than by external rewards and control.

Perry and Wise (1990) propose that PSM encompasses three distinct motives: rational, normative, and affective. The rational motive entails individuals' aspiration to engage in the policymaking process, prioritizing societal or communal interests over personal gain, contrary to the assumptions of economic theory. Normative motive involves a desire to advance the common good and fulfill civic duties as a citizen. Affective motive reflects a commitment to government programs driven by a conviction of their societal significance, accompanied by feelings of empathy and affection toward others. These three motives, integral to PSM, are closely linked to intrinsic motivation (Jung et al., 2018).

The measurement of PSM relies on four sub-elements that mirror these motives. Rational motive is gaged by the inclination to participate in policymaking and attraction toward attraction to policymaking (APM), while normative motive is assessed through commitment to public interest (CPI), indicating the extent to which individuals strive for the common good. Affective motive is measured through compassion (COM) and self-sacrifice (SS) (Perry, 2000). Since the sub-dimensions of PSM overlap with characteristics of intrinsic motivation, some scholars contend that PSM constitutes a form of intrinsic motivation (e.g., Crewson, 1997; Houston, 2000).

Despite similarities, some scholars distinguish between PSM and intrinsic motivation (Paarlberg and Lavigna, 2009; Bozeman and Su, 2015). PSM tends to be more altruistic, driving individuals to perform challenging tasks not solely for personal enjoyment but for the benefit of society and communities. Consequently, individuals with high PSM levels are inclined to invest extra effort in achieving outcomes that hold meaning and significance for society and others (Perry and Hondeghem, 2008; Ki, 2021). Rafique et al. (2023) identified correlations between PSM sub-dimensions and innovative behaviors within the Pakistani context. Thus, public service-motivated individuals consistently approach problem-solving from a citizen's perspective, striving to ensure that public services are delivered in an innovative manner that is both convenient and efficient for citizens.

In addition, innovative behavior can be explained by PSM because this type of motivation is based on self-sacrifice, aims to realize the public good, and drives proactive and active behavior. Given that innovative behavior involves trying to solve problems through new ideas beyond routine work procedures and taking the risk of failure, it is difficult to achieve without an active and positive psychological state and motivation to accept the risk of failure. Therefore, PSM serves as a key driver of innovative behavior because individuals motivated by public service values are more likely to engage in activities that foster organizational innovation.

While the nexus between PSM and innovative behavior has not been comprehensively explored, recent studies have suggested a significant positive relationship. Employees with high PSM may be more inclined to engage in innovative behaviors, as they align with their intrinsic motivation to serve public goods and improve public welfare (Miao et al., 2018; Lee et al., 2020). For instance, Vuong (2023) found that civil servants with high levels of PSM tended to exhibit innovative work behavior in Vietnamese local governments. Khan and Burdey (2021) and Suryani et al. (2023) discovered that individuals motivated by public service are inclined to exhibit innovative behaviors in the workplaces in Pakistan.

Self-determination theory (SDT), proposed by Deci and Ryan (1985), explains PSM can be a potent intrinsic motivator for individuals in the public sector. PSM, characterized by an altruistic desire to serve the public and contribute to society, aligns with the principles of SDT (autonomy, competence, and relatedness). Specifically, PSM fulfills the need for autonomy (engaging in work that feels personally meaningful), competence (feeling effective in contributing to public good), and relatedness (connecting with societal values and the community) (Corduneanu et al., 2020). These alignments suggest that civil servants with high PSM are motivated to serve the public good. Therefore, they will likely engage in proactive behaviors, seeking new and creative work processes to deliver public service efficiently and effectively to citizens.

> *H1*: Public service motivation is positively related to innovative behavior.

2.3 Mediating effect of organizational commitment

Organizational commitment, as defined by Meyer and Allen (1991), encompasses an employee's psychological attachment and loyalty toward their organization, highlighting its complex and multifaceted nature. It encompasses affective commitment (emotional attachment to the organization), continuance commitment (perceived cost of leaving the organization), and normative commitment (sense of obligation to remain with the organization). Although organizational commitment is a multidimensional construct, these three dimensions are not mutually exclusive (Camilleri and Van Der Heijden, 2007).

While PSM and organizational commitment exhibit mutual interdependence, it is more logically argued that PSM serves as an antecedent of organizational commitment within public organizations (Vandenabeele, 2009). As previously noted, there are three dimensions comprising the concept of organizational commitment. Normative commitment pertains to an obligation-based loyalty to the organization (Allen and Meyer, 1990). Public service-motivated individuals entering and working in the public sector strongly embrace the values and goals of public service for the betterment of the public good (Witesman and Walters, 2013). The alignment between individuals and the organization in public services enables employees to uphold the obligations expected by the organization. Adherence to norms and values can serve as a fulfilling motivation for public servants (Andersen et al., 2013). Normative commitment acts as a cohesive force between public service-motivated employees and value-oriented behaviors within public organizations. Consequently, public employees, guided by normative and value-oriented attitudes, endeavor to enhance society by refining and improving the process through which public services are delivered.

Affective commitment refers to emotional attachment to the organization, where organizational members identify themselves with the organization, leading to enjoyment of tasks within the organization (Allen and Meyer, 1990). Public service-motivate individuals identify

themselves with public services, fostering a public service identity (Bednarczuk, 2018). Individuals with a high level of affective commitment, or public service identification, tend to derive satisfaction from their tasks and actively engage in them, thereby enhancing organizational performance. Increased identification with the public service organization correlates with a higher likelihood of employees making significant personal investments in the organization and actively engaging in actions that contribute positively to its success (Miao et al., 2019).

Continuance commitment can be defined as "a desire to maintain organizational membership" (Porter et al., 1974:604). People with this type of commitment and PSM typically internalize the values of public services through the socialization process during their tenure in public organizations. Empirical evidence supports that organizational members with a high level of PSM exhibit a low intention to turnover (Campbell and Im, 2016; Shim et al., 2017; Jia et al., 2022). In other words, low turnover intention indicates high continuance commitment. As a result, employees with high continuance commitment are presumed to engage in innovative behaviors to address imminent challenges, staying with the organization to contribute to its performance and sustainability.

According to social exchange theory, relationships within organizations are driven by the reciprocal exchange of resources, benefits, and rewards between individuals and the organization (Cropanzano and Mitchell, 2005; Blau, 2017). Employees with high levels of PSM are motivated by altruistic values and a desire to contribute to the public good. The initial step in this reciprocal relationship is catalyzed by employees' perception that their altruistic efforts and motivations are recognized and supported by the organization. Next, committed employees are more likely to take initiative, propose new ideas, and implement changes that align with organizational goals, viewing innovation as a way to give back to the organization and further its mission. As a result, organizational commitment mediates the relationship between PSM and innovative behavior by acting as the mechanism through which the social exchange process translates intrinsic motivation (stemming from PSM) into actions that benefit the organization (innovative behavior). The stronger the commitment, the more likely employees are to engage in innovative activities, as they feel an emotional and psychological investment in the organization's success (Mowday et al., 1979; Wright and Pandey, 2008). Specifically, Vandenabeele (2009) empirically found that PSM is linked to performance exhibiting a high correlation with innovative behavior mediated by organizational commitment.

Consequently, the positive influence of PSM on innovative behavior is mediated by the degree of an employee's commitment to the organization, as stronger commitment may lead to greater involvement in innovative activities. Accordingly, we hypothesize that:

> *H2*: Organizational commitment mediates the effect of public service motivation on innovative behavior.

2.4 Moderating effect of perceived innovative culture

Organizational culture refers to a "complex set of values, beliefs, assumptions, and symbols that define the way in which a firm conducts its business" (Barney, 1986, p. 657). Culture is a collective context, such as an institution, that guides organizational members' behaviors and choices. Within this context, individuals internalize and learn shared cultural values to sustain in-group homogeneity (Wilkins and Ouchi, 1983; Büschgens et al., 2013). When innovation is a shared value within an organization, it fosters an perceived innovative culture and actively motivates its members to innovate in terms of both willingness and behavior.

The influence of organizational culture, specifically perceived innovative culture, on employee behavior is well-established in organizational psychology. An perceived innovative culture characterized by support for creativity, tolerance of risk, and openness to new ideas is considered crucial for fostering innovation within organizations (Martins and Terblanche, 2003). A group with a collective organizational culture of innovation will serve as a catalyst to enhance the level of innovative behavior and its relationship with other factors influencing innovation compared to a group lacking such a culture.

The moderating role of perceived innovative culture in the relationship between PSM, organizational commitment, and innovative behavior is rooted in fit theory (Kristof, 1996). According to this perspective, the congruence between an individual's values (such as those associated with PSM) and the organizational environment (such as an perceived innovative culture) enhances the likelihood of certain behaviors, including innovation (Schneider, 1987; Chatman, 1989). Thus, perceived innovative culture may amplify or mitigate the effects of PSM and organizational commitment on innovative behavior.

The alignment between PSM and an perceived innovative culture arises because individuals with a high level of PSM are often intrinsically motivated to achieve outcomes that benefit the public and seek out creative ways to overcome barriers to public service delivery. An organizational culture that values and supports innovation can amplify the impact of PSM by providing the resources, support, and recognition needed to transform creative ideas into tangible improvements in public services. Thus, when PSM and an innovative organizational culture coexist, the organization is more likely to foster a proactive and creative workforce dedicated to public service excellence.

Also, the link between organizational commitment and innovation behavior is grounded in the idea that committed employees are more likely to engage in behaviors that go beyond their basic job requirements, including innovative behavior. This is because committed employees have a stronger desire to contribute to the organization's success and are more willing to engage in risk-taking and experimentation, which are essential for innovation. Furthermore, committed employees are likely to have a deeper understanding of the organization's goals and challenges, enabling them to identify opportunities for innovation that align with organizational objectives.

Hence, the presence of an perceived innovative culture within an organization strengthens the relationship between PSM, organizational commitment, and innovative behavior, creating an environment more conducive to innovation.

Accordingly, Hypothesis 3-1 states that an perceived innovative culture influences how PSM translates into organizational commitment, potentially enhancing the alignment between personal values and organizational objectives. Hypothesis 3-2 implies that the

impact of organizational commitment on innovative behavior varies depending on the level of perceived innovative culture, with a stronger culture likely to enhance the commitment-behavior link. Finally, hypothesis 3-3 suggests that perceived innovative culture within an organization can moderate the relationship between PSM and innovative behavior.

> *H3*: Perceived innovative culture moderates the relationships among PSM, organizational commitment, and innovative behavior.
>
> *H3-1*: Perceived innovative culture moderates the relationship between PSM and organizational commitment.
>
> *H3-2*: Perceived innovative culture moderates the relationship between organizational commitment and innovative behavior.
>
> *H3-3*: Perceived innovative culture moderates the relationship between PSM and innovative behavior.

3 Methods

3.1 Sampling and data collection

The survey in this study targeted public servants within the central government of the Republic of Korea. Due to the challenge of obtaining a comprehensive sampling frame of all government agency employees in Korea, we utilized two sources for sampling: an online panel pool and a list of employees from the Ministry of the Interior and Safety (MOIS). The online panel pool, owned by Mbrane Public, a reputable research company in Korea, comprises approximately 1.5 million individuals as of May 2022. We distributed an email containing a web survey instrument and sent text messages requesting participation to all 6,333 panelists who identified their occupation as "public servant in a centralized administrative organization." Ultimately, 714 respondents out of the 6,333 panelists participated in the web survey, resulting in a survey participation rate of 11.3%.

However, due to the insufficient sample size to meet our target, we extended the survey to include public employees in the central government through the MOIS. A cooperation letter containing the survey URL was issued to 3,845 employees working in the MOIS headquarters and agencies, with 307 employees participating in the survey, yielding a response rate of 8.0%. The combined response rate for both surveys was 10.0%. Data collection took place from May 24 to June 5, 2022, and was conducted by Mbrane Public. To analyze the survey data and test the proposed hypotheses, structural equation modeling (SEM) was employed.

3.2 Measures

3.2.1 Public service motivation

PSM was measured using four survey items from PSM measurement instruments suggested by Kim (2009). The four items include: 'Meaningful public service is very important to me' (Commitment to the public interest dimension), 'I am interested in making public programs that are beneficial for my country I belong to' (Attraction to policymaking dimension), 'I feel sympathetic to the plight of the underprivileged' (Compassion dimension), and 'I am prepared to make enormous sacrifices for the good of society' (Self-sacrifice dimension). The reliability of the survey items, as measured by Cronbach's α, was 0.80.

3.2.2 Perceived innovative culture

Perceived innovative culture was measured using two survey items modified from Cameron and Quinn's (1999) Competing Values Framework Scale. The two survey items include 'My organization emphasizes innovation and creativity,' and 'My organization takes into account employees' insights to resolve the challenges' The value of Cronbach's α of the scale was 0.81. These two items were incorporated into a single metric variable. We transformed the variable into a non-metric variable and dichotomized it into high- and low-innovation culture groups based on the average value.

3.2.3 Organizational commitment

Organizational commitment was evaluated using four modified survey items referenced from Allen and Meyer (1990). The four survey items are: "I feel a strong sense of belonging to my organization' (Affective commitment dimension), I feel proud of belonging to my organization' (Affective commitment dimension), 'I am willing to work additionally if my organization wants'(Normative commitment dimension), and 'I have never thought about leaving this organization'(Continuance commitment dimension). The reliability of the items in this study was indicated by a Cronbach's α value of 0.81.

3.2.4 Innovative behavior

Innovative behavior was assessed using three modified survey items developed by Scott and Bruce (1994). The three items include: 'I frequently generate creative ideas,' and 'I try to develop new ideas to solve problems at work,' 'I do my best to revamp the irrational status quo.' The Cronbach's α value of the scale was 0.86.

3.2.5 Control variables

We include employee gender (1: male, 0: female), education level (1: graduate degree, 0: undergraduate degree), and job tenure (0–38 years) as control variables that may affect innovative behavior in the model. All the variables except the control variables were scored on a five-point Likert scale. The sample consists of 562 males (55.0%) and 459 females (45.0%). In terms of education, 327 individuals are graduates (31.7%), and the majority, 697, have an undergraduate level of education or less (68.3%). Regarding job tenure, the sample is divided among those with less than 2 years (109 individuals, 10.7%), 2–6 years (276 individuals, 27.0%), 6–10 years (188 individuals, 18.4%), 11–20 years (261 individuals, 25.6%), and more than 20 years (187 individuals, 18.3%).

4 Analytical results

4.1 Reliability and validity

The factor loadings of the measurement items demonstrated sufficient representation of their respective constructs. Both the

overall Cronbach's α value and those of all constructs exceeded 0.8, exceeding the established threshold of 0.70 (Kline, 2016). Convergent and discriminant validity were assessed to ensure the convergence of multiple indicators within the same construct and the distinctiveness of the indicators across different constructs (Neuman, 2011). The evaluation of convergent validity relies on average variance extracted (AVE) and composite reliability (CR). As presented in Table 3, the CR values exceeded 0.8 and the AVE values exceeded 0.6, meeting the criteria for sufficient convergent validity.

For discriminant validity, a comparison was made between correlation coefficients of the three latent variables and the square root values of their respective AVE. According to the established criterion, discriminant validity was affirmed if the square root values of AVE surpass the correlation coefficients. The results in Table 4 indicate that the square root values of the AVE for all four latent variables consistently exceeded the correlation coefficients among the variables, confirming the model's satisfactory discriminant validity.

4.2 Common method variance

To check for common method bias, we followed Podsakoff et al. (2003) and applied Harman's one-factor technique. Harman's one-factor analytical results identified the variance of the first factor as 38.44%, which was less than 50%, indicating that common-source bias was not a serious concern in our data. Additionally, the Heterotrait-Monotrait (HTMT) ratios for our study ranged from 0.33 to 0.598, effectively confirming the discriminant validity of the constructs. Since all HTMT values are significantly below the conventional thresholds of 0.85, it is clear that the constructs are distinct and measure separate phenomena (Henseler et al., 2015). This is a crucial validation point, particularly in addressing potential concerns related to common method variance.

4.3 Confirmatory factor analysis

Confirmatory factor analysis (CFA) was conducted to identify the optimal model through multiple confirmatory factor comparisons. As depicted in Table 5, the model fit least favorably when all factors were combined into a single factor (χ^2 = 2343.765, df = 65, CFI = 0.608, TLI = 0.530, RMSEA = 0.185, SRMR = 0.110). The most suitable model was determined to be the four-factor model, demonstrating a good fit to the data (χ^2 = 327.478, df = 59, CFI = 0.954, TLI = 0.939, RMSEA = 0.067, SRMR = 0.050). Significantly, the proposed four factor-model outperformed the three-factor model, as evidenced by $\Delta\chi^2(3) = 485.146$, $p < 0.001$.

4.4 Hypothesis testing

4.4.1 Main effects

Structural equation modeling revealed a favorable fit to the data (χ^2 = 271.19, df = 67, CFI = 0.960, TLI = 0.947, RMSEA = 0.055, SRMR = 0.069). As illustrated in Figure 2 and Table 6, PSM exhibited a positive relationship with organizational commitment ($\beta = 0.658$, $p < 0.001$), and was also positively associated with innovative behavior ($\beta = 0.433$, $p < 0.001$), supporting our hypotheses. Contrary to our expectations, however, organizational commitment did not emerge as a predictor of innovative behavior ($\beta = 0.110$, $p > 0.05$).

Regarding the control variables, gender demonstrated a positive association with innovative behavior, indicating that male employees were more inclined to be innovative than their female counterparts. Education was found to be linked to innovative behavior, suggesting that employees with graduate degrees are more likely to innovate than those with undergraduate degrees. In addition, job tenure displayed a positive association with innovative behavior in public organizations, which supports that Woods et al. (2018)'s findings that employees' organizational tenure has a pivotal role of innovative work behavior.

4.4.2 Mediation effect

To examine the mediation effect, we performed bootstrap resampling with 5,000 replications. The bootstrap analysis in Table 7, revealed that the mediation effect value of organizational commitment between PSM and innovative behavior was 0.08, with a 95% confidence interval of [−0.009, 00172], which includes 0, indicating the absence of a mediating effect of organizational commitment in the model, contrary to our hypothesis. In this causal path, the direct effect was 0.48 and the indirect effect was 0.08, and the total effect was thus 0.56. This finding indicates that most of the effect can be attributed to the direct relationship between PSM and innovative behavior.

4.4.3 Moderating effects

To examine the moderating effect of perceived innovative culture, we conducted separate structural equation modeling for the high and low innovation groups. Table 8 presents the coefficients for all paths in both groups. The effect value of PSM on organizational commitment for the high innovation group was 0.832 ($p < 0.001$), while that for the low innovation group was 0.557 ($p < 0.001$). However, it remains uncertain whether the coefficient of the high innovation group differs significantly from that of the low innovation group.

To test the significance of the difference between the two coefficients, the unconstrained model was compared with the

TABLE 3 Reliability of the constructs.

Variable	Items	Factor loading	CR	AVE	Cronbach's α
Public service motivation	PSM 1	0.786***	0.846	0.702	0.803
	PSM 2	0.730***			
	PSM 3	0.621***			
	PSM 4	0.708***			
Organizational commitment	OC 1	0.807***	0.871	0.748	0.814
	OC 2	0.658***			
	OC 3	0.803***			
	OC 4	0.668***			
Innovative behavior	IB 1	0.822***	0.861	0.790	0.861
	IB 2	0.864***			
	IB 3	0.778***			
Perceived innovative culture	PC 1	0.745***	0.824	0.809	0.814
	PC 2	0.923***			

***$p < 0.001$.

TABLE 4 Correlation coefficients and discriminant validity.

Variable	$\sqrt{AVE}$	PSM	OC	IB	PC	Gender	Work year	Edu
PSM	0.83	1						
OC	0.86	0.28***	1					
IB	0.88	0.24***	0.22***	1				
PC	0.89	0.33***	0.29***	0.17***	1			
Gender	–	0.15***	0.06***	0.08	0.01	1		
Work year	–	0.20***	1.36***	1.66	0.58*	1.18***	1	
Edu	–	0.07*	0.02	0.02	0.01	0.01	0.63***	1

*$p < 0.05$; ***$p < 0.001$.

TABLE 5 Confirmatory factor analysis.

Model	χ^2	*df*	CFI	TLI	RMSEA	SRMR
Four-factor model (PSM, PC, OC, IB)	327.478	59	0.954	0.939	0.067	0.050
Three-factor model (PSM, OC + PC, IB)	812.624	62	0.871	0.838	0.109	0.068
Three-factor model (PSM + PC, OC, IB)	975.656	62	0.843	0.802	0.120	0.081
Two-factor model (PSM + OC, PC + IB)	1,616.130	64	0.733	0.675	0.154	0.107
Two-factor model (PSM + PC, OC+ IB)	2,114.574	64	0.647	0.570	0.177	0.109
One-factor model (PSM + OC + IB + PC)	2,343.765	65	0.608	0.530	0.185	0.110

TABLE 6 Main effects of the proposed model.

Direct Path	Coefficient	S.E	95% Confidence Interval	
			Lower 2.5%	Upper 2.5%
PSM → OC	0.658***	0.034	0.591	0.723
OC → IB	0.110	0.062	−0.012	0.234
PSM → IB	0.433***	0.061	0.312	0.549
Gender → IB	0.129***	0.031	0.068	0.188
Education → IB	0.071*	0.029	0.014	0.128
Working year → IB	0.115***	0.029	0.058	0.172

*$p < 0.05$; ***$p < 0.001$.

constrained model while holding the effects of PSM on organizational commitment equal. The chi-square difference value, "$\chi^2(1)$, between the unconstrained (χ^2 = 361.66, *df* = 150) and constrained (χ^2 = 373.27, *df* = 151) models was 11.61, exceeding the critical value of 3.84 at the 0.05 significance level. This indicates a moderating effect, suggesting that the effect of PSM on organizational commitment is significantly higher for the high-innovation group than for the low-innovation group.

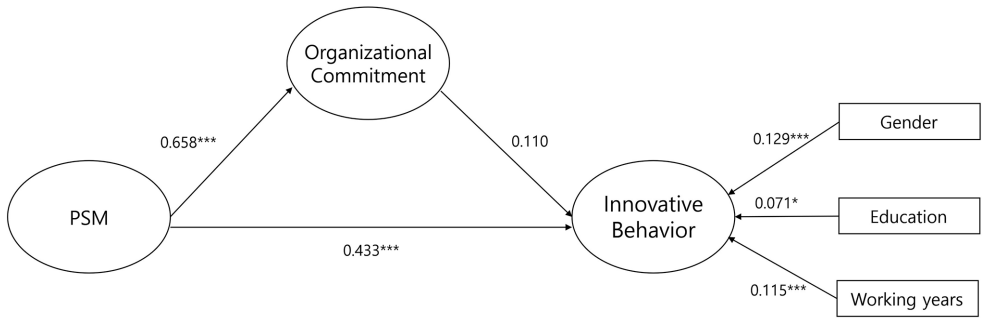
For the causal path between organizational commitment and innovative behavior, the effect of organizational commitment on innovative behavior for the high innovation culture group was positive and statistically significant (β = 0.219, $p < 0.01$), but that of its counterpart was not statistically significant. The chi-square difference value, "$\chi^2(1)$, between the unconstrained (χ^2 = 361.66, *df* = 150) and constrained (χ^2 = 367.31, *df* = 151) models was 5.65, indicating that the effect for the high innovation group is significantly different from that for the low innovation group—that is, there is a moderating effect.

For the effect of PSM on innovative behavior, the chi-square difference value, "$\chi^2(1)$, between the unconstrained and constrained models was 3.51, which is less than the critical value of 3.84. This finding demonstrates that perceived innovative culture has no moderating effect.

5 Discussion and implications

5.1 Discussion

The results offer significant insight into the dynamics of innovative behavior within public organizations. The acceptance of Hypothesis 1 confirms that PSM is positively related to innovative behavior. This finding aligns with the existing literature, suggesting that employees motivated by a desire to serve the public are more inclined to engage in innovative activities aimed at making citizens more comfortable with public services (Miao et al., 2018; Lee et al., 2020; Nguyen et al., 2023). This relationship underscores the importance of intrinsic motivation in fostering an environment conducive to innovation, particularly in the public sector.



χ^2=271.49***, df=67, CFI=0.960, TLI=0.947, RMSEA=0.055, SRMR=0.069

FIGURE 2
Path coefficients of the proposed model.

TABLE 7 Analytical results of bootstrap resampling for mediation (replication = 5,000).

Mediation	Estimate	S.E.	95% CI
PSM → OC → IB	0.080	0.045	−0.009, 0.172
Total effect	0.560	0.049	0.463, 0.656
Direct effect	0.480	0.072	0.339, 0.621
Indirect effect	0.080	0.045	−0.009, 0.172

The non-acceptance of Hypothesis 2 suggests that organizational commitment may not play the hypothesized mediating role in the relationship between PSM and innovative behavior. This could indicate that the direct influence of PSM on innovative behavior is not significantly channeled through organizational commitment. This finding suggests that PSM directly influences innovative behavior without mediation through organizational commitment, perhaps implying that the intrinsic motivation provided by PSM is sufficient to drive innovative behavior independently. Alternatively, the nature of public sector work, with its complex regulations and bureaucratic constraints, might limit the extent to which individual commitment can translate into observable innovative outcomes (Demircioglu and Audretsch, 2017; Acar et al., 2018).

The acceptance of Hypotheses 3–1 and 3–2 with positive moderation underscores the significant role of perceived innovative culture in enhancing the relationships between PSM and organizational commitment (H3-1) and between organizational commitment and innovative behavior (H3-2). This indicates that in environments where innovation is culturally valued and nurtured, employees with high PSM are likely to develop stronger organizational commitment, which in turn, more effectively translates into innovative behavior. This result highlights the pivotal role of an innovative organizational culture in leveraging employee motivation and commitment toward fostering innovation (Lukoto and Chan, 2016; Li and Liu, 2022; Pradana et al., 2022).

The finding that Hypothesis 3-3, positing that perceived innovative culture moderates the relationship between PSM and innovative behavior, is not supported prompts several possible explanations. This outcome suggests that the influence of an innovative organizational culture may not be as pivotal in moderating the impact of PSM on innovative behavior as initially theorized.

The results offer significant insight into the dynamics of innovative behavior within public organizations. The hypothesis 1 was supported. It confirms that PSM is positively related to innovative behavior. This finding aligns with the existing literature, suggesting that employees motivated by a desire to serve the public are more inclined to engage in innovative activities aimed at making citizens more comfortable with public services (Miao et al., 2018; Lee et al., 2020; Nguyen et al., 2023). This relationship underscores the importance of intrinsic motivation in fostering an environment conducive to innovation, particularly in the public sector.

The hypothesis 2 was not supported. It suggests that organizational commitment may not play the hypothesized mediating role in the relationship between PSM and innovative behavior. This could indicate that the direct influence of PSM on innovative behavior is not significantly channeled through organizational commitment. This finding suggests that PSM directly influences innovative behavior without mediation through organizational commitment, perhaps implying that the intrinsic motivation provided by PSM is sufficient to drive innovative behavior independently. Alternatively, the nature of public sector work, with its complex regulations and bureaucratic constraints, might limit the extent to which individual commitment can translate into observable innovative outcomes (Demircioglu and Audretsch, 2017; Acar et al., 2018). Given the limited research on this relationship, further investigation is necessary across different sociocultural and methodological contexts.

The hypotheses 3–1 and 3–2 were supported; positive moderation underscores the significant role of perceived innovative culture in enhancing the relationships between PSM and organizational commitment (H3-1) and between organizational commitment and innovative behavior (H3-2). This indicates that in environments where innovation is culturally valued and nurtured, employees with a high level of PSM are likely to develop stronger organizational commitment, which in turn, more effectively translates into innovative behavior. This result highlights the pivotal role of an innovative organizational culture in leveraging employee motivation and commitment toward fostering innovation (Lukoto and Chan, 2016; Li and Liu, 2022; Pradana et al., 2022).

The finding that hypothesis 3-3, positing that perceived innovative culture moderates the relationship between PSM and innovative behavior, is not supported prompts several possible explanations. This outcome suggests that the influence of an innovative organizational

TABLE 8 Group analysis for moderation effects.

Path	High innovation group	Low innovation group	Unconstrained model	Constrained model
	β (S.E.)	β (S.E.)	χ^2 (*df*)	χ^2 (*df*)
PSM → OC	0.832*** (0.060)	0.557*** (0.076)	361.66 (150)	373.27 (151)
OC → IB	0.219** (0.081)	−0.029 (0.065)	361.66 (150)	367.31 (151)
PSM → IB	0.334*** (0.094)	0.550*** (0.064)	361.66 (150)	365.17 (151)

**$p < 0.01$; ***$p < 0.001$.

culture may not be as pivotal in moderating the impact of PSM on innovative behavior as initially theorized.

One possible explanation for this result could be the inherent strength of PSM itself. Individuals with high PSM may be intrinsically motivated to innovate, regardless of organizational culture. This aligns with one of the core principles of PSM that individuals are driven by a commitment to the public good and societal values, potentially overshadowing environmental factors like organizational culture (Perry and Vandenabeele, 2015).

5.2 Implications

5.2.1 Theoretical implications

The study's findings on the interplay between PSM, organizational commitment, innovative behavior, and the role of perceived innovative culture within public organizations offer several potential contributions to the literature of organizational psychology. These contributions revolve around understanding how individual motivations and organizational factors interact to influence behavior in workplace settings, particularly in the context of fostering innovation. Here are some possible contributions.

First, the direct relationship between PSM and innovative behavior is in line with self-determination theory, which emphasizes the importance of intrinsic motivation in driving workplace behavior (Klaeijsen et al., 2018; Ryan and Deci, 2020). This finding contributes to organizational psychology by providing empirical support for theories that emphasize the role of intrinsic factors, such as a sense of purpose or a desire to contribute to the public good, in motivating behavior beyond extrinsic rewards or formal organizational structures (Reiss, 2012; Kuvaas et al., 2017).

Second, the findings related to the moderating role of perceived innovative culture in enhancing the relationship between PSM and organizational commitment and between organizational commitment and innovative behavior contribute to organizational culture theories. They highlight the importance of alignment between individual motivations, organizational commitment, and the broader cultural context in facilitating innovative behaviors. This aligns with and expands upon person-organization fit theory, providing a view of how culture interacts with individual and organizational-level factors to support or hinder innovation (Goldberg et al., 2015; Lau et al., 2017; Chen et al., 2018).

Third, the study reveals a direct relationship between PSM and innovative behavior in public organizations, challenging the conventional roles of organizational commitment and culture as mediators and moderators. Organizational commitment is based on extrinsic rewards within an organization. However, since PSM is based on intrinsic rewards and operates through a passion for serving the public interest, it can lead to innovative behavior even in the absence of a strong connection to rewards, especially in public organizations. Therefore, self- determination theory can account for this relationship, suggesting that the dynamics of intrinsic motivation play a significant role. In conclusion, within public organizations, it is posited that the motivation driving innovation is more strongly associated with PSM than with organizational commitment (Rosa et al., 2020).

Lastly, we discovered that although organizational culture is an important factor, as demonstrated in previous studies (Naveed et al., 2022; Pradana et al., 2022; Budur et al., 2024), its moderating role of organizational culture is not uniformly influenced and varies depending on other individual characteristics, including commitment or motivation. Furthermore, the lack of a significant moderating effect of perceived innovative culture on the PSM-innovative behavior link indicates that the powerful drive of PSM may transcend organizational cultural influences. These findings underscore PSM's potent and independent role in fostering innovation within the public sector, highlighting the need for further exploration into how motivational dynamics operate in contexts where public service and innovation intersect, without necessarily relying on organizational commitment or culture to facilitate this process.

5.2.2 Practical implications

From a practical standpoint, this study offers actionable strategies for public sector organizations to foster innovation.

First, by recognizing the link between PSM and innovation, public organizations should develop strategies to attract and retain individuals with high PSM. This could involve highlighting service-oriented values in recruitment and promoting a culture that values public service. Although we focused on innovative behavior, PSM has been identified as playing a role in positive outcomes such as job satisfaction, organizational citizenship behavior, and performance within organizations (Ritz et al., 2016). PSM serves as motivation not only for civil servants but also for citizens and employees in private companies. It is widely acknowledged that training programs can cultivate PSM in public organizations. From an innovative standpoint, emphasizing public values and a sense of community through training

programs in an organization can directly or indirectly inculcate this motivation within the workforce, thus fostering innovative behavior to enhance public services for citizens.

Second, the role of perceived innovative culture as a catalyst for innovation underscores the necessity for organizations to deliberately foster such a culture. It is critical to create an environment that not only encourages creativity and risk-taking but also deeply values and supports PSM and organizational commitment. Employees are pivotal in driving organizational innovation, crucial for maintaining a competitive advantage and ensuring long-term sustainability (Borins, 2002). Consequently, cultivating a workplace culture or climate that actively encourages employees to embrace and demonstrate innovative behaviors is increasingly becoming an essential strategic approach for organizations (Guo et al., 2023).

Third, the moderating effect of perceived innovative culture on the PSM-commitment relationship implies a need to balance flexibility and innovation with stability and commitment. Organizations should strive for a culture that simultaneously promotes innovation and values the stability brought by committed employees.

In conclusion, this research offers both theoretical and practical insights, enhancing the understanding of how PSM, organizational commitment, and perceived innovative culture interact to drive innovation in the public sector. This underscores the need for a holistic approach to managing public sector organizations, in which individual motivations and organizational culture are aligned to foster innovative behaviors.

6 Conclusion

This study seeks to deepen our understanding of the relationships among PSM, organizational commitment, perceived innovative culture, and innovative behavior in public sector organizations. It illuminates how these factors interact and influence each other, contributing significantly to the body of knowledge in organizational psychology and public administration. These findings underscore the pivotal role of PSM in fostering innovative behavior. Furthermore, this study highlights the critical moderating role of perceived innovative culture in this dynamic. This understanding is invaluable for public-sector organizations striving to enhance innovation and adaptability in a rapidly changing global environment.

However, this study has some limitations that should be acknowledged as opportunities for future research. This study's findings are based on a specific demographic and institutional context, which may limit their generalizability. Different public sector environments, cultural contexts, and organizational structures might yield different results. While this study examined perceived innovative culture as a moderating factor, the multifaceted nature of culture suggests that other cultural elements could influence the observed relationships. Further research could explore additional cultural dimensions and their interplay with PSM and innovative behavior. Other variables not considered in this study may influence innovative behavior in public organizations, such as personal values, leadership styles, policy environments, or external societal pressures (Borins, 2002; Purc and Laguna, 2019). A shortened version of measures was utilized for PSM, organizational commitment, and innovative behavior in this study, potentially compromising the validity of the constructs. Future research should replicate using a full scale of measurement for those variables.

In conclusion, while this study contributes to a valuable understanding of the factors driving innovative behavior in public organizations, it highlights the need for continued exploration in this field. Future research should build on these findings, explore new contexts and incorporate diverse methodologies to further our understanding of innovation in the public sector.

Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: The data was created by the Korea Institute of Public Administration and is used with permission in accordance with the Research Data Management Rules of the Korea Institute of Public Administration. The data that support the findings of this study are available on request from Korea Institute of Public Administration. Requests to access these datasets should be directed to https://www.kipa.re.kr/site/kipa/stadb/selectBaseDBFList.do.

Ethics statement

The studies involving humans were approved by Korea Institute of Public Administration. 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

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

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This work was supported by the research fund of Hanyang University (HY-201900000000921).

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.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

Abdelmotaleb, M., and Saha, S. K. (2019). Corporate social responsibility, public service motivation and organizational citizenship behavior in the public sector. *Int. J. Public Adm.* 42, 929–939. doi: 10.1080/01900692.2018.1523189

Acar, O., Tarakci, M., and Knippenberg, D. (2018). Creativity and innovation under constraints: A cross-disciplinary integrative review. *J. Manag.* 45, 96–121. doi: 10.1177/0149206318805832

Agostino, D., Arnaboldi, M., and Lema, M. (2020). New development: COVID-19 as an accelerator of digital transformation in public service delivery. *Public Money Manag.* 41, 69–72. doi: 10.1080/09540962.2020.1764206

Allen, N. J., and Meyer, J. P. (1990). The measurement and antecedents of affective, continuance and normative commitment to the organization. *J. Occup. Psychol.* 63, 1–18. doi: 10.1111/j.2044-8325.1990.tb00506.x

Andersen, L. B., Heinesen, E., and Pedersen, L. H. (2014). How does public service motivation among teachers affect student performance in schools? *J. Public Adm. Res. Theory* 24, 651–671. doi: 10.1093/jopart/mut082

Andersen, L. B., Jørgensen, T. B., Kjeldsen, A. M., Pedersen, L. H., and Vrangbæk, K. (2013). Public values and public service motivation: conceptual and empirical relationships. *Am. Rev. Public Adm.* 43, 292–311. doi: 10.1177/0275074012440031

Andersen, L. B., and Kjeldsen, A. M. (2013). Public service motivation, user orientation, and job satisfaction: A question of employment sector? *Int. Public Manag. J.* 16, 252–274. doi: 10.1080/10967494.2013.817253

Askaripoor, M., Motaghi Pisheh, M. H., and Sheikhy, A. (2020). The impact of servant leadership on innovative work behavior in the public sector of Iran: analyzing the mediating role of public service motivation and the moderating role of political skill. *J. Public Adm.* 12, 67–87. doi: 10.22059/jipa.2019.292773.2661

Austen, A., and Zacny, B. (2015). The role of public service motivation and organizational culture for organizational commitment. *Management* 19, 21–34. doi: 10.1515/manment-2015-0011

Barney, J. B. (1986). Organizational culture: can it be a source of sustained competitive advantage? *Acad. Manag. Rev.* 11, 656–665. doi: 10.2307/258317

Bednarczuk, M. (2018). Identity and vote Overreporting by bureaucrats: implications for public service motivation. *Am. Rev. Public Adm.* 48, 148–158. doi: 10.1177/0275074016672345

Bellé, N. (2013). Experimental evidence on the relationship between public service motivation and job performance. *Public Adm. Rev.* 73, 143–153. doi: 10.1111/j.1540-6210.2012.02621.x

Bernier, L., Hafsi, T., and Deschamps, C. (2015). Environmental determinants of public sector innovation: A study of innovation awards in Canada. *Public Manag. Rev.* 17, 834–856. doi: 10.1080/14719037.2013.867066

Bertot, J., Estevez, E., and Janowski, T. (2016). Universal and contextualized public services: digital public service innovation framework. *Gov. Inf. Q.* 33, 211–222. doi: 10.1016/j.giq.2016.05.004

Blau, P. (2017). *Exchange and Power in Social Life*. Abingdon-on-Thames: Routledge. doi: 10.4324/9780203792643

Borins, S. (2002). Leadership and innovation in the public sector. *Leadersh. Organ. Dev. J.* 23, 467–476. doi: 10.1108/01437730210449357

Bozeman, B. (1987). *All organizations are public: Comparing public and private organizations*. Washington, DC: Beard Books.

Bozeman, B., and Su, X. (2015). Public service motivation concepts and theory: A criticque. *Public Adm. Rev.* 75, 700–710. doi: 10.1111/puar.12248

Bright, L. (2020). Does perception of organizational prestige mediate the relationship between public service motivation, job satisfaction, and the turnover intentions of federal employees? *Public Personnel Manage.* 50, 408–429. doi: 10.1177/0091026020952818

Brunetto, Y., Saheli, N., Dick, T., and Nelson, S. (2021). Psychosocial safety climate, psychological capital, healthcare SLBs' wellbeing and innovative behaviour during the COVID 19 pandemic. *Public Perform. Manag. Rev.* 45, 751–772. doi: 10.1080/15309576.2021.1918189

Budur, T., Demirer, H., and Rashid, C. A. (2024). The effects of knowledge sharing on innovative behaviours of academicians; mediating effect of innovative organization culture and quality of work life. *J. Appl. Res. Higher Educ.* 16, 405–426. doi: 10.1108/JARHE-08-2022-0257

Büschgens, T., Bausch, A., and Balkin, D. B. (2013). Organizational culture and innovation: a meta-analytic review. *J. Prod. Innov. Manag.* 30, 763–781. doi: 10.1111/jpim.12021

Bysted, R., and Hansen, J. R. (2015). Comparing public and private sector employees' innovative behaviour: understanding the role of job and organizational characteristics, job types, and subsectors. *Public Manag. Rev.* 17, 698–717. doi: 10.1080/14719037.2013.841977

Cameron, K., and Quinn, R. (1999). *Diagnosing and changing organizational culture. Base on the competing values framework*. Reading, MA: Addison-Wesley.

Camilleri, E., and Van Der Heijden, B. I. J. M. (2007). Organizational commitment, public service motivation, and performance within the public sector. *Public Perform. Manag. Rev.* 31, 241–274. doi: 10.2753/PMR1530-9576310205

Campbell, J. W., and Im, T. (2016). PSM and turnover intention in public organizations: does change-oriented organizational citizenship behavior play a role? *Rev. Public Pers. Adm.* 36, 323–346. doi: 10.1177/0734371X14567366

Chatman, J. A. (1989). Improving interactional organizational research: A model of person-organization fit. *Acad. Manag. Rev.* 14, 333–349. doi: 10.2307/258171

Chen, Z., Huang, S., Liu, C., Min, M., and Zhou, L. (2018). Fit between organizational culture and innovation strategy: implications for innovation performance. *Sustain. For.* 10:378. doi: 10.3390/SU10103378

Chen, S., Wu, M., and Chen, C. (2010). Employee's personality traits, work motivation and innovative behavior in marine tourism industry. *J. Serv. Sci. Manag.* 03, 198–205. doi: 10.4236/jssm.2010.32025

Cho, Y. J., and Song, H. J. (2015). Determinants of whistleblowing within government agencies. *Public Pers. Manage.* 44, 450–472. doi: 10.1177/0091026015603206

Choi, D. L. (2004). Public service motivation and ethical conduct. *Int. Rev. Public Adm.* 8, 99–106. doi: 10.1080/12294659.2004.10805032

Clerkin, R. M., Paynter, S. R., and Taylor, J. K. (2009). Public service motivation in undergraduate giving and volunteering decisions. *Am. Rev. Public Adm.* 39, 675–698. doi: 10.1177/0275074008327512

Corduneanu, R., Dudau, A., and Kominis, G. (2020). Crowding-in or crowding-out: the contribution of self-determination theory to public service motivation. *Public Manag. Rev.* 22, 1070–1089. doi: 10.1080/14719037.2020.1740303

Crewson, P. E. (1997). Public-service motivation: building empirical evidence of incidence and effect. *J. Public Adm. Res. Theory* 7, 499–518. doi: 10.1093/oxfordjournals.jpart.a024363

Cropanzano, R., and Mitchell, M. S. (2005). Social exchange theory: an interdisciplinary review. *J. Manag.* 31, 874–900. doi: 10.1177/0149206305279602

Deci, E. L., and Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press.

Demircioglu, M., and Audretsch, D. (2017). Conditions for innovation in public sector organizations. *Res. Policy* 46, 1681–1691. doi: 10.1016/J.RESPOL.2017.08.004

Devloo, T., Anseel, F., De Beuckelaer, A., and Salanova, M. (2015). Keep the fire burning: reciprocal gains of basic need satisfaction, intrinsic motivation and innovative work behaviour. *Eur. J. Work Organ. Psychol.* 24, 491–504. doi: 10.1080/1359432X.2014.931326

Esteve, M., Urbig, D., van Witteloostuijn, A., and Boyne, G. (2016). Prosocial behavior and public service motivation. *Public Adm. Rev.* 76, 177–187. doi: 10.1111/puar.12480

Fernandez, S., and Moldogaziev, T. (2013). Using employee empowerment to encourage innovative behavior in the public sector. *J. Public Admin. Res. Theor.* 23, 155–187. doi: 10.1093/jopart/mus008

Fischer, C., Malycha, C. P., and Schafmann, E. (2019). The influence of intrinsic motivation and synergistic extrinsic motivators on creativity and innovation. *Front. Psychol.* 10:137. doi: 10.3389/fpsyg.2019.00137

Gan, K., Lin, Y., and Wang, Q. (2020). Public service motivation and turnover intention: testing the mediating effects of job attitudes. *Front. Psychol.* 11:1289. doi: 10.3389/fpsyg.2020.01289

Gans-Morse, J., Kalgin, A., Klimenko, A., Vorobyev, D., and Yakovlev, A. (2022). Public service motivation as a predictor of corruption, dishonesty, and altruism. *J. Public Adm. Res. Theory* 32, 287–309. doi: 10.1093/jopart/muab018

Goldberg, A., Srivastava, S., Manian, V., Monroe, W., and Potts, C. (2015). Fitting in or standing out? The tradeoffs of structural and cultural embeddedness. *Am. Sociol. Rev.* 81, 1190–1222. doi: 10.1177/0003122416671873

Gu, H., Duverger, P., and Yu, L. (2017). Can innovative behavior be led by management? A study from the lodging business. *Tour. Manage.* 63, 144–157. doi: 10.1016/J.TOURMAN.2017.06.010

Guo, U., Peng, Y., and Zhu, Y. (2023). How does empowering leadership motivate employee innovative behavior: A job characteristics perspective. *Curr. Psychol.* 42, 18280–18290. doi: 10.1007/s12144-022-03000-6

Hansen, J. A., and Pihl-Thingvad, S. (2019). Managing employee innovative behaviour through transformational and transactional leadership styles. *Public Manag. Rev.* 21, 918–944. doi: 10.1080/14719037.2018.1544272

Heinonen, K., and Strandvik, T. (2020). Reframing service innovation: COVID-19 as a catalyst for imposed service innovation. *J. Serv. Manag.* 32, 101–112. doi: 10.1108/JOSM-05-2020-0161

Henseler, J., Ringle, C. M., and Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the academy of marketing science*, 43, 115–135. doi: 10.1007/s11747-014-0403-8

Houston, D. J. (2000). Public-service motivation: A multivariate test. *J. Public Adm. Res. Theory* 10, 713–728. doi: 10.1093/oxfordjournals.jpart.a024288

Houston, D. J. (2006). "Walking the walk" of public service motivation: public employees and charitable gifts of time, blood, and money. *J. Public Adm. Res. Theory* 16, 67–86. doi: 10.1093/jopart/mui028

Im, T., Campbell, J. W., and Jeong, J. (2016). Commitment intensity in public organizations. *Rev. Public Pers. Admin.* 36, 219–239. doi: 10.1177/0734371X13514094

Ingrams, A. (2020). Organizational citizenship behavior in the public and private sectors: A multilevel test of public service motivation and traditional antecedents. *Rev. Public Pers. Admin.* 40, 222–244. doi: 10.1177/0734371X18800372

Janssen, O. (2000). Job demands, perceptions of effort-reward fairness and innovative behavior. *J. Occup. Organ. Psychol.* 73, 287–302. doi: 10.1348/096317900167038

Jia, H., Gao, S., Shang, P., Cao, P., Yu, J., and Yu, X. (2022). The relationship between public service motivation and turnover intention: the mediating role of work stress and task performance. *Environ. Health Prev. Med.* 27, 31–10. doi: 10.1265/ehpm.22-00045

Jung, K., Lee, S. H., and Workman, J. E. (2018). Exploring a relationship between creativity and public service motivation. *Knowl. Manag. Res. Pract.* 16, 292–304. doi: 10.1080/14778238.2018.1471327

Kanter, R. M. (1983). *The change masters*. New York: Simon and Schuster.

Kelman, S. (1987). Public choice and public spirit. *Public Interest* 87, 305–360,

Khan, J., and Burdey, M. B. (2021). Enhancing job performance and innovative work behavior through public service motivation-A case study of employees working in federal government of Pakistan. *Journal of the Research Society of Pakistan*, 58, 269–282.

Khorakian, A., Shahroodi, H., Jahangir, M., and Farkhani, Z. (2019). Innovative work behavior in public organizations: the roles of ethical and knowledge sharing behaviors. *Creat. Res. J.* 31, 164–173. doi: 10.1080/10400419.2019.1607444

Ki, N. (2021). Public service motivation and government officials' willingness to learn in public sector benchmarking process. *Public Manag. Rev.* 23, 610–632. doi: 10.1080/14719037.2019.1708437

Kim, S. (2006). Public service motivation and organizational citizenship behavior in Korea. *Int. J. Manpow.* 27, 8, 722–740. doi: 10.1108/01437720610713521

Kim, S. (2009). Revising Perry's measurement scale of public service motivation. *Am. Rev. Public Admin.* 39, 149–163. doi: 10.1177/0275074008317681

Klaeijsen, A., Vermeulen, M., and Martens, R. (2018). Teachers' innovative behaviour: the importance of basic psychological need satisfaction, intrinsic motivation, and occupational self-efficacy. *Scand. J. Educ. Res.* 62, 769–782. doi: 10.1080/00313831.2017.1306803

Kline, R. B. (2016). *Principles and practice of structural equation modeling. 4th* Edn. New York: The Guilford Press.

Koumenta, M. (2015). Public service motivation and organizational citizenship. *Public Money & Management*, 35, 341–348. doi: 10.1080/09540962.2015.1061169

Kristof, A. L. (1996). Person-organization fit: an integrative review of its conceptualizations, measurement, and implications. *Pers. Psychol.* 49, 1–49. doi: 10.1111/j.1744-6570.1996.tb01790.x

Kuvaas, B., Buch, R., Weibel, A., Dysvik, A., and Nerstad, C. G. L. (2017). Do intrinsic and extrinsic motivation relate differently to employee outcomes? *J. Econ. Psychol.* 61, 244–258. doi: 10.1016/j.joep.2017.05.004

Kwon, I. (2014). Motivation, discretion, and corruption. *J. Public Adm. Res. Theory* 24, 765–795. doi: 10.1093/jopart/mus062

Lau, P., McLean, G., Hsu, Y., and Lien, B. (2017). Learning organization, organizational culture, and affective commitment in Malaysia: A person–organization fit theory. *Hum. Resour. Dev. Int.* 20, 159–179. doi: 10.1080/13678868.2016.1246306

Lee, H. J., Kim, M. Y., Park, S. M., and Robertson, P. J. (2020). Public service motivation and innovation in the Korean and Chinese public sectors: exploring the role of Confucian values and social capital. *Int. Public Manag. J.* 23, 496–534. doi: 10.1080/10967494.2019.1639570

Leisink, P., Knies, E., and van Loon, N. (2021). Does public service motivation matter? A study of participation in various volunteering domains. *Int. Public Manag. J.* 24, 865–885. doi: 10.1080/10967494.2018.1428254

Li, Z., and Liu, L. (2022). The impact of organizational innovation culture on employees' innovation behavior. *Soc. Behav. Personal. Int. J.* 50, 1–10. doi: 10.2224/sbp.11934

Li, Y., and Wang, F. (2022). Challenge stressors from using social media for work and change-oriented organizational citizenship behavior: effects of public service motivation and job involvement. *Gov. Inf. Q.* 39:101741. doi: 10.1016/j.giq.2022.101741

Lim, J. Y., Moon, K.-K., and Christensen, R. K. (2022). Does psychological empowerment condition the impact of public service motivation on perceived organizational performance? Evidence from the US federal government. *Int. Rev. Adm. Sci.* 88, 682–701. doi: 10.1177/00208523211008958

Liu, D., Jiang, K., Shalley, C. E., Keem, S., and Zhou, J. (2016). Motivational mechanisms of employee creativity: A meta-analytic examination and theoretical extension of the creativity literature. *Organ. Behav. Hum. Decis. Process.* 137, 236–263. doi: 10.1016/j.obhdp.2016.08.001

Lukoto, K., and Chan, K. (2016). The perception of innovative organisational culture and its influence on employee innovative work behaviour. *Portland Int. Conf. Manage. Eng. Technol.* 2016, 972–977. doi: 10.1109/PICMET.2016.7806707

Mahmood, S., Khan, J., Iqbal, S. M. J., and Farooq, R. M. A. (2020). Investigating the impact of transformational leadership on employee innovative behavior and job performance: the mediating role of public service motivation. *Pak. J. Soc Sci.* 40, 455–465,

Martins, E. C., and Terblanche, F. (2003). Building organisational culture that stimulates creativity and innovation. *Eur. J. Innov. Manag.* 6, 64–74. doi: 10.1108/14601060310456337

Meyer, J. P., and Allen, N. J. (1991). A three-component conceptualization of organizational commitment. *Hum. Resour. Manag. Rev.* 1, 61–89. doi: 10.1016/1053-4822(91)90011-Z

Miao, Q., Eva, N., Newman, A., and Schwarz, G. (2019). Public service motivation and performance: the role of organizational identification. *Public Money Manage.* 39, 77–85. doi: 10.1080/09540962.2018.1556004

Miao, Q., Newman, A., Schwarz, G., and Cooper, B. (2018). How leadership and public service motivation enhance innovative behavior. *Public Admin. Rev.* 78, 71–81. doi: 10.1111/PUAR.12839

Moore, M., and Hartley, J. (2008). Innovations in governance. *Public Manag. Rev.* 10, 3–20. doi: 10.1080/14719030701763161

Mowday, R. T., Steers, R. M., and Porter, L. W. (1979). The measurement of organizational commitment. *J. Vocat. Behav.* 14, 224–247. doi: 10.1016/0001-8791(79)90072-1

Naff, K. C., and Crum, J. (1999). Working for America: does public service motivation make a difference? *Rev. Public Pers. Adm.* 19, 5–16. doi: 10.1177/0734371X9901900402

Naveed, R., Alhaidan, H., Al Halbusi, H., and Al-Swidi, A. (2022). Do organizations really evolve? The critical link between organizational culture and organizational innovation toward organizational effectiveness: pivotal role of organizational resistance. *J. Innov. Knowl.* 7, 100178–100114. doi: 10.1016/j.jik.2022.100178

Neuman, W. L. (2011). *Social research methods: Qualitative and quantitative approaches*. London, United Kingdom: Pearson.

Nguyen, N., Nguyen, D., Vo, N., and Tuan, L. (2023). Fostering public sector employees' innovative behavior: the roles of servant leadership, public service motivation, and learning goal orientation. *Adm. Soc.* 55, 30–63. doi: 10.1177/00953997221100623

Northcott, D., and Taulapapa, T. M. (2012). Using the balanced scorecard to manage performance in public sector organizations: issues and challenges. *Int. J. Public Sect. Manag.* 25, 166–191. doi: 10.1108/09513551211224234

Osborne, S. P., and Brown, L. (2011). Innovation, public policy and public services delivery in the UK. The word that would be king? *Public Adm.* 89, 1335–1350. doi: 10.1111/j.1467-9299.2011.01932.x

Paarlberg, L. E., and Lavigna, R. (2009). *Using research on altruism, prosocial behavior, and public service motivation to change how we manage people in public organizations*. Paper presented at the international public service motivation research conference, Bloomington, IN, June 7-9.

Park, S., and Jo, S. J. (2018). The impact of proactivity, leader-member exchange, and climate for innovation on innovative behavior in the Korean government sector. *Leadersh. Organ. Dev. J.* 39, 130–149. doi: 10.1108/LODJ-09-2016-0216

Park, Y., and Yun, C. (2022). Innovative behavior and performance in the public sector: determinants of innovative behavior and their impacts on performance. *Korean Assoc. Gov. Stud.* 32, 63–99. doi: 10.26847/mspa.2022.32.3.63

Perry, J. L. (1996). Measuring public service motivation: an assessment of construct reliability and validity. *J. Public Admin. Res. Theor.* 6, 5–22. doi: 10.1093/oxfordjournals.jpart.a024303

Perry, J. L. (2000). Bringing society in: toward a theory of public service motivation. *J. Public Adm. Res. Theory* 10, 471–488. doi: 10.1093/oxfordjournals.jpart.a024277

Perry, J. L., and Hondeghem, A. (2008). *Motivation in public management: The call of public service*. Oxford, UK: Oxford University Press.

Perry, J. L., and Vandenabeele, W. (2015). Public service motivation research: achievements, challenges, and future directions. *Public Admin. Rev.* 75, 692–699. doi: 10.1111/puar.12430

Perry, J. L., and Wise, L. R. (1990). The motivational bases of public service. *Public Admin. Rev.* 50, 367–373. doi: 10.2307/976618

Piatak, J. S., and Holt, S. B. (2020). Prosocial behaviors: A matter of altruism or public service motivation? *J. Public Adm. Res. Theory* 30, 504–518. doi: 10.1093/jopart/muz041

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., and Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *J. Appl. Psychol.* 88, 879–903. doi: 10.1037/0021-9010.88.5.879

Porter, L. W., Steers, R. M., and Mowday, R. T. (1974). Organizational commitment, job satisfaction, and turnover among psychiatric technicians. *J. Appl. Psychol.* 59, 603–609. doi: 10.1037/h0037335

Potipiroon, W., and Wongpreedee, A. (2021). Ethical climate and whistleblowing intentions: testing the mediating roles of public service motivation and psychological safety among local government employees. *Public Pers. Manage.* 50, 327–355. doi: 10.1177/0091026020944547

Pradana, M., Silvianita, A., Syarifuddin, S., and Renaldi, R. (2022). The Implication of Digital Organisational Culture on Firm Performance. *Front. Psychol.* 13:840699. doi: 10.3389/fpsyg.2022.840699

Prysmakova, P., and Evans, M. D. (2022). Whistleblowing motivation and gender: vignette-based study in a local government. *Rev. Public Pers. Adm.* 42, 165–190. doi: 10.1177/0734371X20967982

Prysmakova, P., and Vandenabeele, W. (2020). Enjoying police duties: public service motivation and job satisfaction. *J. Police Crim. Psychol.* 35, 304–317. doi: 10.1007/s11896-019-09324-7

Purc, E., and Laguna, M. (2019). Personal values and innovative behavior of employees. *Front. Psychol.* 10:865. doi: 10.3389/fpsyg.2019.00865

Rafique, M. A., Hou, Y., Chudhery, M. A. Z., Gull, N., and Ahmed, S. J. (2023). The dimension linkage between public service motivation and innovative behavior in public sector institutions: the mediating role of psychological empowerment. *Eur. J. Innov. Manag.* 1, 207–229. doi: 10.1108/EJIM-02-2021-0098

Rainey, H. G. (1982). Reward preference among public and private managers: in search of the service ethic. *Am. Rev. Public Admin.* 16, 288–302. doi: 10.1177/027507408201600402

Rainey, H. G., and Bozeman, B. (2000). Comparing public and private organizations: empirical research and the power of the priori. *J. Public Admin. Res. Theor.* 10, 447–470. doi: 10.1093/oxfordjournals.jpart.a024276

Reiss, S. (2012). Intrinsic and extrinsic motivation. *Teach. Psychol.* 39, 152–156. doi: 10.1177/0098628312437704

Ritala, P., Vanhala, M., and Järveläinen, K. (2019). The role of employee incentives and motivation on organizational innovativeness in different organisational culture. *Int. J. Innov. Manage.* 2019:759. doi: 10.1142/s1363919620500759

Ritz, A. (2009). Public service motivation and organizational performance in Swiss federal government. *Int. Rev. Adm. Sci.* 75, 53–78. doi: 10.1177/0020852308099506

Ritz, A., Brewer, G. A., and Neumann, O. (2016). Public service motivation: A systematic literature review and outlook. *Public Admin. Rev.* 76, 414–426. doi: 10.1111/puar.12505

Roh, C., Moon, M. H., Yang, S., and Jung, K. (2016). Linking emotional labor, public service motivation, and job satisfaction: social workers in health care settings. *Soc. Work Public Health* 31, 43–57. doi: 10.1080/19371918.2015.1087904

Rosa, E., Najberg, E., and Sousa, M. (2020). Does PSM matter among innovative government managers? *REGE Rev. Gestão* 27, 263–279. doi: 10.1108/rege-05-2019-0059

Ryan, R., and Deci, E. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: definitions, theory, practices, and future directions. *Contemp. Educ. Psychol.* 61:101860. doi: 10.1016/j.cedpsych.2020.101860

Schneider, B. (1987). The people make the place. *Pers. Psychol.* 40, 437–453. doi: 10.1111/j.1744-6570.1987.tb00609.x

Scott, S. G., and Bruce, R. A. (1994). Determinants of innovative behavior: A path model of individual innovation in the workplace. *Acad. Manag. J.* 37, 580–607. doi: 10.2307/256701

Scott, P. G., and Falcone, S. (1998). Comparing public and private organizations. *Am. Rev. Public Admin.* 28, 126–145. doi: 10.1177/027507409802800202

Shim, D. C., and Faerman, S. (2017). Government employees' organizational citizenship behavior: the impacts of public service motivation, organizational identification, and subjective OCB norms. *Int. Public Manag. J.* 20, 531–559. doi: 10.1080/10967494.2015.1037943

Shim, D. C., Park, H. H., and Eom, T. H. (2017). Street-level bureaucrats' turnover intention: does public service motivation matter? *Int. Rev. Adm. Sci.* 83, 563–582. doi: 10.1177/0020852315582137

Stazyk, E. C., and Davis, R. S. (2015). Taking the 'high road': does public service motivation alter ethical decision making processes? *Public Adm.* 93, 627–645. doi: 10.1111/padm.12158

Suryani, S. T., Fachmi, M., Yahya, M., and Tamsah, H. (2023). Structural modeling analysis of public service motivation on civil Servants' performance through innovative behavior. *Int. J. Multicult. Multireligious Understand* 10, 404–413. doi: 10.18415/ijmmu.v10i10.5235

Thuy, N. T. T., and Phinaitrup, B.-A. (2023). The effect of public service motivation on job performance of public servants in Vietnam: the role of mediation of job satisfaction and person-organization fit. *Int. J. Public Adm.* 46, 326–343. doi: 10.1080/01900692.2021.1995747

Vandenabeele, W. (2009). The mediating effect of job satisfaction and organizational commitment on self-reported performance: more robust evidence of the PSM–performance relationship. *Int. Rev. Admin. Sci.* 75, 11–34. doi: 10.1177/0020852308099504

Venketsamy, A., and Lew, C. (2024). Intrinsic and extrinsic reward synergies for innovative work behavior among south African knowledge workers. *Pers. Rev.* 53, 1–17. doi: 10.1108/PR-02-2021-0108

Vuong, B. N. (2023). The influence of servant leadership on job performance through innovative work behavior: does public service motivation matter? *Asia Pac. J. Public Admin.* 45, 295–315. doi: 10.1080/23276665.2022.2070517

Waheed, A., Xiaoming, M., Ahmad, N., and Waheed, S. (2017). Impact of work engagement and innovative work behavior on organizational performance; moderating role of perceived distributive fairness. *Int. Conf. Manag. Sci. Eng.* 2017, 127–133. doi: 10.1109/ICMSE.2017.8574390

Walton, M., Clerkin, R., Christensen, R. K., Paarlberg, L., Nesbit, R., and Tschirhart, M. (2017). Means, motive and opportunity: exploring board volunteering. *Pers. Rev.* 46, 115–135. doi: 10.1108/PR-01-2015-0012

Wang, Q., Gan, K. P., Wei, H. Y., Sun, A., Wang, Y., and Zhou, X. M. (2024). Public service motivation and public employees' turnover intention: the role of job satisfaction and career growth opportunity. *Pers. Rev.* 53, 99–118. doi: 10.1108/PR-11-2020-0836

West, M. A., and Far, J. L. (1990). *Innovation and creativity at work: Psychological and organizational strategies*. Chichester, UK: Wiley.

Wilkins, A. L., and Ouchi, W. G. (1983). Efficient cultures: exploring the relationship between culture and organizational performance. *Admin. Sci. Q.* 28, 468–481. doi: 10.2307/2392253

Witesman, E., and Walters, L. (2013). Public service values: A new approach to the study of motivation in the public sphere. *Public Adm.* 92, 375–405. doi: 10.1111/padm.12000

Woods, S., Mustafa, M., Aderson, N., and Sayer, B. (2018). Innovative work behavior and personality traits: examining the moderating effects of organizational tenure. *J. Managerial Psychol.* 33, 29–42. doi: 10.1108/JMP-01-2017-0016

Wright, B. E., and Grant, A. M. (2010). Unanswered questions about public service motivation: designing research to address key issues of emergence and effects. *Public Admin. Rev.* 70, 691–700. doi: 10.1111/j.1540-6210.2010.02197.x

Wright, B., Hassan, S., and Park, J. (2016). Does a public service ethic encourage ethical behavior? Public service motivation, ethical leadership and the willingness to report ethical problems. *Public Adm.* 94, 647–663. doi: 10.1111/padm.12248

Wright, B. E., and Pandey, S. K. (2008). Public service motivation and the assumption of person-organization fit: testing the mediating effect of value congruence. *Admin. Soc.* 40, 502–521. doi: 10.1177/0095399708320187

Yuan, F., and Woodman, R. W. (2010). Innovative behavior in the workplace: the role of performance and image outcome expectations. *Acad. Manag. J.* 53, 323–342. doi: 10.5465/amj.2010.49388995

Zandberg, T., and Morales, F. N. (2019). Public managers' networking and innovative work behavior: the importance of career incentives. *Int. Rev. Admin. Sci.* 85, 286–303. doi: 10.1177/0020852317692138

Zhang, Y. (2023). Disclosing the relationship between public service motivation and job satisfaction in the Chinese public sector: A moderated mediation model. *Front. Psychol.* 14:1073370. doi: 10.3389/fpsyg.2023.1073370

Zhu, C., and Wu, C. (2016). Public service motivation and organizational performance in Chinese provincial governments. *Chin. Manag. Stud.* 10, 770–786. doi: 10.1108/CMS-08-2016-0168

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 07 August 2024
DOI 10.3389/fpsyg.2024.1398163

Check for updates

OPEN ACCESS

EDITED BY
Delia Virga,
West University of Timişoara, Romania

REVIEWED BY
Mandy Sim,
University of Nottingham Malaysia Campus, Malaysia
Zhenduo Zhang,
Dalian University of Technology, China

*CORRESPONDENCE
Hongxin Qiu
✉ qiuhongxin1166@163.com

RECEIVED 09 March 2024
ACCEPTED 19 July 2024
PUBLISHED 07 August 2024

CITATION
Jiang B, Qiu H, Liu S and Zhang J (2024) Employee perceived overqualification and innovation performance: the roles of self-oriented perfectionism and job crafting. *Front. Psychol.* 15:1398163. doi: 10.3389/fpsyg.2024.1398163

COPYRIGHT
© 2024 Jiang, Qiu, Liu and Zhang. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Employee perceived overqualification and innovation performance: the roles of self-oriented perfectionism and job crafting

Bing Jiang[1], Hongxin Qiu[1]*, Siyi Liu[1] and Ji Zhang[2]

[1]School of Management, Shandong University of Technology, Zibo, China, [2]School of Economics, Shandong University of Technology, Zibo, China

Leveraging the trait activation theory, the study constructs a model featuring moderated chain mediation to explore how perceived overqualification influences employee innovation performance. After conducting two surveys with Chinese employees, this study collects 363 valid questionnaires. The findings reveal that perceived overqualification is positively related to employee innovation performance. Both self-oriented perfectionism and job crafting are partial mediators between perceived overqualification and innovation performance, and they collectively play a chain mediating role. Furthermore, independent self-construction positively moderates the link between perceived overqualification and self-oriented perfectionism, and informal status positively moderates the relationship between job crafting and employee innovation performance. Additionally, the indirect influence of perceived overqualification on employee innovation performance is moderated by independent self-construction and informal status. This study adds to the current body of literature on perceived overqualification and offers practical implications for organizations aiming to enhance innovation performance.

KEYWORDS

perceived overqualification, self-oriented perfectionism, job crafting, innovation performance, independent self-construction, informal status

1 Introduction

In recent years, various factors, such as the global economic recession, advancements in education, and a challenging employment landscape, have contributed to a scenario where numerous professionals' educational backgrounds, skills, and social experience surpass the demands of available positions. This phenomenon, widely observed in the global labor market, is collectively known as overqualification (Zhang et al., 2016). According to a report, nearly half of the worldwide workforce (47%) regards their qualifications as exceeding the requirements for their current positions, with particularly pronounced sentiments in China (84%) (Lin et al., 2017). Perceived overqualification is often associated with reduced job satisfaction and negative workplace behaviors (Cheng et al., 2020). However, it is noteworthy that, through specific mechanisms or within particular contexts, individuals with perceived overqualification can distinguish themselves within an organization and exhibit positive work behaviors (Zhang et al., 2021). Such behaviors prove advantageous for the organization's long-term development. Consequently, exploring

how to leverage perceived overqualification to enhance employees' work output becomes imperative.

Prior research has generally ascertained that perceived overqualification yields more adverse employee effects. For instance, individuals harboring a perception of being overqualified tend to experience diminished job satisfaction, affective commitment, and other work attitudes (Lobene and Meade, 2013; Harari et al., 2017), leading to negative work behaviors such as job withdrawal, cyberloafing, and voluntary separation (Cheng et al., 2020; Zhang et al., 2020; Ma and Zhang, 2022). Recent research has begun shedding light on the positive aspects associated with perceived overqualification. For instance, Hu et al. (2015) found that employees who perceive themselves as overqualified tend to attribute higher importance to their tasks, which subsequently leads to increased levels of organizational citizenship behaviors. Deng et al. (2018) proposed that perceived overqualification can enhance employees' career commitment. Ma et al. (2020) posited that employees with elevated perceived overqualification often manifest higher levels of positive self-perceived resources, consequently displaying more favorable work behaviors. Despite these insights, a scarcity of empirical evidence regarding the positive effects of perceived overqualification persists (Dar and Rahman, 2020), impeding a comprehensive understanding of its overall impact. Innovation is a primary avenue for employees to cultivate core competitive advantages and actualize enhanced life value, representing a crucial manifestation of their work initiative. Despite existing attention to the influence of perceived overqualification on employee innovation (e.g., perceived overqualification is positively related to employee creativity; Liu and Wang, 2012), a study has yet to elucidate this relationship from a trait activation perspective. Innovation performance, delineating the cumulative outcomes of the employee innovation process, serves as a metric for gauging the results and effectiveness of their innovative activities (Mumford, 2000). Given the prevalence of the "underutilization of abilities" phenomenon in China, this study investigates the impact of perceived overqualification on employee innovation performance within the framework of trait activation theory in the context of Chinese management. The primary focus is to unveil the underlying mechanisms and boundary conditions associated with this indirect influence.

Perceived overqualification engenders a pervasive sense among employees that their skills and qualifications are underappreciated and underutilized, making them prone to negative emotions (Zhang et al., 2020). In psychology, it is a fundamental principle that individuals seek to maximize positive experiences and minimize negative ones (Alicke and Sedikides, 2009). When employees perceive themselves as overqualified, they may develop an intrinsic drive to prove their worth through superior performance. This intrinsic motivation can propel them to excel in their work, thereby enhancing their innovation performance. Consequently, self-oriented perfectionism, characterized by a strong motivation to pursue high standards and goals (Kim et al., 2022), is likely to serve as a bridge between perceived overqualification and employee innovation performance. Motivated by self-oriented perfectionism, employees channel their resources toward innovative endeavors and embrace job crafting behaviors involving transforming, designing, and enhancing job aspects to attain higher professional objectives. Throughout the job crafting process, employees continually improve their innovation abilities through learning and reflective summarization (Tims et al., 2014), resulting in an ultimately favorable impact on innovation performance. Furthermore, the influence of perceived overqualification on employees' self-oriented perfectionism exhibits variation based on individual characteristics. Those strongly inclined toward independent self-construction prioritize personal development and skill enhancement (Lacko et al., 2021), providing a foundation for generating self-oriented perfectionism. Additionally, the recognition and influence derived from informal status significantly contribute to employees' reassessment of their self-work and job crafting, thereby enhancing innovation performance (Wang and Lau, 2022). Consequently, independent self-construction and informal status play pivotal moderating roles in shaping the trajectory of employee innovation performance improvement.

In summary, the study endeavors to investigate the mechanisms and boundary conditions that underlie the impact of perceived overqualification on employee innovation performance. Firstly, the study scrutinizes the impact of perceived overqualification on employee innovation performance within the Chinese management context by applying the conservation of resource theory. Secondly, the research delves into the pathways of perceived overqualification in enhancing innovation performance, examining the dual perspectives of self-oriented perfectionism and job crafting. Thirdly, the study analyzes the moderating effects of independent self-construction and informal status in the relationship between perceived overqualification and innovation performance. Lastly, a moderated chain mediation model is proposed, systematically elucidating the influence mechanism and boundary conditions of perceived overqualification on employee innovation performance. This endeavor aims to broaden our understanding of the positive outcomes and mechanisms associated with perceived overqualification. Additionally, it aims to offer insights and recommendations for enterprises in guiding employees with a sense of overqualification to unleash their creative potential.

2 Theory and hypotheses

2.1 Employee perceived overqualification and innovation performance

Perceived overqualification pertains to an individual's belief that their education, experience, and skills surpass the requisites of their current job (Maynard et al., 2006), which essentially constitutes a subjective evaluation and feeling that the individual's abilities and quality are not optimally aligned with the job. The perception of perceived overqualification comprises two central elements. First is the condition of surplus qualification, evident as a directional "demand-ability" mismatch (Debus et al., 2020). Second, it involves employees' subjective awareness of the disparity between their qualifications and the job requirements. Employees frequently gauge their performance against their ideal self-image and the accomplishments of peers in analogous roles.

This subjective comparison engenders personal cognition and elicits emotional responses from employees. Thus, perceived overqualification is rooted in objective overqualification rather than subjective overconfidence stemming from unwarranted beliefs.

Innovation performance denotes the systematic generation of innovative ideas and the implementation of inventive actions within the organizational context (Wang and Chen, 2022). This process facilitates employees in augmenting their intrinsic value, enabling them to navigate the dynamic organizational environment effectively. Successful innovation performance necessitates not only profound knowledge and exceptional skills but also the subjective initiative of employees. Initially, perceived overqualification propels employees to perceive routine tasks as inadequate for fulfilling their value pursuit. Consequently, they allocate time and effort toward seeking challenges and innovations to satisfy internal aspirations and augment their self-esteem, ultimately fostering innovation performance (Dar and Rahman, 2020). Moreover, employees with perceived overqualification consider their surplus knowledge and abilities valuable and scarce resources within the organization. Drawing from the conservation of resource theory (Hobfoll et al., 2018), employees who want to preserve and cultivate these advantageous resources will exert additional efforts to acquire new skills, initiate novel projects, and employ diverse strategies and methods in their work. This heightened engagement increases the likelihood of organizational innovation performance. Lastly, when employees perceive themselves as more competent than their peers, they exhibit heightened confidence. This confidence mitigates their fear of innovation failure, empowering them to explore novel approaches and thereby enhance innovation performance. Building upon these observations, we posit the subsequent hypotheses:

Hypothesis 1 Perceived overqualification is positively related to employee innovation performance.

2.2 The mediating role of self-oriented perfectionism

Self-oriented perfectionism entails an individual's pursuit of high standards and goals, driven by intrinsic motivation to achieve perfection (Hewitt and Flett, 1991). It is associated with positive outcomes such as dedication and innovative behavior (Childs and Stoeber, 2010; Chang et al., 2016), emphasizing excellence and a zero-tolerance attitude toward imperfections (Otto et al., 2021). According to trait activation theory, individuals' traits are accentuated in specific motivational contexts, leading them to focus on situational factors aligned with their traits (Tett and Guterman, 2000). Compared to employees whose qualifications match their job requirements, those who perceive themselves as overqualified possess a unique advantage. When they recognize that their abilities exceed the demands of their current role, they proactively seek job opportunities that better align with their skills. Driven by a motivation to realize their full potential, they strive to perform their work perfectly, viewing it as an opportunity to showcase their capabilities. Therefore, this study suggests that employees with a strong perceived overqualification are likely to leverage their strengths fully, pursuing higher personal and work goals, thereby fostering self-oriented perfectionism.

Self-oriented perfectionism emphasizes employees' persistent pursuit of perfection, enabling them to actively cope with the pressure arising from job-role mismatches and demonstrate their problem-solving abilities. This, in turn, stimulates positive performance behaviors and enhances innovation performance. First, employees with self-oriented perfectionism exhibit higher work motivation and a stronger sense of efficacy (Kim et al., 2017). These personal resources facilitate the active exploration of new methods and solutions to overcome work obstacles, thereby increasing the likelihood of organizational innovation. Second, employees with high self-oriented perfectionism pursue excellence and perfection when setting and implementing work goals. During the execution of innovation strategies, they maintain this pursuit of perfection, setting higher standards and more stringent self-requirements, and integrating innovative ideas and technologies into their activities, thereby improving innovation performance. Building upon these analyses, we posit the following hypotheses:

Hypothesis 2 Self-oriented perfectionism acts as a mediator linking perceived overqualification to employee innovation performance.

2.3 The mediating role of job crafting

Job crafting pertains to employees spontaneously reshaping their roles to better align with their abilities and interests (Dutton, 2001). Employees perceiving themselves as overqualified often demonstrate the capability to surpass job requirements, leading to a positive self-evaluation. However, the acknowledgment of employees' "positive selves" by leaders and colleagues is typically confined to the assessment of job duties. Consequently, the self-image of overqualified employees goes unrecognized in their current roles, motivating them to engage in job redesign efforts to uphold a positive self- perception (Lin et al., 2017). This motivation is highly likely to foster job-crafting behaviors. Therefore, job crafting, characterized as an active behavior optimizing the alignment between employees and their roles, should be considered an outcome of perceived overqualification.

Job crafting is an innovative learning process wherein employees reevaluate the significance of their jobs and redesign their content (Zhang and Parker, 2019), reflecting a series of behavioral manifestations to achieve superior job performance. Firstly, employees engaged in extensive job crafting exhibit heightened positivity toward their work, demonstrating proactive and adaptive behaviors (Petrou et al., 2012; Guo and Hou, 2022). This proactivity encourages them to seek opportunities for job breakthroughs or actively accept challenging tasks to implement job crafting (Kapica and Baka, 2021) and stimulate more innovative behavior. Secondly, job crafting grants employees greater autonomy and decision-making authority, stimulating their innovation awareness and motivating them to experiment with novel approaches and ideas, thereby enhancing innovation performance. Lastly, through job crafting, employees garner increased recognition from others, enhancing cooperative relationships and creating favorable conditions for implementing innovative behaviors (Erdogan et al., 2020). Furthermore, employees bolster their self-efficacy through learning and reflective

thinking to summarize their work experience in the process of job crafting, enhancing their ability to implement innovative behaviors and ultimately improving their innovation performance. Building upon these observations, we formulate the following hypotheses:

Hypothesis 3 Job crafting acts as a mediator linking perceived overqualification to employee innovation performance.

2.4 The chain mediation of self-oriented perfectionism and job crafting

Self-oriented perfectionism reflects employees' cognitive pursuit of self-perfection and self-improvement. To achieve perfection and avoid uncertain or flawed outcomes, employees high in self-oriented perfectionism exert significant effort to overcome difficulties and meet high standards (Chang et al., 2016). This relentless pursuit of perfection drives them to continuously examine and reflect on their work methods, discard inefficient procedures, and proactively engage in transformative job crafting aligned with their self-actualization goals. This process not only enhances organizational recognition and personal development but also increases job satisfaction. Moreover, employees with self-oriented perfectionism exhibit strong initiative and a notable emphasis on prioritization and ego in their work (Hewitt and Flett, 1991). When job performance does not meet their expectations, they take the initiative to craft their job to improve effectiveness. Consequently, this study concludes that self-oriented perfectionism can promote job crafting.

Trait activation theory posits that individual behavior results from a combination of personality traits and situational factors (Tett and Guterman, 2000). The perception of overqualification arises when employees believe their qualifications exceed the requirements of their current position, reflecting the traits of those who perceive overqualification. Employees with a high perception of overqualification feel their knowledge and abilities are underutilized, leading them to have higher expectations of their intellectual resources. This accelerates the formation of self-oriented perfectionism, driving them to set higher work goals. Through job crafting, they improve work efficiency and stimulate innovative behaviors, thereby enhancing their own innovation performance. Building on these insights, we advance the following hypotheses:

Hypothesis 4 Self-oriented perfectionism and job crafting act as chain mediators linking perceived overqualification to employee innovation performance.

2.5 The moderating influence of independent self-construction

Self-construction encompasses an individual's perception of interpersonal connections (Abele et al., 2021) and is delineated into independent and dependent self-construction (Ilies et al., 2011). Those with dependent self-construction seek positive interpersonal relationships and a sense of belonging, while individuals with independent self-construction aspire to distinctiveness and personal accomplishment. In the contemporary era, the emphasis on independent self-construction among employees is growing, profoundly influencing their work attitudes and behaviors. On one hand, independent self-constructed employees typically exhibit high self-assurance, believing in their ability to create greater value at work. When faced with perceived overqualification, they are more inclined to leverage their excess qualifications to achieve higher work goals, viewing this as an opportunity to validate their self-worth, thereby stimulating self-oriented perfectionism. On the other hand, those with high independent self-construction prioritize success and gains, prioritizing factors such as increased autonomy and adequate qualifications. These anticipated gains and positive elements also provide psychological support for their self-oriented perfectionism. Conversely, employees with low independent self-construction are inclined toward a "compromise" approach in conflict resolution. Even if they recognize that their qualifications surpass job demands, they suppress the pursuit of loftier goals to maintain a harmonious relationship with supervisors, diminishing the likelihood of generating self-oriented perfectionism. Based on these insights, we posit the following hypotheses:

Hypothesis 5 The positive association between perceived overqualification and self-oriented perfectionism is moderated by independent self-construction.

Moreover, the impact of perceived overqualification on employee innovation performance, mediated by self-oriented perfectionism and job crafting, is contingent on the degree of independent self-construction. Employees with a heightened sense of independent self-construction tend to exhibit more incredible foresight, self-esteem, and creativity (Oeberst and Wu, 2015), making them more prone to initiating self-oriented perfectionism in response to perceived overqualification. This, in turn, motivates employees to reconfigure their job responsibilities, aiming for heightened innovation performance. In contrast, employees with low levels of independent self-construction tend to depend on others for guidance and are hesitant to assume additional responsibilities and challenges. Consequently, they struggle to develop self-oriented perfectionism when faced with perceived overqualification. Constrained by low levels of independent self-construction, these employees lack the intrinsic drive to pursue career advancement and are less likely to engage in job crafting behaviors, consequently diminishing their innovation performance. Building on these insights, we posit the following hypotheses:

Hypothesis 6 The chain-mediated connection between perceived overqualification, self-oriented perfectionism, job crafting, and employee innovation performance is moderated by independent self-construction.

2.6 The moderating influence of informal status

Informal status pertains to an individual's recognition from other members within an organization based on informal channels (Zhang et al., 2023). It encompasses the esteem, prestige, and influence that an individual commands in the perception of their peers. Employees with higher informal status typically occupy

more favorable embedded positions within the organization, assuming leadership roles in relationships and interactions with other members. This positioning facilitates resource mobilization and external support, critical for the smooth progression of job crafting processes. Consequently, individuals with elevated informal status levels possess distinct advantages in achieving high innovation performance outputs through job crafting behaviors. Drawing from social identity theory (Spears, 2021), individuals are inclined to uphold their reputation by displaying traits aligning with high status, deriving psychological incentives from the respect and admiration garnered from others, thereby fostering status-protective motives. For employees with high informal status, maintaining their esteemed position motivates them to challenge existing work modes and processes through remodeling, fostering self-reflection and creativity stimulation (Wang and Lau, 2022), thereby enhancing innovative performance. Conversely, employees with lower informal status face limited resources and control. Even with innovative ideas for work improvement, implementing them becomes challenging without long-term recognition and support for their proposals. This scenario impedes the enhancement of their ultimate innovation performance. Grounded in these observations, we posit the following hypothesis:

Hypothesis 7 The positive association between job crafting and employee innovation performance is moderated by informal status.

Drawing further implications from the preceding analysis, informal status moderates the chain-mediated relationship where perceived overqualification propels employee innovation performance. Higher informal status endows employees with additional intangible resources, including trust and work autonomy, fostering increased organizational cooperation and support. Consequently, this heightened status holds more significant sway over organizational development and operations (Magee and Galinsky, 2008). Specifically, employees experiencing pronounced perceived overqualification, bolstered by informal status, are more prone to engaging in challenging appraisals of stressful situations. They leverage their extensive experiential knowledge to recalibrate their current work content, fostering an environment conducive to enhancing innovation performance. Conversely, employees with lower informal status often face a lack of recognition for their work and contributions, leading to reduced motivation, engagement, and potential feelings of depression. In such circumstances, even if employees perceive themselves as overqualified, they struggle to engage in challenging appraisals due to a negative mindset. This reluctance significantly hampers their ability to engage in job crafting behaviors, thereby failing to provide the necessary support for enhancing innovation performance. Grounded in these insights, we posit the following hypotheses:

Hypothesis 8 The chain-mediated connection between perceived overqualification, self-oriented perfectionism, job crafting, and employee innovation performance is moderated by informal status.

In conclusion, Figure 1 illustrates the theoretical model of the study.

3 Methods

3.1 Data collection and sample analysis

The study participants were from 6 operational enterprises in China, encompassing both manufacturing and service sectors. Before conducting the survey, we established contact with these enterprises' Human Resource (HR) managers through our network, outlining the research's objectives. With the endorsement of the human resource management departments, 80 employees were randomly selected from each enterprise, and paper questionnaires were distributed with a specified response deadline. To safeguard the authenticity of survey data, employees were instructed to furnish the final five digits of their mobile phone numbers following the completion of each questionnaire, facilitating the identification of survey subjects. Moreover, it was emphasized that the questionnaire data were solely designated for academic research purposes. Employees were made aware of their option to conclude or withdraw from the survey at any point. To mitigate homophily bias, our questionnaire was designed longitudinally. The initial phase primarily involved the collection of responses from employees on perceived overqualification, self-oriented perfectionism, job crafting, and demographic information, including gender, age, education, and tenure. The subsequent phase focused on gathering responses about innovation performance, independent self-construction, and informal status. Upon completing the questionnaire collection, we would meticulously review the contents. In total, 480 questionnaires were distributed across the two surveys, and 363 were deemed as final valid submissions, resulting in a commendable questionnaire validity rate of 72.6%.

Among the 363 surveyed employees, 59% are male. On average, participants have an age of 34.66 years (SD = 7.55), and their tenure is 30.33 months (SD = 9.15). Regarding educational attainment, bachelor's and master's degrees predominated, accounting for 38.7% and 51.8%, respectively.

3.2 Measures

The research model encompasses six variables: perceived overqualification, self-oriented perfectionism, job crafting, innovation performance, independent self-construction, and informal status. All scales employed in this study are derived from well-established instruments found in prior literature. Responses utilized a five-point Likert scale, responding on a range from 1 to 5, where 1 signifies "completely disagree," and 5 denotes "completely agree."

3.2.1 Perceived overqualification

The evaluation of perceived overqualification employs the scale crafted by Maynard et al. (2006), which comprises seven items, this measure assesses perceived overqualification in terms of knowledge, education, and skills. Representative items include "My level of qualification is higher than the level of qualification

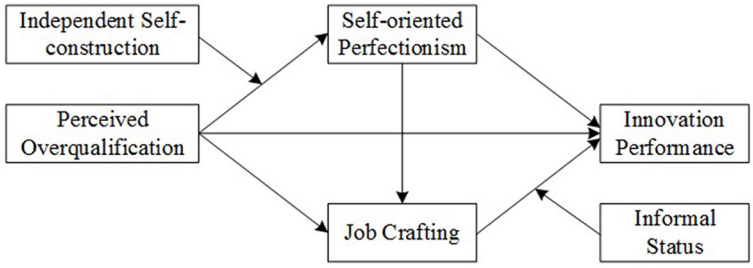


FIGURE 1
Theoretical model.

required by the job." and "Much of my knowledge is not useful in my current job."

3.2.2 Self-oriented perfectionism

The evaluation of self-oriented perfectionism is based on the perfectionism scale developed by Hewitt and Flett (1991). This scale includes eight items specifically focused on self-oriented perfectionism. Representative items are "At work, I set high standards for myself." and "At work, I try to be perfect."

3.2.3 Job crafting

The evaluation of job crafting employs a fifteen-item scale crafted by Slemp and Vella-Brodrick (2014), encompassing three dimensions: task crafting, cognitive crafting, and relational crafting. This scale is adapted to suit the assessed group. Representative items include "I would implement novel approaches to enhance my work." and "I proactively adjust the type or scope of tasks to do my job better."

3.2.4 Innovation performance

The evaluation of innovation performance is based on the scale crafted by Janssen and Van Yperen (2004), comprising three dimensions: idea generation, idea facilitation, and idea realization. This scale includes a total of nine items. Representative items include "I can gain organizational recognition for my innovative ideas." and "I can implement innovative ideas effectively."

3.2.5 Independent self-construction

The evaluation of independent self-construction is based on the self-construction scale crafted by Brockner et al. (2000), with five items selected to assess independent self-construction. Representative items include "I take pleasure in expressing uniqueness in diverse aspects compared to others." and "My personality trait is that I do not want to be constrained by others."

3.2.6 Informal status

Informal status is evaluated through a three-item scale assessing workplace status, derived from the Workplace Status Scale developed by Djurdjevic et al. (2017). Representative items include "I have a high status in the organization." and "I have a high reputation in the organization."

3.2.7 Control variables

Drawing upon extant literature (Wadei et al., 2021), gender, age, education, and tenure are employed as control variables to mitigate the influence of these factors on self-oriented perfectionism, job crafting, and innovation performance. Gender (1 = male, and 2 = female) and education (1 = junior college or below, 2 = undergraduate degree, 3 = master's degree, and 4 = doctoral degree or above) test entries utilized Likert's five-point scoring method, while age (in years) and tenure (in months) are self-reported.

3.3 Analytic strategy

In this study, SPSS 26.0 was utilized for data analysis, while AMOS 24.0 was employed for confirmatory factor analysis and common method bias testing. Firstly, Cronbach's α and composite reliability (CR) were used to assess the reliability of the scale. Secondly, confirmatory factor analysis was conducted to evaluate the discriminant validity of the main variables. Thirdly, common method bias was tested using Harman's single factor analysis and the addition of a common method variance (CMV) factor. Fourthly, an analysis of Pearson correlations was undertaken to explore the connections between the primary variables. Lastly, the hypotheses underwent scrutiny through hierarchical regression analysis combined with the bootstrap method.

4 Results

4.1 Reliability and validity test

The reliability and validity test results for each variable are presented in Table 1. The Cronbach's α and composite reliability (CR) values for all six variables exceed 0.8, indicating strong reliability for each scale. Validity was assessed through convergent and discriminant validity. The results show that the factor loadings for each variable were above 0.5, the KMO values exceeded 0.7, and the average variance extracted (AVE) ranged from 0.514 to 0.731, all above the threshold of 0.5. These findings indicate that the scale demonstrates good convergent validity.

TABLE 1 Reliability and validity test results.

Variables	Factor loading	KMO	Cronbach's α	CR	AVE
Perceived overqualification	0.764–0.824	0.942	0.918	0.921	0.624
Self-oriented perfectionism	0.697–0.851	0.703	0.897	0.909	0.626
Job crafting	0.610–0.963	0.871	0.838	0.939	0.514
Innovation performance	0.730–0.826	0.907	0.897	0.927	0.584
Independent self-construction	0.711–0.902	0.881	0.846	0.931	0.731
Informal status	0.772–0.862	0.702	0.807	0.862	0.677

TABLE 2 Confirmatory factor analysis results.

Models	$\chi 2/df$	$\Delta\chi 2/df$	TLI	CFI	RMSEA	RMR
Six-Factor Model (POQ; CA; JC; ISC; IS; IP)	1.526	–	0.986	0.993	0.018	0.036
Five-Factor Model (POQ; CA + JC; ISC; IS; IP)	2.564	0.302	0.836	0.896	0.063	0.117
Four-Factor Model (POQ; CA + JC+ISC; IS; IP)	3.612	0.737	0.787	0.790	0.070	0.121
Three-Factor Model (POQ; CA + JC+ISC+IS; IP)	5.101	0.976	0.716	0.749	0.091	0.135
Two-Factor Model (POQ+ CA+ JC+ISC+IS; IP)	5.804	1.356	0.665	0.636	0.114	0.147
One-Factor Model (POQ+ CA+ JC+ISC+IS+ IP)	8.194	1.745	0.442	0.534	0.141	0.160
Six-Factor Model + CMV	1.413	3.500	0.991	0.996	0.015	0.031

N = 363; POQ represents perceived overqualification; SP represents self-oriented perfectionism; JC represents job crafting; ISC represents independent self-construction; IS represents informal status; IP represents innovation performance; "+" denotes the amalgamation of two factors into a single factor.

Confirmatory factor analysis was conducted on the variables, with results presented in Table 2. The six-factor model demonstrates the best fit ($\chi^2/df = 1.526$, TLI = 0.986, CFI = 0.993, RMSEA = 0.018, SRMR = 0.036), indicating strong discriminant validity for the scale used in this study. Additionally, the square root of the average variance extracted (AVE) for each variable is greater than the correlation coefficients between the variables (as shown in Table 3), further confirming the good discriminant validity of the scale.

4.2 Test of common method variance

To mitigate the influence of common method bias, a two-stage data collection process was employed. Nevertheless, given that the variables were answered by the same subjects, there remains a potential risk of common method bias. To control for this, a common method latent factor (CMV) was added to the six-factor model following Podsakoff et al.'s (2003) suggestion. The results, presented in Table 2, indicate that while the fitting index improved slightly after adding the CMV, the overall coefficient did not change significantly ($\Delta\chi^2/df = 3.500$, $p > 0.05$). Therefore, common method bias is unlikely to cause serious interference with the hypothesis testing.

4.3 Descriptive statistical analysis

The analysis results, encompassing mean values, standard deviations, and correlation coefficients among variables, are presented in Table 3. Perceived overqualification exhibits a significant positive correlation with self-oriented perfectionism, job crafting, and innovation performance ($r = 0.198$, $p < 0.01$; $r = 0.521$, $p < 0.01$; $r = 0.453$, $p < 0.01$). Additionally, self-oriented perfectionism demonstrates a significant positive association with both job crafting and innovation performance ($r = 0.219$, $p < 0.01$; $r = 0.345$, $p < 0.01$), while job crafting demonstrates a positive association with innovation performance ($r = 0.437$, $p < 0.01$). These findings offer initial support for the hypotheses posited in this study.

4.4 Hypotheses testing

In this study, the hierarchical regression method (Baron and Kenny, 1986) is used to test the main effect and the intermediate effect. The outcomes are presented in Table 4. Initially, we assess the main effect. Perceived overqualification significantly contributes to positive outcomes in employee innovation performance (Model 6, $r = 0.347$, $p < 0.001$) while controlling for gender, age, education, and years of experience, thereby confirming Hypothesis H1. Secondly, this study examines the mediating effects of self-oriented perfectionism and job crafting. The results in Table 4 reveal that perceived overqualification significantly positively influences self-oriented perfectionism and job crafting (Model 2, $r = 0.193$, $p < 0.001$; Model 4, $r = 0.488$, $p < 0.001$). When both perceived overqualification and self-oriented perfectionism are incorporated into the regression equation, self-oriented perfectionism significantly and positively influences employee innovation performance (Model 7, $r = 0.205$, $p < 0.001$), confirming Hypothesis 2. Similarly, when incorporating perceived overqualification and job crafting into the regression equation, it

TABLE 3 Descriptive statistics of variables.

Variables	1	2	3	4	5	6	7	8	9	10
1 Gender										
2 Age	0.041									
3 Education	0.006	0.154**								
4 Tenure	0.017	0.882**	0.192**							
5 POQ	0.019	−0.025	−0.018	−0.066	**0.790**					
6 SP	−0.065	−0.124*	−0.137*	−0.187**	0.198**	**0.791**				
7 JC	0.042	−0.074	−0.063	−0.097	0.521**	0.219**	**0.717**			
8 IP	0.009	−0.222**	−0.082	−0.329**	0.453**	0.345**	0.437**	**0.764**		
9 IS	0.104	0.088	0.022	0.121*	−0.222**	0.156**	−0.163**	−0.276**	**0.855**	
10 ISC	0.019	0.129*	0.037	0.116*	−0.079	0.129**	−0.104*	−0.114*	0.027	**0.823**
M	1.580	34.660	2.110	30.330	3.817	3.668	3.749	3.709	3.891	3.033
SD	0.500	7.550	0.927	9.150	0.892	0.872	0.841	0.727	0.772	0.785

N = 363; POQ represents perceived overqualification; SP represents self-oriented perfectionism; JC represents job crafting; ISC represents independent self-construction; IS represents informal status; IP represents innovation performance. *Represents $p < 0.05$, **represents $p < 0.01$.

TABLE 4 Results of hierarchical regression analysis.

	Self-oriented perfectionism		Job crafting		Innovation performance			
	M 1	M 2	M 3	M 4	M 5	M 6	M 7	M 8
Gender	−0.115	−0.121	0.072	0.059	0.012	0.001	0.018	−0.013
Age	−0.022	−0.021	0.036	−0.029	−0.024**	0.178*	0.179**	0.185**
Education	−0.017	−0.014	−0.041	−0.040	−0.046	−0.011	−0.011	−0.002
Tenure	0.004*	0.003*	−0.099	−0.020	0.011	−0.345***	−0.313***	−0.341***
POQ		0.193***		0.488***		0.347***	0.327***	0.240***
SP							0.205***	
JC								0.219***
R^2	0.032	0.071	0.014	0.279	0.037	0.308	0.294	0.354
ΔR^2	0.032	0.039	0.014	0.265	0.037	0.179	0.056	0.046
F-value	2.941	5.441	1.243	27.598	3.455	31.765	24.747	32.547

N = 363; POQ represents perceived overqualification; SP represents self-oriented perfectionism; JC represents job crafting. *Represents $p < 0.05$, **represents $p < 0.01$, ***represents $p < 0.001$.

is observed that job crafting significantly and positively influences employee innovation performance (Model 8, r = 0.219, $p < 0.001$), supporting Hypothesis 3.

Furthermore, using the bootstrap method, we explore the mediating roles of self-oriented perfectionism and job crafting, as well as their chained mediating roles (Preacher and Hayes, 2004). As outlined in Table 5, the 95% confidence interval for the impact of self-oriented perfectionism is [0.016, 0.077] (excluding 0), indicating that self-oriented perfectionism significantly mediates the link between perceived overqualification and innovation performance, providing additional support for Hypothesis 2. Likewise, the 95% confidence interval for the effect of job crafting is [0.057, 0.189] (excluding 0), suggesting that job crafting significantly mediates the relationship between perceived overqualification and employee innovation performance, reinforcing Hypothesis 3. The 95% confidence interval for the joint effect of self-oriented perfectionism and job crafting is [0.001, 0.011] (excluding 0), indicating that self-oriented perfectionism and job crafting are chain mediators in linking perceived overqualification to employee innovation performance, confirming Hypothesis 4.

To examine the moderating hypotheses (Hypotheses 5 and 7), we formulate two moderating models (Models 12 and 16), incorporating interaction terms between perceived overqualification and independent self-construction, as well as between job crafting and informal status, respectively. As depicted in Table 6, the interaction term between perceived overqualification and independent self-construction exhibits a positive association with self-oriented perfectionism (Model 12, r = 0.118, $p < 0.05$). This result implies that the positive link between perceived overqualification and self-oriented perfectionism is more pronounced among employees with higher levels of independent self-construction (refer to Figure 2), substantiating Hypothesis 5. Similarly, the interaction term

TABLE 5 Results of the mediation effect analysis.

Action path	SE	Boot 95% CI	
		LLCI	ULCI
Perceived overqualification → self-oriented perfectionism → innovation performance	0.016	0.016	0.077
Perceived overqualification → job crafting → innovation performance	0.034	0.057	0.189
Perceived overqualification → self-oriented perfectionism → job crafting → innovation performance	0.003	0.001	0.011

N = 363. CI represents confidence interval.

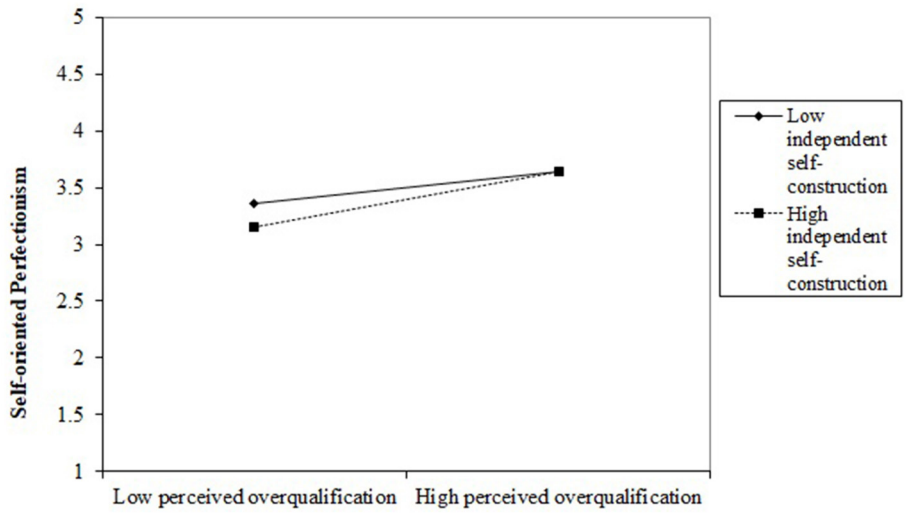


FIGURE 2
The interaction between perceived overqualification and independent self-construction on self-oriented perfectionism.

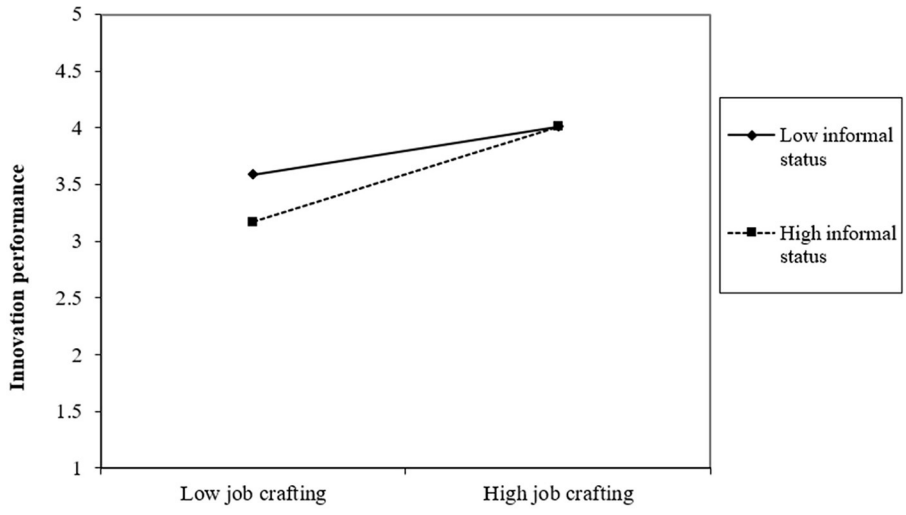


FIGURE 3
The interaction between job crafting and informal status on innovation performance.

between job crafting and informal status demonstrates a significant positive association with innovation performance (Model 16, r = 0.249, $p < 0.001$). The outcome indicates that the positive correlation between job crafting and innovation performance is heightened among individuals with elevated levels of informal status (refer to Figure 3), supporting Hypothesis 7.

For a more in-depth examination of the moderating impacts of independent self-construction and informal status, we illustrate these effects through plotted figures, as depicted in Figures 2, 3.

TABLE 6 Results of hierarchical regression analysis.

	Self-oriented perfectionism				Innovation performance			
	M 9	M 10	M 11	M 12	M 13	M 14	M 15	M 16
Gender	−0.115	−0.121	−0.120	−0.111	0.010	−0.016	0.013	0.023
Age	−0.022	−0.021	−0.021*	0.020*	0.225**	0.212**	0.200**	0.213**
Education	−0.017	−0.014	−0.009	−0.007	−0.011	0.003	0.001	−0.001
Tenure	0.004*	0.003*	0.004	0.004	−0.401***	−0.366***	−0.344***	−0.376***
POQ		0.193***	0.183***	0.159**				
ISC			−0.100	−0.105				
POQ*ISC				0.118*				
JC						0.351***	0.327***	0.251***
IS							−0.167***	−0.209***
JC*IS								0.249***
R^2	0.032	0.071	0.080	0.091	0.128	0.291	0.321	0.344
Δ R^2	0.032	0.039	0.010	0.011	0.128	0.163	0.030	0.023
F-value	2.941	5.441	5.189	5.077	13.196	29.365	28.095	26.639

N = 363; POQ represents perceived overqualification; ISC represents independent self-construction; JC represents job crafting; IS represents informal status. *Represents $p < 0.05$, **represents $p < 0.01$, ***represents $p < 0.001$.

TABLE 7 Results of the moderated mediating effect analysis.

Moderator variables	Indirect effect	SE	Boot 95% CI	
Low ISC (– SD)	0.009	0.017	−0.022	0.048
High ISC (+SD)	0.055	0.018	0.022	0.095
Difference (high ISC – low ISC)	0.046	0.013	0.007	0.058
Low IS (– SD)	0.067	0.025	0.024	0.120
High IS (+SD)	0.127	0.042	0.066	0.228
Difference (high IS – low IS)	0.060	0.033	0.008	0.138

N = 363; ISC represents independent self-construction; IS represents informal status. CI represents confidence interval.

The slope of each line in the figures delineates the effects of perceived overqualification on self-oriented perfectionism across varying levels of independent self-construction and the influence of job crafting on innovation performance across different levels of informal status. The indicators Mean + SD (-SD) denote higher (lower) independent self-construction and informal status levels, respectively. Initially, when the level of independent self-construction is low, perceived overqualification positively affects self-oriented perfectionism (simple slope = 0.159, $p < 0.001$). Notably, this positive impact of perceived overqualification on self-oriented perfectionism becomes more pronounced at higher levels of independent self-construction (simple slope = 0.277, $p < 0.001$). Secondly, job crafting positively affects employee innovation performance when the level of informal status is low (simple slope = 0.251, $p < 0.001$). Significantly, this positive impact of job crafting on innovation performance is accentuated at higher levels of informal status (simple slope = 0.500, $p < 0.001$).

This study employs the bootstrap method to examine the moderating impact of independent self-construction and informal status on the chain-mediated relationship. As delineated in Table 7, at lower levels of independent self-construction and informal status, the indirect impacts of perceived overqualification on the innovation performance of employees through self-oriented perfectionism and job crafting are 0.009 and 0.067, with 95% confidence intervals of [-0.022, 0.048] (including 0) and [0.024, 0.120] (excluding 0), respectively. Conversely, at higher levels of independent self-construction and informal status, the indirect effects of perceived overqualification on employee innovation performance through self-oriented perfectionism and job crafting are 0.055 and 0.127, with 95% confidence intervals of [0.022, 0.095] (excluding 0) and [0.066, 0.228] (excluding 0), respectively. The between-group differences amount to 0.046 and 0.060, with 95% confidence intervals of [0.007, 0.058] (excluding 0) and [0.008, 0.138] (excluding 0), respectively, and the findings are statistically significant. These results underscore that the chain mediation of self-oriented perfectionism and job crafting varies across distinct levels of independent self-construction and informal status, indicating a moderation effect. Consequently, hypotheses 6 and 8 were substantiated.

5 Discussion

Leveraging the trait activation theory, the research develops a theoretical model to elucidate the relationship between perceived overqualification, self-oriented perfectionism, job crafting, and innovation performance. Furthermore, it examines the moderating influence of independent self-construction and informal status on this theoretical framework. The findings reveal that perceived overqualification significantly

enhances employee innovation performance. Moreover, self-oriented perfectionism and job crafting are partial mediators in linking perceived overqualification to innovation performance. Additionally, self-oriented perfectionism positively influences job crafting, thereby acting as a chain mediating role. Lastly, independent self-construction moderates the relationship between perceived overqualification and self-oriented perfectionism, while informal status moderates the link between job crafting and employee innovation performance. Both factors jointly act as moderators between perceived overqualification and employee innovation performance.

5.1 Theoretical implications

Firstly, this study establishes that perceived overqualification can positively impact employee innovation performance, contributing a favorable outcome variable to the existing literature on overqualification. As a widespread phenomenon in contemporary management practice, previous studies have primarily examined the negative impacts of perceived overqualification through lenses such as person-job matching theory (Debus et al., 2020), equity theory (Cheng et al., 2020), and relative deprivation theory (Schreurs et al., 2021), it often overlooked the potential for employee initiative and creativity. In reality, employees with a strong sense of perceived overqualification possess knowledge and skills that exceed job requirements, which can be advantageous for the organization (Li et al., 2022). This study explores how subjective perceptions of overqualification can lead to enhanced innovation performance, providing a positive response to the academic research recommendations advocating for increased focus on the positive impacts of the perception of perceived overqualification (Russell et al., 2016).

Secondly, this research applies trait activation theory to elucidate the mechanism by which perceived overqualification influences outcomes, thereby enhancing the theoretical perspective within the overqualification domain. While existing studies have explored the positive effects of perceived overqualification through self-regulation theory and self-representation theory (Zhang et al., 2016; Erdogan et al., 2020), they have often neglected the activation effects of intrinsic motivational factors, such as employee competence, on employee traits. And we have found that an employee's intrinsic sense of satisfaction and achievement are crucial factors in realizing innovation performance (Elliot and Harackiewicz, 1994). Therefore, grounded in trait activation theory, this study verifies the chain-mediating roles of self-oriented perfectionism and job crafting in the relationship between perceived overqualification and innovation performance, responding to scholars' call for diverse perspectives on perceived overqualification in future research (Hu et al., 2015).

Thirdly, this study delves deeper into the boundary conditions shaping the impact of perceived overqualification on innovation performance through the moderating influence of independent self-construction and informal status. Previous research has shown that independent self-construction and informal status positively influence employees' innovation performance (Blackburn, 2005; Sun and Guo, 2021), primarily due to their strong psychological capital and relational resources. However, these studies often overlook the complexity of induced innovation behavior. By introducing independent self-construction and informal status as moderating variables, this study integrates independent self-construction with external environment perception and informal status with behavioral expression, providing a more comprehensive analysis of the boundary conditions influencing employees' innovation performance.

5.2 Practical implications

Initially, organizations ought to accurately discern the potential value embedded in overqualified employees and actively guide them to assess their perceived overqualification rationally. Employees harboring such perceptions possess extensive knowledge reserves and high technical proficiency, predisposing them to generate and implement innovative ideas. Enterprises must not only furnish ample opportunities and corresponding platforms but also proactively foster an optimistic work mindset among employees. This approach enables employees to view perceived overqualification as a potential asset, motivating them to channel their qualifications into creative endeavors, ultimately enhancing innovation performance.

Secondly, the research findings underscore that self-oriented perfectionism and job crafting behaviors significantly elevate employee innovation performance. Therefore, enterprises should prioritize managerial attention and support for employees with high perceived overqualification. By offering job opportunities, promotions, and future development prospects, companies can construct intrinsic motivation mechanisms that significantly stimulate self-oriented perfectionism, thereby fostering greater innovation. Moreover, organizations should empower employees by granting them greater autonomy in shaping work ideas and making decisions. Encouraging innovative behaviors through job crafting by creating a proactive organizational atmosphere and formulating effective incentive policies.

Thirdly, this study reveals that independent self-construction and informal status play pivotal roles in augmenting the impact of perceived overqualification on innovation performance. Managers should afford employees increased autonomy in work, empower them with decision-making authority and supportive conditions, provide substantial mental incentives, and help them shape an independent self-construction cognition. Additionally, attention should be directed toward formalizing the recognition of employees' informal status, tailoring measurement standards based on individual circumstances, and establishing a transparent management framework for cultivating informal status among employees. Collectively, these efforts enable employees to leverage their innovative behaviors more effectively.

5.3 Limitations and future directions

Firstly, it is noteworthy that all sample data are derived exclusively from Chinese enterprises, selectively excluding certain industries and regions characterized by distinct cultural and

geographical attributes. While this approach may introduce certain limitations to the generalizability of the research findings, future studies can enhance their sample selection scope, ensuring a more comprehensive and reliable dataset. Secondly, this study delves into the indirect mechanism wherein perceived overqualification influences employee innovation performance, drawing insights from trait activation theory. Future exploration can delve deeper into whether perceived qualification among employees can extend their influence, empowering colleagues and organizations by sharing knowledge and information and enhancing overall effectiveness. Finally, this research incorporates independent self-construction and informal status as moderating variables, exclusively focusing on employees' internal factors. However, future investigations can benefit from examining the boundary conditions posed by external factors, such as leadership behavior and the organizational climate for error management, thereby contributing to a more nuanced understanding of the dynamics at play.

6 Conclusion

Drawing upon trait activation theory, this study investigates the mechanism and boundary conditions surrounding the impact of employees' perceived overqualification on their innovative performance in the workplace. This research holds both theoretical significance and practical insights. Companies should proactively encourage self-oriented perfectionism in employees who perceive themselves as overqualified to foster job crafting behaviors that enhance innovation performance. Such proactive measures can contribute to the long-term development of the company.

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 School of Management, Shandong University of Technology. 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

HQ: Conceptualization, Data curation, Formal analysis, Methodology, Software, Writing – original draft, Writing – review & editing. BJ: Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Supervision, Writing – original draft, Writing – review & editing. SL: Data curation, Funding acquisition, Writing – review & editing. JZ: Data curation, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This research was funded by Natural Science Foundation project of Shandong Province (Grant ZR2022MG011) and a Chinese college student's innovation and entrepreneurship training program (Grant 202310433241s).

Acknowledgments

Thanks to the funding support from the Natural Science Foundation project of Shandong Province and the National Undergraduate Innovation and Entrepreneurship Training Program and the research facilities provided by the School of Management, Shandong University of Technology.

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.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

Abele, A. E., Ellemers, N., Fiske, S. T., Koch, A., and Yzerbyt, V. (2021). Navigating the social world: toward an integrated framework for evaluating self, individuals, and groups. *Psychol. Re.* 128, 290–314. doi: 10.1037/rev0000262

Alicke, M. D., and Sedikides, C. (2009). Self-enhancement and self-protection: what they are and what they do. *Eur. Rev. Soc. Psychol.* 20, 1–48. doi: 10.1080/10463280802613866

Baron, R. M., and Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J. Pers. Soc. Psychol.* 51:1173. doi: 10.1037/0022-3514.51.6.1173

Blackburn, R. (2005). The hidden power of social networks: understanding how work really gets done in organizations. *Pers. Psychol.* 58:231. doi: 10.1111/j.1467-9620.2005.00619.x

Brockner, J., Chen, Y.-R., Mannix, E. A., Leung, K., and Skarlicki, D. P. (2000). Culture and procedural fairness: when the effects of what you do depend on how you do it. *Admin. Sci. Quart.* 45, 138–159. doi: 10.2307/2666982

Chang, H.-T., Chou, Y.-J., Liou, J.-W., and Tu, Y.-T. (2016). The effects of perfectionism on innovative behavior and job burnout: team workplace friendship as a moderator. *Pers. Indiv. Differ.* 96, 260–265. doi: 10.1016/j.paid.2016.02.088

Cheng, B., Zhou, X., Guo, G. X., and Yang, K. Z. (2020). Perceived overqualification and cyberloafing: a moderated-mediation model based on equity theory. *J. Bus. Ethics.* 164, 565–577. doi: 10.1007/s10551-018-4026-8

Childs, J. H., and Stoeber, J. (2010). Self-oriented, other-oriented, and socially prescribed perfectionism in employees: Relationships with burnout and engagement. *J. Workplace. Behav. He.* 25, 269–281. doi: 10.1080/15555240.2010.518486

Dar, N., and Rahman, W. (2020). Two angles of overqualification-the deviant behavior and creative performance: The role of career and survival job. *PLoS ONE.* 15:e0226677. doi: 10.1371/journal.pone.0226677

Debus, M. E., Gross, C., and Kleinmann, M. (2020). The power of doing: how job crafting transmits the beneficial impact of autonomy among overqualified employees. *J. Bus. Psychol.* 35, 317–331. doi: 10.1007/s10869-019-09625-y

Deng, H., Guan, Y., Wu, C.-H., Erdogan, B., Bauer, T., and Yao, X. (2018). A relational model of perceived overqualification: the moderating role of interpersonal influence on social acceptance. *J. Manage.* 44, 3288–3310. doi: 10.1177/0149206316668237

Djurdjevic, E., Stoverink, A. C., Klotz, A. C., Koopman, J., Veiga, S. P. D., Yam, K. C., et al. (2017). Workplace status: the development and validation of a scale. *J. Appl. Psychol.* 102, 1124–1147. doi: 10.1037/apl0000202

Dutton, W. J. E. (2001). Crafting a job: revisioning employees as active crafters of their work. *Acad. Manage. Rev.* 26, 179–201. doi: 10.2307/259118

Elliot, A. J., and Harackiewicz, J. M. (1994). Goal setting, achievement orientation, and intrinsic motivation: a mediational analysis. *J. Pers. Soc. Psychol.* 66:968. doi: 10.1037/0022-3514.66.5.968

Erdogan, B., Karaeminogullari, A., Bauer, T. N., and Ellis, A. M. (2020). Perceived overqualification at work: implications for extra-role behaviors and advice network centrality. *J. Manage.* 46, 583–606. doi: 10.1177/0149206318804331

Guo, Y. R., and Hou, X. Y. (2022). The effects of job crafting on tour leaders' work engagement: the mediating role of person-job fit and meaningfulness of work. *Int. J. Contemp. Hosp. M.* 34, 1649–1667. doi: 10.1108/IJCHM-09-2021-1082

Harari, M. B., Manapragada, A., and Viswesvaran, C. (2017). Who thinks they're a big fish in a small pond and why does it matter? A meta-analysis of perceived overqualification. *J. Vocat. Behav.* 102, 28–47. doi: 10.1016/j.jvb.2017.06.002

Hewitt, P. L., and Flett, G. L. (1991). Perfectionism in the self and social contexts: conceptualization, assessment, and association with psychopathology. *J. Pers. Soc. Psychol.* 60:456. doi: 10.1037/0022-3514.60.3.456

Hobfoll, S. E., Halbesleben, J., Neveu, J. P., and Westman, M. (2018). Conservation of resources in the organizational context: the reality of resources and their consequences. *Annu. Rev. Organ. Psych.* 5, 103–128. doi: 10.1146/annurev-orgpsych-032117-104640

Hu, J., Erdogan, B., Bauer, T. N., Jiang, K. F., Liu, S. B., and Li, Y. H. (2015). There are lots of big fish in this pond: the role of peer overqualification on task significance, perceived fit, and performance for overqualified employees. *J. Appl. Psychol.* 100, 1228–1238. doi: 10.1037/apl0000008

Ilies, R., Johnson, M. D., Judge, T. A., and Keeney, J. (2011). A within-individual study of interpersonal conflict as a work stressor: dispositional and situational moderators. *J. Organ. Behav.* 32, 44–64. doi: 10.1002/job.677

Janssen, O., and Van Yperen, N. W. (2004). Employees' goal orientations, the quality of leader-member exchange, and the outcomes of job performance and job satisfaction. *Acad. Manage. J.* 47, 368–384. doi: 10.2307/20159587

Kapica, L., and Baka, L. (2021). What is job crafting? a review of theoretical models of job crafting/czym jest job crafting? Przeglad koncepcji teoretycznych dotyczacych ksztaltowania pracy. *Med. Pr.* 72, 423–437. doi: 10.13075/mp.5893.01115

Kim, M., Kim, S. L., Son, S. Y., and Yun, S. (2022). Perfectionism, interactional justice and job performance: a trait activation perspective. *Sustainability* 14:1117. doi: 10.3390/su14031117

Kim, S. L., Kim, M., and Yun, S. (2017). What do we need for creativity? The interaction of perfectionism and overall justice on creativity. *Pers. Rev.* 46, 154–167. doi: 10.1108/PR-06-2015-0187

Lacko, D., Cenek, J., and Urbánek, T. (2021). Psychometric properties of the independent and interdependent self-construal questionnaire: evidence from the Czech Republic. *Front. Psycho.* 12:564011. doi: 10.3389/fpsyg.2021.564011

Li, Y., Li, Y., Yang, P., and Zhang, M. (2022). Perceived overqualification at work: implications for voice toward peers and creative performance. *Front. Psychol.* 13:835204. doi: 10.3389/fpsyg.2022.835204

Lin, B., Law, K. S., and Zhou, J. (2017). Why is underemployment related to creativity and OCB? A task-crafting explanation of the curvilinear moderated relations. *Acad. Manage. J.* 60, 156–177. doi: 10.5465/amj.2014.0470

Liu, S., and Wang, M. (2012). Perceived overqualification: a review and recommendations for research and practice. *Res. Occup. Stress Well Being* 10, 1–42. doi: 10.1108/S1479-3555(2012)0000010005

Lobene, E. V., and Meade, A. W. (2013). The effects of career calling and perceived overqualification on work outcomes for primary and secondary school teachers. *J. Career. Dev.* 40, 508–530. doi: 10.1177/0894845313495512

Ma, B., and Zhang, J. (2022). Are overqualified individuals hiding knowledge: the mediating role of negative emotion state. *J. Knowl. Manag.* 26, 506–527. doi: 10.1108/JKM-01-2021-0022

Ma, C., Lin, X., and Wei, W. (2020). Linking perceived overqualification with task performance and proactivity? An examination from self-concept-based perspective. *J. Bus. Res.* 118, 199–209. doi: 10.1016/j.jbusres.2020.06.041

Magee, J. C., and Galinsky, A. D. (2008). 8 social hierarchy: the self-reinforcing nature of power and status. *Acad. Manag. Ann.* 2, 351–398. doi: 10.5465/19416520802211628

Maynard, D. C., Joseph, T. A., and Maynard, A. M. (2006). Underemployment, job attitudes, and turnover intentions. *J. Organ. Behav.* 27, 509–536. doi: 10.1002/job.389

Mumford, M. D. (2000). Managing creative people: Strategies and tactics for innovation. *Hum. Resour. Manage. R.* 10, 313–351. doi: 10.1016/S1053-4822(99)00043-1

Oeberst, A., and Wu, S. (2015). Independent vs. interdependent self-construal and interrogative compliance: Intra- and cross-cultural evidence. *Pers. Indiv. Differ.* 85, 50–55. doi: 10.1016/j.paid.2015.04.038

Otto, K., Geibel, H. V., and Kleszewski, E. (2021). "Perfect leader, perfect leadership?" Linking leaders' perfectionism to monitoring, transformational, and servant leadership behavior. *Front. Psychol.* 12:657394. doi: 10.3389/fpsyg.2021.657394

Petrou, P., Demerouti, E., Peeters, M., and Schaufeli, W. (2012). Crafting a job on a daily basis: Contextual correlates and the link to work engagement. *J. Organ. Behav.* 33, 1120–1141. doi: 10.1002/job.1783

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., and Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J. Appl. Psychol.* 88:879. doi: 10.1037/0021-9010.88.5.879

Preacher, K. J., and Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behav. Res. Methods Instrum. Comput.* 36, 717–731. doi: 10.3758/BF03206553

Russell, Z. A., Ferris, G. R., Thompson, K. W., and Sikora, D. M. (2016). Overqualified human resources, career development experiences, and work outcomes: Leveraging an underutilized resource with political skill. *Hum. Resour. Manage. R.* 26, 125–135. doi: 10.1016/j.hrmr.2015.09.008

Schreurs, B., Hamstra, M. R. W., Jawahar, I. M., and Akkermans, J. (2021). Perceived overqualification and counterproductive work behavior: testing the mediating role of relative deprivation and the moderating role of ambition. *Pers. Rev.* 50, 1038–1055. doi: 10.1108/PR-05-2019-0237

Slemp, G. R., and Vella-Brodrick, D. A. (2014). Optimising employee mental health: The relationship between intrinsic need satisfaction, job crafting, and employee well-being. *J. Happiness Stud.* 15, 957–977. doi: 10.1007/s10902-013-9458-3

Spears, R. (2021). Social influence and group identity. *Annu. Rev. Psychol.* 72, 367–390. doi: 10.1146/annurev-psych-070620-111818

Sun, C. S., and Guo, M. (2021). Research on the impact of informal status on innovation behavior of knowledge-based employees. *Res. Manage.* 42, 184–193. doi: 10.19571/j.cnki.1000-2995.2021.06.022

Tett, R. P., and Guterman, H. A. (2000). Situation trait relevance, trait expression, and cross-situational consistency: testing a principle of trait activation. *J. Res. Pers.* 34, 397–423. doi: 10.1006/jrpe.2000.2292

Tims, M. B., Bakker, A., and Derks, D. (2014). Daily job crafting and the self-efficacy–performance relationship. *J. Manage. Psychol.* 29, 490–507. doi: 10.1108/JMP-05-2012-0148

Wadei, K. A., Chen, L., Frempong, J., and Appienti, W. A. (2021). The mediation effect of ethical leadership and creative performance: a social information processing perspective. *J. Creat. Behav.* 55, 241–254. doi: 10.1002/jocb.449

Wang, L., and Chen, Y. (2022). Success or growth? Distinctive roles of extrinsic and intrinsic career goals in high-performance work systems, job crafting, and job performance. *J. Vocat. Behav.* 135, 103714. doi: 10.1016/j.jvb.2022.103714

Wang, Y., and Lau, D. C. (2022). How and why job crafting influences creative performance? A resource allocation explanation of the curvilinear moderated relations. *Asia. Pac. J. Manag.* 39, 1561–1587. doi: 10.1007/s10490-021-09773-x

Zhang, F. F., and Parker, S. K. (2019). Reorienting job crafting research: A hierarchical structure of job crafting concepts and integrative review. *J. Organ. Behav.* 40, 126–146. doi: 10.1002/job.2332

Zhang, J., Akhtar, M. N., Zhang, Y., and Sun, S. (2020). Are overqualified employees bad apples? A dual-pathway model of cyberloafing. *Internet. Res.* 30, 289–313. doi: 10.1108/INTR-10-2018-0469

Zhang, M., Wang, F., and Li, N. (2021). The effect of perceived overqualification on creative performance: person-organization fit perspective. *Front. Psychol.* 12, 12. doi: 10.3389/fpsyg.2021.582367

Zhang, M. J., Law, K. S., and Lin, B. (2016). You think you are big fish in a small pond? Perceived overqualification, goal orientations, and proactivity at work. *J. Organ. Behav.* 37, 61–84. doi: 10.1002/job.2024

Zhang, Z., Li, B., and He, W. (2023). Double-edged sword effect of informal status on work procrastination: the roles of career calling and workload. *Curr. Psychol.* 16:7. doi: 10.1007/s12144-023-05552-7

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 07 January 2025
DOI 10.3389/fpsyg.2024.1407426

Check for updates

OPEN ACCESS

EDITED BY
Mike James Mustafa,
University of Nottingham Malaysia, Malaysia

REVIEWED BY
Zhenjing Pang,
Tsinghua University, China
Mohammad Ali Yamin,
Jeddah University, Saudi Arabia
Sughra Bibi,
Zhejiang University, China

*CORRESPONDENCE
Wenyin Yang
✉ yangwenyin@bwu.edu.cn

RECEIVED 26 March 2024
ACCEPTED 22 November 2024
PUBLISHED 07 January 2025

CITATION
Li Y, Zhang Q and Yang W (2025) Crucial role of craftsmanship spirit in fostering innovative behavior among skilled talents in the manufacturing sector.
Front. Psychol. 15:1407426.
doi: 10.3389/fpsyg.2024.1407426

COPYRIGHT
© 2025 Li, Zhang and Yang. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Crucial role of craftsmanship spirit in fostering innovative behavior among skilled talents in the manufacturing sector

Yuzhu Li, Qiuyue Zhang and Wenyin Yang*

College of Business, Beijing Wuzi University, Beijing, China

Introduction: Innovation remains pivotal for establishing and sustaining a competitive edge within the manufacturing industry. Skilled talents play a vital role in driving innovation and entrepreneurship in this sector. Their creative prowess significantly determines the success of a nation's innovation-centric development strategy. Craftsmanship spirit emerges as an indispensable mental fortitude for exceptionally skilled talents.

Methods: Drawing on social cognitive theory and social exchange theory, this study constructed a theoretical model to explore the intricate relationship between craftsmanship spirit and the innovative behavior of skilled talents, which was subsequently validated through empirical research.

Results: This study showed that craftsmanship spirit actively fostered the innovative behavior of skilled talents. This facilitation was mediated through two interconnected variables: innovative self-efficacy and knowledge sharing among skilled talents, with organizational innovation climate assuming a nuanced regulatory role.

Discussion: Consequently, enterprises are encouraged to nurture craftsmanship spirit, amplify innovative self-efficacy, promote knowledge sharing, and proactively instill an innovative climate within their organization. These measures can collectively inspire and amplify innovative behavior among skilled talents.

KEYWORDS

craftsmanship spirit, innovative behavior, innovative climate, innovative self-efficacy, knowledge sharing

Introduction

Innovation has always been a key driver in establishing and maintaining a competitive edge within the manufacturing industry. Skilled talents serve as the cornerstone of innovation and entrepreneurship in manufacturing. Also, their level of creativity directly shapes the success of the innovation-driven development strategy of a nation, thereby impacting the competitiveness and future trajectory of the nation. Individual creativity is a complex interplay of various factors. Although research has delved into areas such as education and family environment, universities continue to refine their talent development environments; however, the outcomes remain suboptimal (Guo and Deng, 2020). The reasons for this challenge are twofold. First, intrinsic factors are fundamental to personal development, whereas extrinsic factors provide supportive conditions. Education and family environments do not consistently and effectively enhance the creativity of skilled talents (Liu, 2017), as the creative potential of skilled talents is fundamentally determined by their intrinsic factors. Second, the work environment of skilled talents compared with education and family environment substantially influences their creativity. Therefore, delving into the inherent traits of skilled talents and their work environment is crucial.

Among the intrinsic characteristics of skilled talents, the craftsmanship spirit emerges as a pivotal source of inspiration for innovation and entrepreneurship in manufacturing powerhouses such as Germany and Japan. The primary goal of craftsmanship spirit is to craft industry-leading products of the highest quality, surpassing those of competitors. Achieving this objective requires skilled talents to be guided by the spirit of craftsmanship in their innovative behavior. Research suggests that this guidance occurs through both cognitive and behavioral dimensions.

First, craftsmanship spirit can be internalized as an intrinsic quality within skilled talents. Second, it can be externalized as the pursuit of high-quality work outcomes by each skilled talent. According to social cognitive theory, the cognitive aspect, particularly innovation self-efficacy, closely aligns with the creative behavior itself. Individuals with high innovation self-efficacy exhibit increased focus, persistence, patience, and a strong belief in their capacity to achieve innovative outcomes (Gu and Peng, 2011). According to social exchange theory, employees committed to excellence in their work processes often engage in explicit or implicit knowledge exchange between individuals and organizations, fostering willingness to share knowledge. This willingness, in turn, enhances opportunities for collective learning and progress, thereby increasing the likelihood of innovation.

Therefore, this study used craftsmanship spirit as the independent variable to investigate its impact on the innovative behavior of skilled talents. It examined two key mediating factors: the cognitive aspect of skilled talents—innovation self-efficacy—and the attitudinal aspect—knowledge-sharing willingness.

Regarding the work environment, skilled talents are continually engaged in social exchange relationships with their organizations. The behavioral responses of skilled talents are, to a certain extent, influenced and constrained by these exchange relationships. The research results also confirm that high-level exchange relationships prompt employees to engage in more high-quality behaviors (Liu et al., 2020). According to social exchange theory, when skilled talents engage in effective communication, learning, and exchange, they are likely to be influenced by the rich innovative climate provided by the organization. In turn, they may exhibit more positive behaviors, potentially leading to increased innovative behavior. Hence, this study posited a moderating role of the innovative climate in the mechanism through which craftsmanship spirit influences the innovative behavior of skilled talents. The findings of this study enrich the empirical understanding of how craftsmanship spirit impacts employee behavior, and the antecedent of the key factors influencing innovative behavior, and the mechanisms that reinforce innovative behavior in skilled talents.

Literature review and research hypotheses

Literature review

Skilled talents

Skilled talents generally refer to individuals in frontline operational roles in production, manufacturing, or service sectors who use their technical skills to create tangible products or value. Guo et al. (2017) supplemented the definition of skilled personnel by highlighting their crucial role in regional industrial development and technological product updates. These individuals, knowledge-based employees, translate the designs of research and development personnel into tangible products. Building upon the aforementioned definition, this study incorporates the explanation of skilled talents provided by Shen and Pan (2009). It defines skilled personnel as individuals with specific professional knowledge and skills, who create tangible value in roles such as production and manufacturing.

Craftsmanship spirit

Research on the craftsmanship spirit by scholars predominantly encompasses macro and theoretical explorations. It focuses on tracing historical origins, defining its conceptual connotations, examining its cultivation and development, and analyzing the factors that influence it. Specifically, concerning the tracing of historical origins, the emergence of the craftsmanship spirit in China can be traced back to the reign of Emperor Shun, with documented references to "artisans" appearing since then. The connection between artisans and the craftsmanship spirit has become increasingly intimate with progressive improvements in societal and economic levels. Artisans not only embody the craftsmanship spirit but also actively contribute to its creation (Zhang, 2019). For instance, China's achievements in porcelain craftsmanship, silk production, inventions, and innovations have captivated the world, showcasing the profound, distinctive, and vibrant craftsmanship spirit cultivated by Chinese artisans.

Regarding the definition of conceptual connotations, Liu et al. (2022) proposed that the craftsmanship spirit arises as a conscious behavior in the professional process, rooted in exquisite craftsmanship and manifested through a relentless pursuit of excellence and professional responsibility. According to this conceptual delineation, the craftsmanship spirit embodies professional behavior, representing the high-level expertise of individuals in their respective fields and their pursuit of mission-driven values in their work. Zhao et al. (2020) suggested that the craftsmanship spirit reflects individuals' specific work values in their current jobs, reflecting various work objectives they passionately strive for.

Regarding the outcome variables of the craftsmanship spirit, existing research confirms its significant positive impact on innovation performance (Peng and Yang, 2022), and product quality (Senge, 2006) at the enterprise level. Additionally, the craftsmanship spirit plays a significant role in proactive behaviors (Gao, 2022) and job satisfaction (Li et al., 2021) at the employee level.

Existing research has rarely delved into the role of the craftsmanship spirit in innovative behaviors, leaving room for exploration in this study.

Innovative behaviors

Employees are increasingly recognized as a significant source of organizational innovation and, therefore, scholars interpret individual innovative behaviors from various perspectives. From the standpoint of employee innovation ideology, Hurt et al. (1977) argued that individual innovative behavior falls within the realm of ideology, representing a willingness possessed by innovative individuals, manifested in "new perspectives generated by individuals in organizational work" and "behavior manifested in practice." From the perspective of the employee innovation process, Scott and Bruce (1994) defined employee innovative behavior as the sum of processes and activities from generating new ideas to implementing them. Kleysen and Street (2001) suggested that

this process included exploring innovative thinking, creating new ideas, seeking support, and facilitating implementation. Wang and Chang (2017) believed that the individuals promoting new ideas in their work deserve special emphasis, apart from the innovative ideas themselves, in the phased process of innovation.

The research on the influence of innovative behavior can be summarized into two main categories: the impact of intrinsic factors of employees and external situational factors on innovative behavior. The influence of intrinsic factors of employees on innovative behavior mainly involves personal traits (Liu et al., 2020), employees' human capital (Guo et al., 2017), self-awareness and efficacy (Edmondson and Lei, 2014), knowledge-sharing behavior (Zhang et al., 2020), and so forth. Regarding the influence of external situational factors on innovative behavior, previous research focused more on leadership styles (Yang and Yang, 2020) and organizational atmosphere and support (Ren and Zhang, 2015).

The literature analysis revealed that scholars conducted extensive research on the antecedents of the spirit of craftsmanship; however, data on the posterior variables were lacking. Also, the impact of the spirit of craftsmanship on employees' innovative behavior remains unexplored, leaving room for the development of this study. Based on the research group of skilled talents, the spirit of craftsmanship represents high standards, strict requirements, and increasingly refined work values of this group. Therefore, examining the relationship of craftsmanship with the innovative self-efficacy and knowledge-sharing behavior of skilled talents is of great significance. At the same time, this can further improve the mechanism of the relationship between the spirit of craftsmanship and the innovative behavior of skilled talents. Employee innovative behavior is also influenced by external factors, among which organizational innovation atmosphere is an important aspect. However, scholars' findings on organizational innovation atmosphere as a moderating variable are somewhat insufficient. This study helped enrich the research results on organizational innovation atmosphere serving as a moderating variable.

Research hypotheses

Craftsmanship spirit positively influences the innovative behavior of skilled talents

Craftsmanship spirit, as an inherent driving force for employee innovative behavior (Li et al., 2018), instills skilled talents with passion in their work and encourages them to pursue innovation (Ye et al., 2018). It emphasizes the continuous learning required of artisans, cultivating a mindset conducive to innovation and internalizing the spirit of innovation into the work behavior of artisans, including changes in products and processes (Su and Wang, 2018). The craftsmanship spirit can inspire artisans to meticulously create products and deliver services (Liu, 2017). It is an important variable of employee occupational characteristics, primarily reflected in the accumulation of work, flexible thinking, and skill enhancement, driving the occurrence of innovative behavior during work processes (Cheng and Tian, 2016). Therefore, the following hypothesis is proposed:

> *H1: Craftsmanship spirit positively influences the innovative behavior of skilled talents.*

Mediating role of innovative self-efficacy

Innovative self-efficacy refers to the strong belief of individuals in their ability to engage in innovative workplace behaviors (Li et al., 2020). Craftsmanship spirit represents not only tradition but also persistence and innovation. The driving force behind its creation stems from the craftsman's strong self-perception. The interaction between craftsmanship spirit and innovative self-efficacy can be transformed into the values of "artisan" or the confidence strength of "craftsmanship spirit." Craftsmanship spirit essentially reflects employees' work beliefs and behavioral guidelines, constituting a higher-order synthesis of individual values.

Based on social cognitive theory, previous studies have found that higher levels of innovative self-efficacy can enhance the willingness of individuals to innovate, effectively stimulating their innovative behavior; conversely, it often leads to a lack of belief among employees, resulting in a negative attitude toward innovative activities (Wang et al., 2016). Innovative individuals often face challenges or doubts from various sources when generating creative ideas or transforming them into actual behaviors. At such times, if individuals have sufficient confidence in themselves, their innovative behavior is more likely to succeed (Yang et al., 2011). Strong innovative self-efficacy can guide technical workers to actively integrate explicit skills and transform them into enthusiasm for their own unique knowledge. In this process, a sense of achievement arises from the continuous improvement of skills, ultimately leading to surpassing others (Tierney and Farmer, 2002). Therefore, the following hypotheses are proposed:

> *H2: Craftsmanship spirit positively impacts the innovative self-efficacy of skilled talents.*
>
> *H3: Innovative self-efficacy positively impacts the innovative behavior of skilled talents.*
>
> *H4: Innovative self-efficacy mediates the relationship between craftsmanship spirit and innovative behavior of skilled talents.*

Mediating role of knowledge sharing

Zhu et al. (2021) pointed out that craftsmanship spirit, as an excellent professional spirit, might prompt employees to take responsibility proactively, actively provide better suggestions and strategies for work and the company, and facilitate the emergence of behaviors such as offering advice and organizational citizenship. Zhao et al. (2020) revealed that craftsmanship spirit might reflect employees' established work norms, which can guide their work behavior preferences. The motivation in craftsmanship spirit has a self-directed effect (Guo and Deng, 2020).

Innovation is inseparable from knowledge. According to Scott and Bruce's explanation of innovative behavior, individuals need to communicate their ideas with others and seek supporters and alliances while generating innovative behavior. Knowledge sharing is necessary for generating innovative behavior (Obrenovic et al., 2020). In knowledge sharing, organizational members increase opportunities for mutual learning and cooperation, thereby increasing the possibility of innovation (Tsai, 2009). Therefore, the following hypotheses are proposed:

H5: Craftsmanship spirit has a positive impact on knowledge sharing.

H6: Knowledge sharing positively impacts the innovative behavior of skilled talents.

H7: Knowledge sharing mediates the relationship between craftsmanship spirit and innovative behavior of skilled talents.

Innovative self-efficacy and knowledge sharing—intricate variables with significant interconnections

Innovative self-efficacy positively influences knowledge sharing. Studies focusing on organizations and employees reveal that the key factors influencing knowledge sharing stem from individual beliefs. When employees perceive themselves as capable of sharing valuable organizational knowledge, they are typically more motivated to share their insights with colleagues (Lin, 2007). Furthermore, when employees believe they stand to gain—whether through organizational rewards or the fulfillment of helping others—they may cultivate a more positive attitude toward knowledge sharing (Van Den Hooff and De Ridder, 2004). Sun et al. (2012) empirically investigated the relationship between innovative self-efficacy and knowledge sharing using structural equation modeling.

The craftsmanship spirit enhances employees' innovative self-efficacy, which, in turn, positively influences their innovative behaviors. Additionally, this spirit fosters knowledge sharing among employees, while knowledge sharing enhance innovative behaviors. Therefore, given the role of innovative self-efficacy in promoting knowledge sharing, we propose the following hypothesis:

H8: Innovative self-efficacy and knowledge sharing act as a chain-mediating mechanism between craftsmanship spirit and employee innovation, where craftsmanship spirit encourages knowledge sharing through innovative self-efficacy, thereby facilitating employee innovation.

Based on the research hypothesis, a theoretical model is established, as shown in Figure 1.

Moderating role of innovative climate

Innovative climate represents the subjective psychological perception of skilled talents toward the innovative environment, indicating, to some extent, the level of support for innovation provided by leadership and organizations (Ahmed, 1998). Social cognitive theory emphasizes the interaction between the environment, individual cognition, and behavior. Within this theoretical framework, the innovative climate is considered as a social environment whereas craftsmanship spirit and innovation self-efficacy are perceived by individuals as cognitive aspects. Knowledge-sharing and innovative behavior arise from the interaction between the social environment and cognitive processes.

An innovative climate fosters a social environment rich in opportunities for innovation and learning. In such an environment, individuals can observe the craftsmanship spirit, knowledge sharing, and innovative behaviors of others. Also, they can transform these observations into their own behaviors and attitudes through observational learning. The knowledge-sharing and innovative behaviors of individuals may be encouraged, recognized, and rewarded

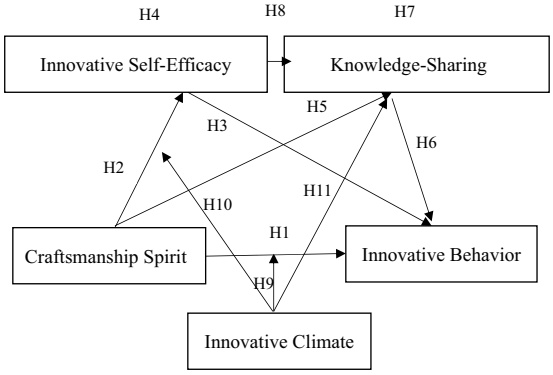


FIGURE 1
The theoretical model.

in an organizational environment with an innovative climate. Such support and encouragement can significantly enhance the innovation self-efficacy of individuals, which is the belief in their ability to implement innovative actions. This self-efficacy is conducive to the more effective transformation of craftsmanship spirit into actual innovative behavior and increases the likelihood of individuals engaging in knowledge sharing to drive innovation. Positive social support and team interactions within the innovative climate can facilitate knowledge sharing, cooperation, and collaborative innovation, creating a more favorable environment for effectively transforming craftsmanship spirit into innovative behavior.

Based on the aforementioned theoretical considerations and analysis, the following hypotheses are proposed:

H9: The innovative climate moderates the relationship between craftsmanship spirit and the innovative behavior of skilled talents.

H10: The innovative climate moderates the relationship between craftsmanship spirit and the innovation self-efficacy of skilled talents.

H11: The innovative climate moderates the relationship between knowledge-sharing and innovative behavior of skilled talents.

Methods

Sample and procedure

From November 2022 to August 2023, a questionnaire survey was conducted on skilled talents in the Chinese manufacturing industry based on the principles of convenience and randomness. We distributed and collected survey questionnaires through the Credamo platform. Skilled talents are those who engage in technical and skilled work in frontline positions. The scope of manufacturing industry is restricted through the Credamo platform, mainly including 31 industries such as agricultural and sideline food processing industry, food manufacturing industry, alcohol, beverage, and refined manufacturing industry, tobacco products industry, textile industry, textile and clothing industry, and so forth. We initially distributed questionnaires on a small scale to ensure the accuracy of the data, eliminating ineligible ones. We expanded the survey on a larger scale

after ensuring the reliability and validity of the questionnaire. A total of 468 questionnaire forms were distributed, and 400 valid responses were obtained after filtering based on mandatory questions and response time, resulting in a validity rate of 85.47% (see Figure 1).

Measures

Scales widely used both domestically and internationally were selected for this study. The content of each variable was compared through a review of relevant literature, and the most suitable items for this study were selected. A 5-point Likert-type scale (1 = completely disagree to 5 = completely agree) was used for all measures.

Craftsmanship spirit

This study employed the craftsmanship spirit scale developed by Zhao et al. (2020). The scale divided craftsmanship spirit into 5 dimensions: personal growth, responsibility, excellence, reputation, and commitment, including 20 items such as "I constantly explore my potential in my work" (α =0.89). See the attachment for the specific scale.

Innovative behavior

Compared with foreign scales, the employee innovative behavior scale compiled by Chinese scholar Zhang Zhengang is more suitable for the Chinese context and aligns better with the Chinese way of thinking. Therefore, this study used this scale, comprising eight items such as "*I often seek opportunities to improve work methods and processes*" (α = 0.95). See the attachment for the specific scale.

Innovative self-efficacy

This study adopted the measurement scale based on the scale developed by scholars such as Tierney and Farmer (2002), which is widely accepted and used. The scale included four items such as "*I feel confident in coming up with novel ideas*" (α = 0.85). See the attachment for the specific scale.

Knowledge sharing

This study focused on examining the overall level of employees' knowledge sharing. Therefore, we chose the scale revised by Lu et al. (2006) based on the Bock and Kim scale, including eight items such as "*In my daily work, I actively share business knowledge with colleagues*" (α = 0.94). See the attachment for the specific scale.

Innovation climate

This study used the revised keys scale by Liu and Shi (2009), including 12 items such as "*At work, my colleagues are willing to share their methods and techniques with each other*" (α = 0.93). See the attachment for the specific scale.

Results

Data reliability and validity analysis

Common method bias test

All items from the five scales of craftsmanship spirit, innovative behavior, innovative self-efficacy, knowledge sharing, and innovation climate were analyzed using SPSS 26.0. The results are presented in Table 1. Nine eigenvalues were greater than 1, and the variance explained by the largest factor without rotation was 32.67%, which was below the reference threshold of 40%. This indicated that the common method bias in the sample data of this study was acceptable. Therefore, the data analysis based on this was considered reliable.

Validity analysis using AMOS software

Single-factor, two-factor, three-factor, four-factor, and five-factor analysis models were constructed for the analysis data, and each model was individually tested. The results are presented in Table 2. For the five-factor model, $\chi^2/DF = 2.994 < 3$, IFI = 0.932 > 0.9, TLI = 0.924 > 0.9, CFI = 0.931 > 0.9, and RMSEA = 0.071 < 0.08. These values indicated that the model had the best fit, significantly outperforming the fit of the four-factor, three-factor, two-factor, and one-factor models. It suggested good discriminant validity among the five variables. The questionnaire design in this study appeared to be reasonable.

TABLE 1 Total variance explained.

Component	Initial eigenvalues			Sum of squared loadings		
	Total	Percentage of variance	Cumulative percentage	Total	Percentage of variance	Cumulative percentage
1	16.986	32.666	32.666	16.986	32.666	32.666
2	6.005	11.548	44.215	6.005	11.548	44.215
3	3.677	7.072	51.287	3.677	7.072	51.287
4	2.529	4.864	56.151	2.529	4.864	56.151
5	1.791	3.445	59.596	1.791	3.445	59.596
6	1.593	3.063	62.658	1.593	3.063	62.658
7	1.426	2.743	65.401	1.426	2.743	65.401
8	1.227	2.360	67.761	1.227	2.360	67.761
9	1.128	2.169	69.929	1.128	2.169	69.929

TABLE 2 Results of confirmatory factor analysis.

Model	χ^2/DF	IFI	TLI	CFI	RMSEA
Five-factor CS + ISE + KS + IC + IB	2.994	0.932	0.924	0.931	0.071
Four-factor CS, ISE + KS + IC + IB	5.444	0.846	0.830	0.845	0.106
Three-factor CS, ISE, KS + IC + IB	7.995	0.755	0.732	0.754	0.132
Two-factor CS, ISE, KS, IC + IB	8.998	0.718	0.694	0.717	0.142
Single-factor CS, ISE, KS, IC, IB	14.009	0.540	0.502	0.539	0.181

CS is craftsmanship spirit, ISE is Innovative Self-Efficacy, KS is Knowledge Sharing, IC is Innovative Climate, IB is Innovative Behavior.

TABLE 3 Descriptive statistical results of samples.

Project	Option	Frequency	Percentage	Cumulative percentage
Gender	male	280	70.00	70.00
	female	120	30.00	100.00
Age	20–30 years	83	20.75	20.75
	30–39 years	230	57.50	78.25
	40–49 years	55	13.75	92.00
	50–59 years	25	6.25	98.25
	60 years and above	7	1.75	100.00
Education	Junior high school and below	13	3.25	3.25
	high school	23	5.75	9.00
	Technical secondary school	26	6.50	15.50
	junior college	60	15.00	30.50
	undergraduate	269	67.25	97.75
	master	7	1.75	99.50
	doctor	2	0.50	100.00
Length of service	One year and below	9	2.25	2.25
	1–5 years	62	15.50	17.75
	5–10 years	229	57.25	75.00
	10 year and above	100	25.00	100.00
Technical level	Junior technical workers	212	53.00	53.00
	Intermediate skilled worker	90	22.50	75.50
	Senior technical worker	48	12.00	87.5
	technician	13	3.25	90.75
	Senior technician	12	3.00	93.75
	No evaluation	25	6.25	100.00
Total		400	100.00	100.00

Descriptive analyses

Table 3 presents the descriptive statistics and correlations among the variables.

Correlation analysis

Correlation analysis was conducted on various variables using SPSS 26.0, and the results are presented in Table 4. The findings indicated a significant positive correlation between craftsmanship spirit and innovative behavior, with a correlation coefficient of 0.292 ($p < 0.01$). Craftsmanship spirit was also significantly positively correlated with innovative self-efficacy (correlation coefficient = 0.311, $p < 0.01$) and knowledge sharing (correlation coefficient = 0.346, $p < 0.01$). Additionally, innovative self-efficacy and innovative behavior exhibited a significant positive correlation (correlation coefficient = 0.529, $p < 0.01$), as did knowledge-sharing and innovative behavior (correlation coefficient = 0.514, $p < 0.01$). The correlation coefficient between innovative self-efficacy and knowledge sharing was 0.555 ($p < 0.01$), indicating a significant positive correlation. These

10.3389/fpsyg.2024.1407426

TABLE 4 Sample correlation analysis results.

Variables	Average value	Standard ation	Gender	Age	Education	Length of service	Technical level	CS	IB	ISE	KS	IA
Gender	1.700	0.459	1									
Age	2.107	0.862	−0.299**	1								
Education	4.615	1.267	−0.018	0.040	1							
Length of service	3.013	1.202	0.220**	−0.103*	0.248**	1						
Technical level	2.413	1.379	−0.129**	0.389**	−0.095	−0.172**	1					
CS	4.122	0.537	0.054	0.021	0.045	0.095	−0.161**	1				
IB	4.006	0.873	0.090	−0.068	0.189**	0.346**	−0.175**	0.292**	1			
ISE	4.027	0.928	0.082	0.025	0.132**	0.334**	−0.095	0.311**	0.529**	1		
KS	4.253	0.789	0.120*	−0.024	0.138**	0.350**	−0.148**	0.346**	0.514**	0.555**	1	
IA	4.239	0.605	0.000	0.011	0.146**	0.380**	−0.157**	0.289**	0.501**	0.544**	0.755**	1

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

results provided preliminary validation of the research hypotheses 1, 2, 3, 5, and 6 and established a foundation for testing other hypotheses.

Hypothesis testing

Building upon the earlier analyses, this study incorporated sex, age, education level, years of work experience, and technical proficiency as control variables in a hierarchical regression analysis. This was done to validate the positive impact of craftsmanship spirit on innovative behavior, examine the mediating roles of innovative self-efficacy and knowledge sharing between craftsmanship spirit and innovative behavior. The moderating effects of innovation climate on the relationships between craftsmanship spirit and innovative behavior, craftsmanship spirit and innovative self-efficacy, and knowledge-sharing and innovative behavior were explored.

Primary effects test

Control variables such as sex and age were initially included in the regression analysis for validating primary effects, forming Model 1. Subsequently, the independent variable craftsmanship spirit was introduced, forming Model 2. The results of the analysis are presented in Table 5.

As shown in Table 5, the R^2 value of Model 1 was 0.144, indicating that sex, age, education level, years of work experience, and technical proficiency collectively explained 14.4% of the variance in innovative behavior. Following an F-test for Model 1, an F value of 13.204 ($p < 0.001$) was obtained. The regression coefficients for education level, years of work experience, and technical proficiency were 0.105 ($p < 0.05$), 0.298 ($p < 0.001$), and − 0.115 ($p < 0.05$), respectively. This suggested a positive impact of education level and years of work experience and a negative impact of technical proficiency on innovative behavior.

Upon introducing the independent variable craftsmanship spirit in Model 2, the F value increased to 16.711 ($p < 0.001$), and the R^2 value increased from 0.144 to 0.203. The regression coefficient (β) for craftsmanship spirit was 0.250 ($p < 0.001$), indicating a significant

TABLE 5 Regression analysis results of craftsmanship spirit on innovative behavior.

Variables	IB	
	Model 1	Model 2
Gender	0.014	0.001
Age	0.007	−0.022
Education	0.105*	0.103
Length of service	0.298***	0.282***
Technical level	−0.115*	−0.068
CS		0.250***
R^2	0.144	0.203
$\triangle R^2$	0.133	0.191
F	13.204***	16.711***

n = 400. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

positive correlation with innovative behavior. Thus, Hypothesis 1 was supported.

Mediation effects test

For the mediation effects test of innovative self-efficacy, control variables such as sex and age were initially included in hierarchical regression analyses, forming Models 1 and 3. These models were used to examine the relationships between control variables and innovative self-efficacy, as well as the relationships between control variables and innovative behavior. Based on Model 1, craftsmanship spirit was introduced in hierarchical regression analysis to form Model 2, examining the relationship between craftsmanship spirit and innovative self-efficacy. Furthermore, based on Model 1, innovative self-efficacy was included in hierarchical regression analysis to form Model 5, examining the relationship between innovative self-efficacy and innovative behavior. Lastly, based on Model 2, innovative self-efficacy was included in hierarchical regression analysis to form Model 6, examining the mediating role of innovative self-efficacy between craftsmanship spirit and innovative behavior. The specific results of the hierarchical regression analysis are presented in Table 6.

As shown in Table 6, in Model 1, years of work experience positively influenced innovative self-efficacy ($\beta = 0.313$, $p < 0.001$). In Model 2, craftsmanship spirit positively influenced innovative self-efficacy ($\beta = 0.276$, $p < 0.001$), validating Hypothesis 2. In Model 5, innovative self-efficacy positively influenced innovative behavior ($\beta = 0.460$, $p < 0.001$), validating Hypothesis 3. In Model 6, when both craftsmanship spirit and innovative self-efficacy were included in hierarchical regression analysis for innovative behavior, the regression coefficient of craftsmanship spirit changed from 0.250 to 0.134. However, innovative self-efficacy continued to significantly and positively influence innovative behavior ($\beta = 0.420$, $p < 0.001$), validating Hypothesis 4.

Further validation of the mediating role of innovative self-efficacy was conducted using the bootstrap method, as shown in Table 7. For the mediating role of innovative self-efficacy between craftsmanship spirit and innovative behavior, the 95% confidence interval was 0.088–0.223, excluding 0. Additionally, the mediating effect of innovative self-efficacy accounted for 51.783%. Hypothesis 4 was further supported.

For the mediation effects test of knowledge sharing, a hierarchical regression analysis was conducted following the methodology employed for the innovative self-efficacy mediation effects test. The specific analysis results are presented in Table 7.

As shown in Table 7, in Model 1, years of work experience positively influenced knowledge sharing ($\beta = 0.314$, $p < 0.001$). In Model 2, craftsmanship spirit positively influenced knowledge sharing ($\beta = 0.305$, $p < 0.001$), validating Hypothesis 5. In Model 5, knowledge sharing positively influenced innovative behavior ($\beta = 0.437$, $p < 0.001$), validating Hypothesis 6. In Model 6, when both craftsmanship spirit and knowledge sharing were included in hierarchical regression analysis for innovative behavior, the regression coefficient of craftsmanship spirit changed from 0.250 to 0.393. However, knowledge sharing continued to significantly and positively influence innovative behavior ($\beta = 0.130$, $p < 0.001$), validating Hypothesis 7.

Chain mediation effects testing

This study constructed a chain mediation model to examine the parallel mediation effects of innovative self-efficacy and knowledge sharing. This study used the bootstrap method to ensure the accuracy of the test. Before analyzing the data, 5,000 sampling repetitions with a 95% confidence interval needed to be set. The specific analysis results are shown in Table 8.

As shown in Table 8, in Path 1: craftsmanship spirit → innovative self-efficacy → innovative behavior, the effect size was 0.171, with a 95% confidence interval of 0.055–0.166. This confidence interval did not include 0, confirming Hypothesis 4 once again. In Path 2: craftsmanship spirit → knowledge sharing → innovative behavior, the effect size was 0.093, with a 95% confidence interval of 0.022–0.106. This confidence interval also did not include 0, confirming Hypothesis 7 once again. In Path 3: craftsmanship spirit → innovative self-efficacy → knowledge sharing→ innovative behavior, the effect size was 0.075, with a 95% confidence interval of 0.020–0.079. In summary, innovative self-efficacy and knowledge sharing mediated the relationship between craftsmanship spirit and innovative behavior, validating the chain mediation model.

TABLE 6 Mediation effects test for innovative self-efficacy.

Variables	ISE		IB			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Gender	0.033	0.018	0.014	0.001	−0.001	−0.007
Age	0.091	0.059	0.007	−0.022	−0.035	−0.047
Education	0.045	0.043	0.105	0.103	0.084	0.085*
Length of service	0.313***	0.296***	0.298***	0.282***	0.154**	0.158**
Technical level	−0.068	−0.016	−0.115	−0.068	−0.083	−0.061
CS		0.276***		0.250***		0.134**
ISE					0.460***	0.420***
R^2	0.122	0.195	0.144	0.203	0.329	0.345
$\triangle R^2$	0.111	0.183	0.133	0.191	0.319	0.333
F	10.939	15.865	13.204	16.711	32.147	29.491

$n = 400$. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Moderation effects test

First, the moderation effects of the innovation climate on the relationship between knowledge-sharing and innovative behavior were examined. The hierarchical regression analysis was conducted on the centralized processed knowledge-sharing and innovative climate concerning innovative behavior, resulting in Model 2. Subsequently, the interaction term between knowledge sharing and the innovation climate was incorporated into the hierarchy regression analysis of innovative behavior based on Model 2, resulting in Model 3. The specific analysis results are presented in Table 9.

As shown in Table 9, in Model 3, the ΔR^2 value was 0.325 and the F value was 25.022 ($p < 0.001$), indicating a well-fitted hierarchical regression result. Additionally, the regression coefficient of the interaction term between knowledge sharing and the innovation climate in Model 3 was 0.168 ($p < 0.05$). This suggested the significance of the interaction term, affirming that the innovation climate positively moderated the relationship between knowledge-sharing and innovative behavior, thus validating Hypothesis 9.

A simple slope analysis was conducted to provide a more intuitive analysis of the moderating effect of the innovation climate. As illustrated in Figure 2, the slope value of the effect line from knowledge sharing to innovative behavior was higher in a high-innovation climate compared with a low-innovation climate. This implied that knowledge sharing is more effective in promoting innovative behavior in a situation with a pronounced innovation climate. Therefore, the innovation climate positively moderated the relationship between knowledge-sharing and innovative behavior, confirming Hypothesis 9 once again.

We employed the same testing method that was applied to examine the moderating effects of the innovation climate on the relationship between knowledge-sharing and innovative behavior to test the moderating effects of the innovation climate on the following relationships: the relationship between craftsmanship spirit and innovative self-efficacy (Table 10) and the relationship between craftsmanship spirit and innovative behavior (Table 11).

Conclusions and implications

Research conclusions

The craftsmanship spirit of technical talents in the manufacturing industry significantly influences their innovative behavior. Exploring its impact mechanism reveals that knowledge sharing and self-efficacy serve as chain mediators in the relationship between craftsmanship spirit and innovative

TABLE 7 Mediation effects test for knowledge sharing.

Variables	KSB		IB			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Gender	0.057	0.041	0.014	0.001	−0.011	−0.015
Age	0.064	0.029	0.007	−0.022	−0.022	−0.034
Education	0.048	0.045	0.105	0.103	0.084	0.085
Length of service	0.314***	0.295***	0.298***	0.282***	0.160**	0.166***
Technical level	−0.107	−0.050	−0.115	−0.068	−0.068	−0.048
CS		0.305***		0.250***		0.130**
KS					0.437***	0.393***
R^2	0.138	0.227	0.144	0.203	0.308	0.323
$\triangle R^2$	0.127	0.215	0.133	0.191	0.298	0.311
F	12.569	19.204	13.204	16.711	29.207	26.701

$n = 400$. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

TABLE 8 Mediation effects testing results (Bootstrap Method).

	Effect value	95% confidence intervals	
		Lower limit	Upper limit
Path 1: CS → ISE → IB	0.171	0.055	0.166
Path 2: CS → KS → IB	0.093	0.022	0.106
Path 3: CS → ISE → KS → IB	0.075	0.020	0.079
Total Effect	0.474	0.321	0.627

$n = 400$.

TABLE 9 Moderation effect test of the innovation climate between knowledge sharing and innovation behavior.

Variables	Model 1	Model 2	Model 3
	IB		
Control Variable	Control	Control	Control
KS	0.437***	0.282***	0.342***
IC		0.219**	0.306***
KS × IC			0.168*
R^2	0.308	0.328	0.339
$\triangle R^2$	0.298	0.315	0.325
F	29.207***	27.272***	25.022***

$n = 400$. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

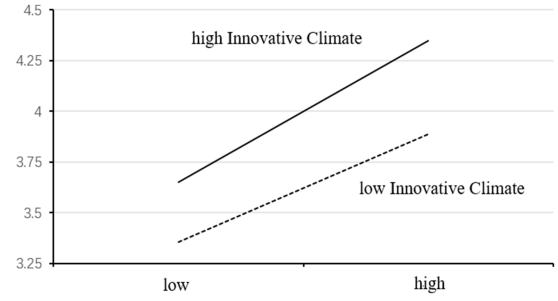


FIGURE 2
The moderating effect of innovation climate on knowledge sharing and innovation behavior.

TABLE 10 Testing the moderating effect of innovative climate on the relationship between craftsmanship spirit and innovative behavior.

Variables	Model 1	Model 2	Model 3
	IB		
Control variable	Control	Control	Control
CS	0.000**	0.000**	0.006**
IA		0.000**	0.000**
CS*IA			0.000**
R^2	0.085	0.275	0.301
F	36.980***	75.110***	56.769***
$\triangle R^2$	0.085	0.189	0.026

$n = 400$. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

TABLE 11 Analysis of the moderating effect of innovative climate on the relationship between craftsmanship spirit and innovative self-efficacy.

Variables	Model 1	Model 2	Model 3
	IS		
Control variable	Control	Control	Control
CS	0.000**	0.000**	0.001**
IA		0.000**	0.000**
CS*IA			0.005**
R^2	0.097	0.322	0.336
调整R^2	0.094	0.319	0.330
F 值	42.621	94.343	66.651
$\triangle R^2$	0.097	0.225	0.013

$n = 400$. *$p < 0.05$, **$p<0.01$, ***$p<0.001$.

behavior. Additionally, the innovation climate moderates the relationships between craftsmanship spirit and innovative behavior, craftsmanship spirit and innovative self-efficacy, as well as knowledge-sharing and innovative behavior. The research findings unveil novel influencing factors for innovative behavior, elucidating the impact mechanism of craftsmanship spirit on innovative behavior. This has significant reference value for fostering and motivating innovative behavior among technical talents.

Management insights

The findings of this study underscore the significance of craftsmanship spirit, innovative self-efficacy, knowledge sharing, and innovation climate for skilled talents in the manufacturing industry, as well as their shaping and stimulating roles in fostering innovative behavior among these talents. They provide management insights for manufacturing organizations seeking to enhance innovative behavior among their skilled talents.

Cultivating craftsmanship spirit in skilled talents

Craftsmanship spirit is recognized as a crucial source of inspiration for innovation and entrepreneurship in manufacturing powerhouses such as Germany and Japan. The conclusions drawn in this study also affirm the pivotal impact of craftsmanship spirit on innovative behavior among skilled talents in the manufacturing industry. Therefore, manufacturing organizations should prioritize and cultivate the craftsmanship spirit in their skilled talents.

Craftsmanship spirit emphasizes the mastery of practical skills and the accumulation of hands-on experience. Companies should provide skilled talents with specialized education and skill training courses, including technical training and industry certification programs, ensuring a profound knowledge base and exceptional technical skills in specific domains. Establishing a mentorship program is also recommended, allowing experienced artisans to impart their accumulated skills and experiences to the next generation of skilled talents. This enables the new generation to collaboratively solve real technical challenges and adapt to new demands through close cooperation with mentors.

Implementing incentive mechanisms, such as rewards, encourages skilled talents to demonstrate craftsmanship spirit in their practical work, thereby providing additional motivation, such as monetary incentives or honorary titles. Cultivating a company culture emphasizing skills and practicality is essential, as the values within the culture can encourage skilled talents to embody the craftsmanship spirit, thus showcasing enthusiasm for their work and a commitment to excellence.

Enhancing innovative self-efficacy of skilled talents

The innovative self-efficacy of skilled talents can effectively promote their innovative behavior and transform their craftsmanship spirit into tangible innovative outcomes. Therefore, manufacturing companies should prioritize the enhancement of innovative self-efficacy among skilled talents. Innovative self-efficacy reflects the confidence of skilled talents in their own innovative capabilities. Companies are advised to provide opportunities for skilled talents to practice innovation, allowing them to gain practical experience in successful innovation.

This can be achieved by encouraging skilled talents to participate in innovation projects, solve real-world problems, or propose technical and skill-related improvement suggestions. Recognizing and rewarding innovative ideas and solutions put forward by skilled talents can help establish a stronger sense of innovative self-confidence. Ensuring that skilled talents have sufficient support in terms of resources, including time, technical equipment, and training

resources, is crucial to enabling them to fully unleash their innovation potential.

Stimulating interest in innovation involves creating a culture fostering curiosity and enthusiasm. Companies can achieve this by showcasing successful innovation cases, inviting industry experts to share their experiences, and using other means to spark the interest and passion of skilled talents in innovation.

Encouraging knowledge sharing in skilled talents

Elevating the knowledge sharing of skilled talents is crucial for organizations seeking to foster a craftsmanship spirit among employees and promote innovation. Companies should cultivate an open, transparent, and inclusive communication environment to encourage knowledge sharing among skilled talents, allowing them the freedom to express their opinions and share knowledge.

Establishing knowledge-sharing platforms, such as internal social networks, team collaboration platforms, professional communities, or groups, can facilitate the easy sharing of documents, experiences, and best practices among skilled talents. This enhances the accessibility and share ability of information, enabling skilled talents to share knowledge effortlessly. Additionally, creating platforms specifically focused on certain themes or projects encourages the transfer of knowledge and facilitates collaboration.

Supporting knowledge sharing within workflow processes is essential. Integrating knowledge sharing into workflow processes, for example, encouraging the sharing of experiences and knowledge during project reviews or regular meetings, ensures that knowledge sharing becomes an integral part of daily work.

Fostering an organizational culture of innovation

The culture of innovation plays a pivotal, multifaceted role and serves as a crucial task for businesses aiming to enhance employee creativity. Promoting a culture of innovation can stimulate creative thinking among employees, foster the emergence of new ideas, and propel the organization toward continuous progress. It can enhance the positive impact of craftsmanship spirit on the innovative behavior and innovative self-efficacy of skilled talents, as well as amplify the positive influence of knowledge sharing on innovative behavior. Therefore, manufacturing companies should actively cultivate an innovative climate.

Senior leadership should actively support innovation, recognizing it as a key factor for organizational success. The encouragement and exemplary role of leaders are vital in establishing an innovative climate. Implementing incentive mechanisms, such as distributing bonuses, awards, and promotions, encourages employees who propose innovative ideas or successfully implement innovative projects.

Facilitating the formation of diverse teams within the organization, comprising individuals with different backgrounds, expertise, and experiences, can contribute to the generation of innovative thoughts from various perspectives. Creating a culture that encourages innovation attempts is essential. Encouraging employees to experiment with new approaches while embracing and learning from failures allows employees to draw lessons from setbacks, continuously improve, and cultivate a culture characterized by innovation and flexibility. This culture provides employees with more opportunities to unleash their creativity and achieve innovation.

Implications

Theoretical implications

First, this study further explored the empirical research mechanisms through which craftsmanship spirit influenced employee behavior.

Second, it revealed the empirical research mechanisms of antecedent variables for innovative behavior. The study mainly delved into individual cognition and behavior, elucidating and validating the dual mediating role of innovative self-efficacy and knowledge sharing in the relationship between craftsmanship spirit and innovative behavior. This comprehensive understanding of the mechanisms broadened the scope of the impact mechanism of craftsmanship spirit while enriching the research on the antecedent variables of innovative behavior.

Third, it uncovered the reinforcement mechanism of innovative behavior among skilled talents. Based on social exchange theory, the study identified the innovation climate as a boundary condition for the impact of knowledge sharing on innovative behavior among skilled talents. This study is significant for providing guidance to organizations on incentivizing innovative behavior among skilled talents.

Practical implications

First, skilled talents are a crucial force supporting the development of the manufacturing industry, and employee innovative behavior is the inexhaustible driving force for the sustainable development of manufacturing enterprises. Therefore, exploring the impact of craftsmanship spirit on the innovative behavior of skilled talents is conducive to the transformation, upgrading, and sustained development of manufacturing enterprises.

Second, the discovery that craftsmanship spirit influences the innovative behavior of skilled talents through innovative self-efficacy and knowledge sharing is novel. For manufacturing enterprises, this finding provides new insights and references for promoting the transformation of craftsmanship spirit into innovative behavior at the employee level, thereby injecting new impetus into the development of manufacturing enterprises. For managers, this discovery helps implement relevant management measures to maintain the innovative self-efficacy of skilled talents, such as increasing employee incentives and improving assessment systems. Simultaneously, it encourages managers to prioritize the effective use of knowledge resources among skilled talents and provide the necessary conditions for sharing. This approach enhances the innovative behavior of skilled talents and ultimately boosts the overall innovative behavior of the manufacturing industry.

Third, from an organizational perspective, the moderating effects of the innovation climate prompt manufacturing enterprises to pay more attention to the working environment and atmosphere of employees, thus fully leveraging the multiple moderating effects of the innovation climate.

Limitations and future research

The data for variables in this study were obtained through self-assessment by survey respondents within the same timeframe. Consequently, a potential risk of common method bias existed.

Although this study passed the common method bias test and we tried our best to minimize its effects, the possibility of some impact still exists. Therefore, future studies should consider examining and analyzing data from different sources. In our preliminary research and design, the innovation climate played a moderating role between craftsmanship spirit and knowledge sharing of employees. However, this was not supported by the data collected. This might be attributed to the fact that the amount of data we collected was not large enough. Therefore, we plan to address this issue or identify the root cause of the issue in the future.

Craftsmanship spirit is a crucial source of inspiration for innovation and entrepreneurship in manufacturing powerhouses. This study focused solely on investigating the impact and influencing mechanisms of craftsmanship spirit on the innovative behavior of skilled talents. Our future studies will emphasize on researching outcome variables related to craftsmanship spirit, expanding the scope of craftsmanship spirit research, and providing insights for actively and fully harnessing the power of craftsmanship spirit.

Innovation is a key driver for creating and maintaining competitive advantages in enterprises. This study primarily explored the impact mechanism of craftsmanship spirit on innovative behavior. Future studies can promote the investigation of other factors influencing innovative behavior, thus broadening the understanding of the multifaceted aspects contributing to innovation.

We should acknowledge that, despite the robustness of the conducted analyses, the findings were based on self-reported data collected at a single point in time. Thus, future research should consider using data from diverse sources and time points to mitigate potential common method bias and provide a more comprehensive understanding of the studied relationships. Additionally, expanding the scope of research to include diverse outcome variables related to craftsmanship spirit and exploring the influence of various factors on innovative behavior can contribute to a more holistic understanding of these complex dynamics.

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.

Author contributions

YL: Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Project administration, Methodology, Investigation, Data curation, Conceptualization. QZ: Writing – original draft, Visualization, Validation, Methodology, Investigation. WY: Writing – review & editing, Validation, Methodology, Formal analysis, Visualization, Data curation, Conceptualization.

Funding

The author(s) declare that financial support was received for the research, authorship, and/or publication of this article. Humanities and Social Fund of Ministry of Education of China "Research on the Trust Mechanism and Cooperative Governance among Multiple Collaborative Subjects in Skill Formation" (Number:22YJA880023). Beijing Wuzi University's scholarship program for teachers to study abroad.

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.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2024.1407426/full#supplementary-material

References

Ahmed, P. K. (1998). Culture and climate for innovation. *Eur. J. Innov. Manag.* 1, 30–43. doi: 10.1108/14601069810199131

Cheng, H., and Tian, H. (2016). Does the lack of craftsman Spirit Lead to poor product quality?—empirical evidence from Chinese Enterprise employee matching survey (CEES). *Macro Quality Res.* 4, 1–10. doi: 10.13948/j.cnki.hgzlyj.2016.04.001

Edmondson, A. C., and Lei, Z. (2014). Psychological safety: the history, renaissance, and future of an interpersonal construct. *Annu. Rev. Organ. Psychol. Organ. Behav.* 1, 23–43. doi: 10.1146/annurev-orgpsych-031413-091305

Gao, Z. (2022). Study on the impact mechanism of craftsman Spirit on employee proactive behavior. *J. Manag.* 6, 851–860.

Gu, Y., and Peng, J. (2011). The impact mechanism of innovative self-efficacy on employee innovation behavior. *Sci. Res. Manag.* 32, 63–73. doi: 10.19571/j.cnki.1000-2995.2011.09.009

Guo, J., and Deng, F. (2020). The impact of higher education talent cultivation reform on college Students' innovation ability. *J. High. Educ. Res.* 41, 70–77.

Guo, D., Yao, X., Yang, R., and Cao, X. (2017). Innovative qualities of highly skilled personnel: content and structure. *Stud. Sci. Sci.* 35, 1112–1120. doi: 10.16192/j.cnki.1003-2053.2017.07.017

Hurt, H. T., Joseph, K., and Cook, C. D. (1977). Scales for the measurement of innovativeness. *Hum. Commun. Res.* 4, 58–65. doi: 10.1111/j.1468-2958.1977.tb00597.x

Kleysen, R. F., and Street, C. T. (2001). Toward a multi-dimensional measure of individual innovative behavior. *J. Intellect. Cap.* 2, 284–296. doi: 10.1108/EUM0000000005660

Li, Q., Cai, F., and Zhang, H. (2021). The effect of manufacturing Employees' craftsman Spirit on job satisfaction and its influencing factors. *J. Manag.* 18:9.

Li, C., Murad, M., Shahzad, F., Khan, M. A. S., Ashraf, S. F., and Dogbe, C. S. K. (2020). Entrepreneurial passion to entrepreneurial behavior: role of entrepreneurial alertness, entrepreneurial self-efficacy and proactive personality. *Front. Psychol.* 11:516989. doi: 10.3389/fpsyg.2020.01611

Li, Q., Tang, Q., and Zhang, H. (2018). Research on cultivation of craftsman Spirit among new generation migrant Workers in the Context of "made in China 2025". *J. Changzhou Univ.* 19, 76–82.

Lin, C. P. (2007). To share or not to share: modeling tacit knowledge sharing, its mediators and antecedents. *J. Bus. Ethics* 70, 411–428. doi: 10.1007/s10551-006-9119-0

Liu, H. (2017). From apprentice to craftsman: transformation of Core competencies and cultivation of craftsman Spirit. *China Vocat. Techn. Educ.* 30, 17–21.

Liu, Y., Jiang, C., and Shi, J. (2022). Research on the measurement and cultivation of Enterprise craftsman Spirit. *J. Hohai Univ.* 24, 88–98.

Liu, Y., and Shi, J. (2009). The interactive effect of organizational innovation atmosphere and incentive preference on employee innovative behavior. *Manag. World* 88:188. doi: 10.19744/j.cnki.11-1235/f.2009.10.011

Liu, X., Zhang, Y., and Xu, C. (2020). Configuration study on promoting employee innovative behavior: a qualitative comparative analysis based on fuzzy sets. *Sci. Sci. Manag. Sci. Technol.* 41, 114–128.

Lu, L., Leung, K., and Koch, P. T. (2006). Managerial knowledge sharing: the role of individual, interpersonal, and organizational factors. *Manag. Organ. Rev.* 2, 15–41. doi: 10.1111/j.1740-8784.2006.00029.x

Obrenovic, B., Jianguo, D., Tsoy, D., Khan, M. A. S., and Anwar, F. (2020). The enjoyment of knowledge sharing: impact of altruism on tacit knowledge-sharing behavior. *Front. Psychol.* 11:518611. doi: 10.3389/fpsyg.2020.01496

Peng, H., and Yang, Q. (2022). The impact of craftsman Spirit and corporate reputation on corporate innovation performance. *J. Hunan Univ. Sci. Technol.* 25:9. doi: 10.13582/j.cnki.1672-7835.2022.05.014

Ren, F., and Zhang, J. (2015). Job stressors, organizational innovation climate, and employees' innovative behavior. *Creat. Res. J.* 27, 16–23. doi: 10.1080/10400419.2015.992659

Scott, S. G., and Bruce, R. A. (1994). Determinants of innovative behavior: a path model of individual innovation in the workplace. *Acad. Manag. J.* 37, 580–607. doi: 10.2307/256701

Senge, P. M. (2006). The fifth discipline: The art and practice of the learning organization. New York: Broadway Business.

Shen, X., and Pan, B. (2009). Factors influencing the structural imbalance of industrial upgrading and the supply of highly skilled personnel: a case study of the Pearl River Delta region, Guangdong Province. *J. South China Normal Univ.* 6, 91–159.

Su, Y., and Wang, M. (2018). Cultivation model of craftsman Spirit and analysis of innovation-driven path. *Contemp. Econ. Manag.* 40, 65–69. doi: 10.13253/j.cnki.ddjjgl.2018.11.010

Sun, Y., Yang, F., and Zhang, L. (2012). The relationship between creative self-efficacy and employee innovation behavior: a cross-level analysis. *Econ. Manag.* 11, 84–92. doi: 10.19616/j.cnki.bmj.2012.11.011

Tierney, P., and Farmer, S. M. (2002). Creative self-efficacy: its potential antecedents and relationship to creative performance. *Acad. Manag. J.* 45, 1137–1148. doi: 10.2307/3069429

Tsai, K. H. (2009). Collaborative networks and product innovation performance: toward a contingency perspective. *Res. Policy* 38, 765–778. doi: 10.1016/j.respol.2008.12.012

Van Den Hooff, B., and De Ridder, J. A. (2004). Knowledge sharing in context: the influence of organizational commitment, communication climate and CMC use on knowledge sharing. *J. Knowl. Manag.* 8, 117–130. doi: 10.1108/13673270410567675

Wang, H., and Chang, Y. (2017). The impact of organizational innovation atmosphere and job motivation on employee innovative behavior. *Manag. Sci.* 30, 51–62.

Wang, N., Zhang, L., and Wang, Y. (2016). The influence of innovative self-efficacy on innovative behavior: a multiple mediating effects analysis. *Psychol. Behav. Res.* 14, 811–816.

Yang, W., and Yang, S. (2020). Distributed leadership, organizational support, and proactive-passive innovative behavior of new generation employees: interactive moderating effects based on supervisor-subordinate relationship and value congruence. *J. Manag. Eng.* 34, 10–19. doi: 10.13587/j.cnki.jieem.2020.03.002

Yang, J., Yang, D., and Zhao, S. (2011). The intrinsic motivation of employee innovation in the workplace: employee creativity self-efficacy. *Adv. Psychol. Sci.* 19, 1363–1370.

Ye, L., Liu, Y., and Guo, M. (2018). The influence of inclusive leadership on craftsman Spirit of skilled talents. *Technol. Econ.* 37, 36–44.

Zhang, Y., Sun, J. M., Lin, C. H., and Ren, H. (2020). Linking core self-evaluation to creativity: The roles of knowledge sharing and work meaningfulness. *J. Bus. Psychol.* 35, 257–270.

Zhang, Z. (2019). The connotation, inheritance, and promotion path of model worker Spirit and craftsman Spirit. *Learn. Forum* 6:6. doi: 10.16133/j.cnki.xxlt.2019.06.005

Zhao, C., Fu, Y., and Gao, Z. (2020). Research on the connotation, measurement, and cultivation path of craftsman Spirit under the background of high-quality development. *China Soft Sci.* 7:9.

Zhu, Y., Guo, M., and Chen, W. (2021). Development and application of a craftsman spirit scale for manufacturing industry employees from the perspective of traditional and modern integration. *Sci. Technol. Progress Countermeasures* 38, 124–133.

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 14 April 2025
DOI 10.3389/fpsyg.2025.1387963

Check for updates

OPEN ACCESS

EDITED BY
Delia Virga,
West University of Timişoara, Romania

REVIEWED BY
Meng Lv,
Shandong Provincial Hospital, China
Qaiser Mohi Ud Din,
Harbin Institute of Technology, China

*CORRESPONDENCE
Yu Wang
✉ limliy0818@naver.com
Xiu Jin
✉ soohua1005@gachon.ac.kr

RECEIVED 19 February 2024
ACCEPTED 27 March 2025
PUBLISHED 14 April 2025

CITATION
Wang L, Wang Y and Jin X (2025) Exploring the effect of leader other-oriented perfectionism on radical innovation. *Front. Psychol.* 16:1387963. doi: 10.3389/fpsyg.2025.1387963

COPYRIGHT
© 2025 Wang, Wang and Jin. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Exploring the effect of leader other-oriented perfectionism on radical innovation

Le Wang, Yu Wang* and Xiu Jin*

Department of Business Administration, Gachon University, Seongnam, Republic of Korea

Introduction: Rapid shifts in the global economy have increased the demand for innovation within companies, with radical innovation being a key factor for achieving competitive advantage, organizational success, and sustainable growth. Leadership traits can significantly affect employee behavior and attitudes, which in turn, can influence their work. leader's others-oriented perfectionism, representing the interaction between a perfectionist leader and their employees, is particularly relevant in the workplace.

Methods: This study constructed a theoretical model to explore the relationship between leadership perfectionism and employee radical innovation and validated it through empirical research.

Results: The findings indicate that there is a positive correlation between leader's others-oriented perfectionism and employees' work engagement, which in turn is related to radical innovation. In addition, there is a moderating effect of leader's conscientiousness between the effects of perfectionism on employee work engagement. Employee promotion focus moderated the mediating role of work engagement in the relationship between leader perfectionism and employee radical innovation.

Discussion: The purpose of this study is to reveal the relationship between leadership perfectionism and employee work engagement and to explore how these findings can help organizations enhance employee breakthrough innovation. The findings will provide specific practical guidance for managers to encourage the combination of leadership perfectionism and accountability to drive employee work engagement and expand employee facilitation focus, ultimately impacting breakthrough innovation.

KEYWORDS

leader's other-oriented perfectionism, work engagement, radical innovation, conscientiousness, promotion focus

1 Introduction

Today's world is undergoing profound changes, and the wave of digitization has accelerated global market restructuring, placing higher demands on corporate innovation. Enterprises are faced with both challenges and once-in-a-century opportunities to catch up (Wang et al., 2023). The traditional innovation model can no longer meet the needs of breakthrough development, and it is crucial to enhance the capability of breakthrough innovation (Li et al., 2023). Breakthrough innovation has a significant impact through fundamental improvements

beyond existing solutions (Wang et al., 2023). It can reshape the industry landscape and drive business competitiveness and industrial upgrading (Wang et al., 2022). Against the backdrop of heightened global economic uncertainty, breakthrough innovation is not only a source of revolutionary solutions, but also a key to driving economic recovery (Cheng and Wu, 2023). However, the high cost and low success rate of breakthrough innovations discourage many employees (Yang and Wang, 2023). How to incentivize employees to participate in high-risk innovations has become a core issue that companies must address.

With the increasing importance of innovative work in organizational settings, the relationship between perfectionism and innovative behavior has become a focus of research (Park and Shin, 2022). However, much of the existing research has focused on self-oriented perfectionism, ignoring the role of other-oriented perfectionism in the workplace (Stoeber and Rennert, 2008). The present study focuses on leader-other-oriented perfectionism and argues that it is highly relevant to the workplace because it exemplifies leader-employee interactions on perfectionist traits. Perfectionism is a personality trait that manifests itself by striving for perfection, setting extremely high standards, and judging one's own behavior harshly (Flett and Hewitt, 2002). Although traditional research has tended to focus on the negative effects of perfectionism, recent research has shown that under certain conditions, perfectionism may also produce positive outcomes (Ocampo et al., 2020). Leaders, as perfectionists, tend to set high standards for their employees, emphasizing personal achievement and success, which may motivate employees to go beyond the status quo and strive for excellence (Fowler et al., 2018). This dissatisfaction with the status quo and pursuit of excellence may push employees to break away from existing solutions and experiment with innovative options, which may inspire breakthrough innovation (Xu et al., 2022). Therefore, this study takes leadership perfectionism as a prior variable to explore how leader's other-oriented perfectionism perfectionism predicts employees' radical innovation, providing a new theoretical perspective on the role of perfectionism in organizational behavior.

This study focuses on the pathways through which leadership perfectionism enhances employees' radical innovation and analyzes the mediating mechanisms involved. Work engagement, as a positive affective state, can help employees cope with the high standards demanded by perfectionism and provide them with the energy needed to accomplish difficult tasks (Ocampo et al., 2020). Therefore, this study examined work engagement as a mediating variable. Engaged employees are energized and enthusiastic about their work and perceive it as challenging rather than stressful, thus experiencing positive occupational well-being (Bakker et al., 2014). The increasing demands of modern organizations that expect employees to go beyond the call of duty, take the initiative to innovate, and commit to professional development have increased the need for energetic and engaged employees (Bakker and Schaufeli, 2008). Research has shown that engaged employees are not only able to cope with uncertainty in the innovation process, but also actively contribute to innovative behaviors, which can lead to breakthrough innovations (Gupta et al., 2017). Based on this, this study argues that engaged employees are more likely to adopt proactive behaviors, take work challenges seriously, and ultimately achieve radical innovation when faced with high standards of leader perfectionism. By introducing work engagement as a mediating variable, this study aims to reveal the underlying mechanisms by which leader's perfectionism promotes employees' radical innovation.

Personality research increasingly recognizes that one personality trait leads to the behavioral expression of others, for example, the realization that a person's level of extraversion may amplify or modulate the performance of his or her conscientiousness in a social or work setting considers the interactions between traits, rather than treating traits as separate dimensions (Hofstee et al., 1992; Johnson and Ostendorf, 1993). As a result, predicting and explaining behavior requires a more holistic view of personality (Shoss et al., 2015). According to Tupes and Christal (1992), conscientiousness has been widely studied and is usually characterized by the key dimensions of reliability, organization, persistence and accountability. Leaders with high levels of conscientiousness are typically more resilient and persistent and may be more effective leaders (Judge et al., 2002). Research suggests that leader's conscientiousness is positively related to other-oriented perfectionism (Hewitt and Flett, 1991) and demonstrates positive effects by encouraging more participatory behaviors (Shoss et al., 2015; Birch et al., 2019). Therefore, this study examines leader's conscientiousness as a moderating variable to explore how it interacts with leadership perfectionism, which in turn predicts employee engagement. This study provides new perspectives for understanding the impact of leadership personality traits on employee behavior.

This study argues that employees' radical innovation are realized through a combination of the mediating role of work engagement and the moderating role of psychological characteristics. Therefore, it is necessary to explore how employees' psychological characteristics modulate this process. Moderating focus theory states that promotion focus is concerned with positive outcomes and favors aggressive strategies (Wu et al., 2021). Promotion focus stimulates positive emotions and makes individuals more optimistic about future expectations, which promotes creativity and innovative performance (Baas et al., 2008). In addition, employees with a promotion focus are more inclined to come up with new ideas and explore new approaches (Zhou et al., 2012). Based on this, this study predicts that promotion focus can interact with employee work engagement to play a positively role on employees' radical innovation. This study provides a new perspective for understanding the role of employee psychological characteristics in innovative behavior.

Overall, this study builds a unified theoretical framework to integrate the model based on Job demands-resources theory (Demerouti et al., 2001). Leadership perfectionism can be viewed as a challenging demand that motivates employee effort and commitment by setting high standards. Work engagement, on the other hand, is viewed as a positive psychological state, driven by resource adequacy and a reasonable match of demand, which enables employees to think out of the box and realize radical innovations. Conscientiousness as a personality factor provides the resources needed for challenging demands, and finally, promotion focus is a personal resource that helps employees transform challenging demands into positive outcomes.

Given the aforementioned background, this study contributes in the following ways.

First, perfectionism is a significant individual-level variable that affects employee behavior. However, most work to date has focused primarily on clinical, student, and athletic populations, with limited attention on the workplace or specific occupational

groups, such as social workers, that may be at higher risk. The nature and effect of perfectionism among social workers remain largely unexplored (Kinman and Grant, 2022). Note that the workplace is a social setting where leaders frequently interact with employees and can assess their performance, making it a crucial context for examining the effect of leaders' other-oriented perfectionism (Shoss et al., 2015). Consequently, this study focuses on the leader's perfectionism and investigates its effect on employee behavior.

Second, the focus of research on perfectionism in the workplace has primarily been on individuals' self-oriented perfectionism (Xu et al., 2022). Kim et al. (2017) concluded that self-oriented perfectionism positively affects employee creativity. However, there has been limited exploration of how a leader's other-oriented perfectionism affects employees. This study, drawing on Hewitt and Flett's (1991) definition of other-oriented perfectionism, investigates whether a leader's high perfectionism standards for others can stimulate radical innovation among employees. Current findings suggest that other-oriented perfectionism is not a positive form of perfectionism (Stoeber, 2014). Previous research has found that a leader's perfectionism can lead to uncivil behavior in the workplace and psychological distress, which can increase employee procrastination (Malik, 2023). Moreover, Xiong and Zhang's (2023) study concluded that a leader's perfectionism can hinder the development of innovative behaviors among employees. In contrast, this study proposes that a perfectionist leader can motivate subordinates to aim for high standards, thereby enhancing their work engagement and fostering radical innovations. This brings new insights into the study of a leader's other-oriented perfectionism.

Third, most existing research concentrates on innovation outcome variables within organizations, such as employees' innovative behaviors (Hoang et al., 2022; Lin et al., 2022). However, only a few studies have examined how an organization's leadership traits affect the mechanisms of radical innovations. For organizations to thrive in a rapidly evolving external environment, their members must generate novel and groundbreaking ideas to distinguish themselves in intense competition. Consequently, the significance of employees' radical innovative behaviors for organizational survival and growth is escalating daily and is invaluable in today's volatile business landscape (Liu et al., 2022). This is why it is crucial to investigate the factors affecting radical innovation in organizations. This study considers a leader's perfectionism as an influential factor and actively investigates the process of enhancing radical innovation.

Fourth, this study of Chinese small and medium-sized enterprises (SMEs) in the context of organizational culture with Chinese characteristics expands the research scope by incorporating both leadership traits and employee psychological states as moderating variables. Judge et al. (2002) argue that the Big Five personality traits are crucial for predicting leadership behavior. Therefore, this study considers conscientiousness as a leadership trait and examines its effect on employee behavior and states in roles that require perfectionism. Furthermore, this study incorporates the regulatory focus literature to explore differences in employees' internal self-regulation toward radical innovations. Because individuals with a promotion focus tend to concentrate more on the positive outcomes of events, they are more likely to explore their environment and work (Wu and Zhang, 2023), which promotes radical innovation. Therefore, this study uses a promotion focus as a moderating variable to interact with work engagement to enhance radical innovation, thereby filling a research gap on this topic in Chinese SMEs.

2 Theoretical background

2.1 Leader's other-oriented perfectionism and subordinate's work engagement

This study uses Hewitt and Flett's (1991) concept of other-oriented perfectionism, which centers on expecting others to strive for perfection and being highly critical of those who fall short of expectations (Stoeber, 2015). According to Hewitt and Flett (1991), this kind of perfectionism is often maladaptive because it can lead to blaming, a lack of trust, and hostility, as well as setting unrealistic standards for others to set unrealistic standards, thus threatening the team climate (Kleszewski and Otto, 2020). However, some research suggests that this trait may have a 'bright side', whereby other-oriented perfectionism may help others to achieve high standards (Shoss et al., 2015). Leaders' perfectionism toward their employees manifests itself in setting extremely high standards for their employees and requiring them to achieve their goals without flaws. If other-oriented perfectionism motivates individuals to help others meet standards, positive outcomes may result (Shoss et al., 2015). Drawing from trait interaction theory, research has demonstrated that other-oriented perfectionism in the workplace, when combined with a conscientious personality, can predict positive interpersonal outcomes at work, such as task-oriented helping behaviors (Shoss et al., 2015). They also propose that a leader's perfectionism can positively affect employee creativity through job crafting (Yu et al., 2021).

Some other-oriented perfectionists may help others meet the high standards they hold, so when leaders set high standards while providing support and autonomy, employees are more likely to experience higher levels of engagement (Shoss et al., 2015). This engagement in turn motivates them to think creatively and pursue radical innovations. Thus, work engagement serves as a mediating mechanism that transforms the effects of leader perfectionism into a driver of innovation. Kahn (1990) defines engagement as the act of committing one's physical, cognitive, and emotional resources to a work role. This engagement is evident when individuals are physically involved in a task, either individually or collectively, are cognitively alert and focused, and feel emotionally connected to their work. Engaged employees also enjoy exploring new ideas or actions, which can lead to more positive learning behaviors and proactive actions (Bakker et al., 2014). Work engagement is the perfect link that combines personal characteristics, work factors, and job performance, and is an important way to increase the competitive advantage of an organization (Guo and Hou, 2022). Job and personal resources have been found to predict work engagement, which in turn leads to improved job performance (Bakker, 2011). Additionally, findings based on a regression analysis indicate that work engagement acts as a mediator between perceived organizational support and employee creativity (Aldabbas et al., 2023).

A leader's perfectionism can enhance the work engagement of their subordinates, because they are often motivated by the challenge of perfectionism and they view the leader's emphasis on perfectionism as a significant learning opportunity, the high standards set by perfectionist leaders align with their desire to be challenged, leading

to increased work engagement among employees working with such leaders (Xu et al., 2022). Moreover, a perfectionist leader can inspire subordinates to aim for high standards, thereby boosting their performance and efficiency (Ocampo et al., 2020). As a result, employees under a leader's other-oriented perfectionism may enhance their engagement and performance at work to meet the expectations of perfectionist leaders (Birch et al., 2019). The high standards and demands of perfectionist leaders can stimulate positive emotions and the development of problem-focused coping strategies in employees, increasing their willingness to expend energy on work-related tasks and subsequently enhancing work engagement (Mazzetti et al., 2023). When employees perceive the perfectionist expectations of their leaders, they also feel the challenge of their work and simultaneously reap benefits and rewards. Overcoming this challenging pressure can yield positive effects and feedback for employees' personal growth, leading them to value their work and invest more resources into it (Li et al., 2010). Therefore, a leader's perfectionism, as a type of challenging stressor, sets high standards and requirements for employees, bringing pressure but also conveying positive ideas. This gives employees the confidence and passion to work hard, increasing their work commitment and subsequently improving their task performance.

Previous research by Amabile and Pratt (2016) suggests that creativity and innovation require the relentless pursuit of elevated standards, a focus on areas of concern, and the continuous motivation of employees to achieve their objectives. These elements can be effectively fostered by a perfectionist leader; therefore, a leader's perfectionism could potentially enhance employees' radical innovations by inspiring them to exert more effort and persist despite challenges and failures (Raza and Shah, 2023). A leader's perfectionist demands inherently involve dissatisfaction with the current state of affairs and a quest for superior outcomes, to meet these demands, employees must deviate from existing solutions and explore different alternatives, thereby fostering creativity and enhancing radical innovation (Xu et al., 2022). Perfectionist leaders set high standards and expectations for their employees, when employees perceive these expectations, they infer that their leaders have strong faith in their abilities (Tierney and Farmer, 2004). This understanding motivates them to overcome their fear of challenging the status quo, ensuring optimal creative performance and increased radical innovation (Gong et al., 2009). Perfectionist leaders impose high standards and demands on their employees' work. This compels employees to adjust their thinking, emotions, and other resources to reach the desired state when dealing with demanding tasks (Yu et al., 2021), and to seek new solutions that lead to radical innovations.

> *H1:* Leader's other-oriented perfectionism is positively related to subordinate's work engagement.

> *H2:* Leader's other-oriented perfectionism is positively related to subordinate's radical innovation.

2.2 Subordinate's work engagement and subordinate's radical innovation

Radical innovation is defined as one that has a strong impact on an organization, provides entirely new solutions and technologies that deliver benefits, and creates new business for the organization (O'Connor and Ayers, 2005). Radical innovation replaces old solutions and create entirely new ways of thinking that provide the engine for the long-term value growth of the business that business leaders seek and create new business opportunities (Leifer et al., 2001). This behavior embodies an employee's ability to actively adopt innovative behaviors, courageously challenge the status quo, attempt new methods or creative thinking to solve technological issues, and potentially lead to disruptive innovations (Li et al., 2022). Therefore, radical innovation plays a crucial role in a firm's economic sustainability (Koberg et al., 2003). Studies have shown that companies with a broad range of knowledge are more skilled at creating groundbreaking innovations when there is internal knowledge sharing (Zhou and Li, 2012). Leadership that supports innovation encourages employees to engage in radical innovation by fostering an identity tied to innovation (Liu et al., 2022). The values associated with pay raises, knowledge sharing, and thorough information processing all play multiple, sequential mediating roles in employees' radical innovative behaviors (Yang and Wang, 2023).

When employees are deeply engaged in their work and less affected by external factors, they are better equipped to generate creative solutions and tackle problems innovatively, thereby boosting their creativity and fostering radical innovation (Wu et al., 2021). Employees who are highly engaged at work not only maximize the use of existing work resources, but also create new ones to sustain their engagement, as a result, these employees are more likely to work harder, be more efficient, exhibit greater creativity, and demonstrate a higher capacity for radical innovative behaviors (Bhatnagar, 2012). Furthermore, the sense of purpose that engaged employees feel at work encourages them to make extra efforts to understand problems from various angles and to connect with different information sources, which can promote radical innovation in the workplace (Gilson and Shalley, 2004; Montani et al., 2020). First, the positive emotional state linked with dedication in work engagement stimulates flexible thinking, which aids in generating creative solutions and enhancing radical innovation (Madrid et al., 2014). Employees who are engaged at work are fully immersed in their tasks, focusing on work-related activities and effectively using their resources (Chang et al., 2013). Additionally, work engagement allows employees to leverage their cognitive resources through absorption to discover new perspectives, information, and knowledge and integrate them into novel creative concepts (Zhang and Bartol, 2010). Work engagement empowers employees to fully use their resources, stimulate creative thinking, find new solutions and techniques, and enhance radical innovation.

> *H3:* Subordinate's work engagement is positively related to subordinate's radical innovation.

2.3 The mediating effect of subordinate's work engagement

Perfectionist leaders drive employees to pursue higher performance by setting high expectations and striving for excellence, emphasizing the gap between the current and ideal state (Mitchell et al., 2019; Park et al., 2014). This behavior motivates employees to invest more physical, cognitive, and emotional resources to enhance work engagement (Xu et al., 2022). Work engagement enables

employees to actively engage in cognitive activities, absorb new knowledge, and drive radical innovation (Parker and Griffin, 2011). Thus, leadership perfectionism promotes employees' self-regulation by motivating them to align with organizational goals, ultimately enhancing innovation. Research has shown that perfectionist leaders enhance employees' sense of efficacy and work engagement by setting high standards and clear expectations (Tierney and Farmer, 2011). Engaged employees are more inclined to seek out learning opportunities, develop expertise, and generate innovative ideas (Park et al., 2014). In addition, employees respond to high demands by increasing their work engagement, both to satisfy intrinsic needs and to achieve innovative outcomes (Yu et al., 2021). Organizations can leverage leadership perfectionism to promote innovation through a supportive environment. For example, leaders align employees with organizational goals through effective communication, boosting their confidence and motivation (Hakanen et al., 2008). By enhancing work engagement, organizations can transform the pressure of leadership perfectionism into a drive for radical innovation, achieving a win-win situation for both employees and the organization.

> *H4:* Subordinate's work engagement positively mediates the relationship between leader's other-oriented perfectionism and subordinate's radical innovation.

2.4 The moderation effects of leader's conscientiousness

Conscientiousness refers to a collection of constructs that describe individual differences in tendencies to exhibit self-control, responsibility toward others, diligence, organization, and adherence to rules (Roberts et al., 2009). Individuals with high conscientiousness typically organize their time, work in a disciplined way toward their objectives, aim for precision and perfection in their tasks, and deliberate carefully when making decisions (Smithikrai and Suwannadet, 2018). Conscientious leaders can significantly aid employees in overcoming anxiety and insecurity, enhancing subjective wellbeing, and responding to the pressing need to tackle the challenges of the new work-life environment (Xue et al., 2023). Conscientious leaders boost performance by aiding in the establishment of norms and behaviors that ultimately inspire employees to actively engage in work process improvement (Walumbwa et al., 2012). Xue et al. (2023) indicate that leaders who exhibit higher levels of conscientiousness may enhance the wellbeing of their subordinates. Smithikrai and Suwannadet (2018) suggest that conscientiousness is a moderating factor in the direct relationship between authentic leadership and proactive work behavior, with the relationship being stronger when the leader's conscientiousness is high. Wang et al. (2020) found that a leader's conscientiousness moderates the indirect effect of a leader's humility on promoting team creativity through team creativity effectiveness.

Leaders who are perfectionists establish high standards and expectations for others. In this study, we explore the personality traits associated with other-oriented perfectionism and examine how a leader's conscientiousness can enhance employee work engagement. A perfectionist leader often favors the performance of others, but the level of their conscientiousness leads to the preference can be successfully converted into supportive behaviors that boost employee work engagement (Shoss et al., 2015). Perfectionistic leaders have high expectations of their employees, when these leaders are also conscientious, they engage in socially acceptable behaviors, adhere to ethical standards and rules, and hold themselves accountable to their employees, this accountability helps keep employees engaged and flexible in completing their tasks (Van Eeden et al., 2008). Conscientious individuals, who are often perfectionists, perform their work meticulously to avoid errors and make informed decisions, these leaders motivate their followers by setting high yet achievable goals and providing assistance when needed; therefore, when employees have a leader who is both a perfectionist and conscientious, they receive the necessary leadership support to fully engage in their work (Breevaart and de Vries, 2021). According to the job demands-resources (JD-R) model, job demands and job resources can act as precursors to employee work engagement, reducing job demands helps employees concentrate on their work and minimize unproductive time, while increasing job resources helps employees maintain their energy and stay engaged in their work, if sufficient job resources are available, they can counteract the negative effects of demands, thereby ensuring high levels of work engagement and subsequent positive outcomes (Bakker and Demerouti, 2007). Therefore, a leader's perfectionism, which places high demands on employees and challenges them to promote desirable behaviors, raises the standard of work and provides employees with the necessary work resources to stay engaged in their work and perform relevant tasks effectively under the personality trait of a leader's conscientiousness.

> *H5:* Leader's conscientiousness positively moderates the relationship between leader's other-oriented perfectionism and subordinate's work engagement.

2.5 The moderated mediation effects of subordinate's promotion focus

The regulatory focus principle differentiates between self-regulation with a promotion focus, which concerns achievement and ambition, and self-regulation with a prevention focus, which concerns safety and responsibility. When individuals have a promotion focus, they are motivated to seek pleasure, and this focus is linked to the motivation to reach a desired outcome (Higgins, 1997). People engaged in a promotion-focused self-regulatory process are motivated by their growth and developmental needs to strive to align with their ideal selves, thereby enhancing the importance of positive outcomes (Brockner and Higgins, 2001). Individuals with a promotion focus tend to view the environment as benign and use a variety of strategies to achieve their goals (Zhou et al., 2012). When people have a promotion focus, they prefer to gain new achievements rather than maintain current ones, value goals that involve accomplishments or outcomes perceived as gains, and persist in tasks that promise rewards for success (Molden et al., 2009). Transformational leadership has a positive effect on employee creativity, facilitated by the mediating effects of promotion focus (Henker et al., 2015). Furthermore, transformational leadership proves particularly beneficial for job crafting when employees have a high promotion focus (Hetland et al., 2018). Challenging stress positively affects promotion focus, which in turn positively affects creativity self-efficacy (Wu et al., 2021).

We emphasize the significant moderating role of an employee's promotion focus in amplifying the effect of work engagement on radical innovation. Essentially, radical innovation is shaped by the interplay between work engagement and promotion focus. Employees with a promotion focus are likely to be more open to risk-taking and experimentation with creative strategies, and more driven to implement creative ideas, leading to radical innovations (Henker et al., 2015). Such employees foster positive changes in their work, enhancing their work resources and fostering work engagement, boosting positive emotions, new work perceptions, and the emergence of radical innovations (Lichtenthaler and Fischbach, 2019). Employees with a promotion focus are motivated to engage in their work to fulfill their aspirations and concentrate on positive outcomes (Blank and Naveh, 2018). This process supports creative insights (Friedman and Förster, 2001), enabling employees to explore new knowledge and develop new competencies, leading to radical innovation. Regulatory focus theory suggests that an individual's motivation aids in achieving their desired end state, driven by this growth desire, employees with a promotion focus engage in work to realize their accomplishments, explore new work solutions, and achieve radical innovations (Jason and Geetha., 2021). Based on these arguments, employees with a promotion focus believe in their ability to perform their jobs well and dedicate their full mental and physical energy to their work. This leads to the acquisition of new knowledge and skills, the generation of new work options, and the achievement of certain accomplishments, resulting in more radical innovation. This process suggests that high levels of employee promotion focus and work engagement foster high levels of radical innovation.

Moreover, employees who are intrinsically motivated and have a promotion focus tend to be more engaged in their work and seek innovative solutions to problems, leading to innovation (Yidong and Xinxin, 2013). High expectations from a perfectionist leader enhance these employees' cognitive flexibility, risk-taking, and confidence in complex tasks, thereby generating new ideas and creative solutions, and enhancing radical innovation (Grant and Berry, 2011). Therefore, this study concludes that an employee's work engagement is linked to their psychological state of promotion focus when their leader exhibits perfectionist traits, and this can affect radical innovation. Employees with a promotion focus are more attuned to the high work standards set by their leaders and, as a result, they seek innovative ways to structure their work and embrace the challenge of working toward the leader's vision (Hetland et al., 2018). Thus, when faced with their leader's perfectionist expectations, employees with a promotion focus can increase their work engagement, seek new ways of working, and achieve radical innovation. When perfectionist leaders set high standards for work engagement, employees adjust their behavior to actively engage in their work, when this high level of work engagement is paired with the stimulation of high work demands, employees with a promotion focus find the most favorable work environment, strive to perform creative work, and achieve radical innovation (Zhou et al., 2012). In general, when employees have higher levels of promotion focus, the high work demands associated with leader perfectionism are more likely to be viewed as a challenging stressor, perceived as contributing to personal growth and development, and enhancing personal work engagement, this, in turn, motivates employees to develop positive emotions and coping behaviors in response to stress and employees with a promotion focus are more open-minded, innovative, and willing to take risks, contributing to radical innovation (Yu et al., 2021). Therefore, this study concludes that when employees have a higher promotion focus, they are more willing to work hard, explore new solutions, and the higher their work engagement, the greater their radical innovation. Furthermore, when faced with the high demands and standards of a leader's perfectionism, employees with a promotion focus have a more open attitude toward challenges, a higher willingness to take risks, and positive emotions toward challenges, and are more likely to be inspired to make radical innovations.

> *H6:* Subordinate's promotion focus will positively moderate the relationship between subordinate's work engagement and subordinate's radical innovation. Such that when the level of subordinate's promotion focus is higher, the positive relationship of subordinate's work engagement on subordinate's radical innovation is enhanced.
>
> *H7:* The mediating role of subordinate's work engagement on the relationship between leader's other-oriented perfectionism and subordinate's radical innovation will be positively moderated by subordinate's promotion focus.

3 Method

3.1 Participants and procedures

To empirically analyze the research hypothesis that leader other-oriented perfectionism is an antecedent of radical innovation, we surveyed employees of Chinese SMEs through an online questionnaire. The majority of employees who participated in the survey were subordinates. The sample size of the recovered questionnaires for analysis was 343 (91.2% response rate), after excluding invalid questionnaires. Regarding the characteristics of the participants in this study, there were 134 men (39.1%) and 209 women (60.9%). In terms of age, 0 (0%) were under the age of 20 years, 62 (18.1%) were between the ages of 20 and 29 years, 71 (20.6%) were between the ages of 30 and 39 years, 110 (32.1%) were between the ages of 40 and 49 years, 100 (29.2%) were between the ages of 50 years or older. In terms of educational level, 111 (32.4%) were from technical secondary school or high school, 72 (21.0%) were from junior college, 84 (24.4%) graduated from college, 17 (5.0%) held a master's degree, 3 (0.9%) held a doctor's degree or higher and 56 (16.3%) are in other. In terms of employment relationships, full-time jobs were the most numerous at 213(62.1%) and informal positions were 130(37.9%).

Regarding Service Years, 29(8.5%) people had worked for a year or under, 42(12.2%) had worked for 1 to 3 years, 42(12.2%) had worked for 3 to 5 years, 37(10.8%) had worked for 5 to 7 years, and 193(56.3%) people had worked for 7 or over. Regarding about the time to work with the current immediate leader, 51(14.9%) people had worked for a year or under, 41(12.0%) had worked for 1 to 2 years under, 50(14.6%) had worked with the current immediate leader for 2 to 3 years under, 31(9.0%) had worked with the current immediate leader for 3 to 4 years under, 32(9.3%) worked with the current immediate leader for 4 to 5 years under, and 138(40.2%) people had worked with the current immediate leader for 5 or over. Regarding enterprise type, 27(7.9%) people were working in education, 37(10.8%) people were working in finance, 25(7.3%) people were working in medical industry,

71(20.7%) people were working in catering services, 36(10.5%) people were working in coal mining, 138(40.2%)people were work in media and 9(2.6%) people were working in other occupations.

3.2 Measures

Leader other-oriented perfectionism. To measure leader other-oriented perfectionism in Chinese SMEs, we used Hewitt and Flett (1991) measurement scale. The measurement tool consists of 5 items. The sample items included,"My leaders have great expectations for me." and "My leader expects me to do my job perfectly."

Work engagement. To measure the work engagement of Chinese SME members, we used a measurement scale consisting of 18 questions from Rich et al. (2010). The sample items include "I work with intensity on my job." and "I exert my full effort to my job."

Conscientiousness. To measure leader conscientiousness in Chinese SMEs, we used Gerlitz and Schupp (2005) measurement scale. The measurement tool consists of 5 items. The sample items included, "My leader is an organized person." and "My leader is a responsible person."

Promotion focus. This study used the measurement items of Wallace and Chen (2006) to measure promotion focus. The measurement tool consists of 6 items. Sample items include "I can accomplish a lot at work." and "I'll do my job well no matter what."

Radical innovation. We used Li et al. (2008) scale to measure Chinese SMEs' radical innovation. The tool used to measure radical innovation consists of 4 items. Sample items include "I often create radically new products." and "I often introduce radically new concept in innovations."

All items use a 7-point Likert scale, with responses ranging from 1 (strongly disagree) to 7 (strongly agree); the higher the score, the stronger the abovementioned intent. The research model is shown in Figure 1.

3.3 Analytical approach

The collected questionnaire data were statistically analyzed using SPSS 26.0. and Amos 24.0. Initial data analysis was completed using SPSS software, covering demographic characterization, reliability analysis of the scales (assessed by Cronbach's alpha coefficients), and correlation analyses between variables. Subsequently, confirmatory factor analysis (CFA) was conducted using AMOS software to test the structural validity of the measurement model. In this study, SPSS Process Macro 3.4.1 Model 4 was used to analyze the direct, indirect, and mediating effects of the variables. In order to test the robustness of the moderating effect, this study used the SPSS PROCESS Macro 3.4.1 Model 1 to conduct 5,000 samples of Bootstrapping tests within the 95% confidence interval. Finally, this study validated the overall model using structural equation modeling in SmartPLS software.

4 Results

4.1 Confirmatory factor analysis and reliability analysis

This study first conducted a confirmatory factor analysis. Confirmatory factor analysis (CFA) is a type of structural equation modeling that deals specifically with measurement models; that is, the relationships between observed measures or indicators (e.g., test items, test scores, behavioral observation ratings) and latent variables or factors (Brown and Moore, 2012). Model 1 was an expected model, in which five factors were loaded independently and input simultaneously. In terms of model fit, the absolute fit index was $X^2(p) = 661.538(0.000)$, $X^2/df = 1.010$, RMSEA = 0.050, and the incremental fit index was IFI = 0.941, CFI = 0.940, and the parsimonious adjusted index was PGFI = 0.806, PNFI = 0.876. Model 2 was designed using all items loaded on a single factor. The results showed $X^2(p) = 4625.311(0.000)$, $X^2/df = 6.955$, RMSEA = 0.132, IFI = 0.621, CFI = 0.619, PNFI = 0.552, and PGFI = 0.434. Based on these results, we acknowledge that Model 1 is acceptable with a good fit. Table 1 summarizes the results of the structural model fit index.

The CFA of Model 1 (five-factor model) showed that the scale was a good fit and construct validity. To verify the feasibility of the model, we derive the Average Variance Extracted (AVE) and Composite Reliability (CR). In terms of the AVE value, all the values are greater

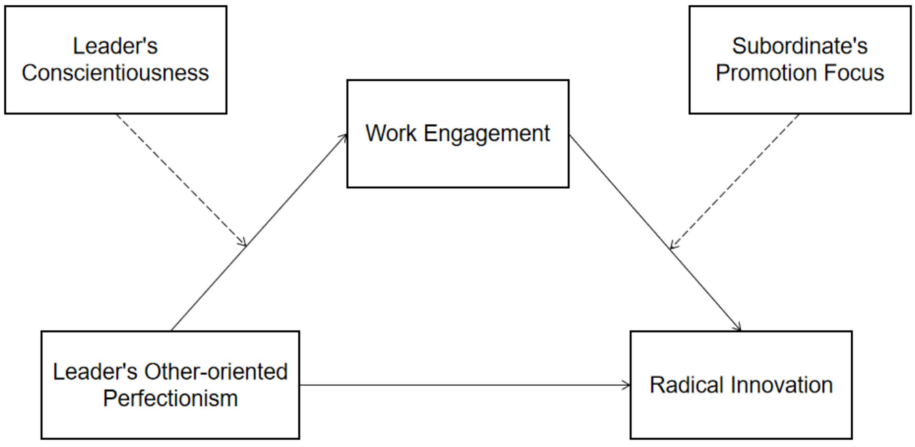


FIGURE 1
The research model.

TABLE 1 Summary of structural model fit results.

Model	χ^2 (p)	χ^2 /df	RMSEA	IFI	CFI	PNFI	PGFI
Model 1 (Expected Model of five-factor[a])	661.538	1.010	0.050	0.941	0.940	0.876	0.806
Model 2 (one-factor[b])	4625.311	6.955	0.132	0.621	0.619	0.552	0.434

[a]Leader Other-oriented perfectionism, work engagement, conscientiousness, promotion focus, and radical innovation; [b]All items were loaded on a single factor.

than 0.5. Regarding the value of CR, all the values are greater than 0.7. Through such a result, convergent validity is ensured. Refer to Table 2 for specific values.

The reliability analysis results of each variable in this study are all above 0.7, thus ensuring confidence in each variable. Table 2 shows the results of the analysis of convergent validity and reliability.

4.2 Descriptive statistics and correlation analysis

In this study descriptive statistical analyses included mean and standard deviations. The means, standard deviations and correlations of the variables are in accordance with the criteria. Table 3 shows the results of the descriptive statistics and correlation analysis.

4.3 Hypothesis test

The results show that work engagement of employees in Chinese SMEs has a mediating effect on the relationship between leader other-oriented perfectionism and radical innovation. The results of the analysis are as follows: leader other-oriented perfectionism had positive effects on work engagement ($t = 8.624$, $p < 0.001$), and Boot LLCI was found to be 0.314 and Boot ULCI was found to be 0.496, which did not contain 0, so hypothesis 1 was supported. Work engagement had positive effects on radical innovation ($t = 3.887$, $p < 0.001$), and Boot LLCI was found to be 0.108 and Boot ULCI was found to be 0.325, which did not contain 0, so hypothesis 3 was supported. Leader other-oriented perfectionism had positive effects on radical innovation ($t = 0.2.409$, $p < 0.05$), and Boot LLCI was found to be 0.027 and Boot ULCI was found to be 0.235, which did not contain 0, so hypothesis 2 was supported.

In this study, SPSS Process Macro 3.4.1 Model 4 was used to test for mediating effects, and 5,000 Bootstrap samples were taken for 95% confidence interval estimation, and the results of the test are shown in the Table 4. The indirect effect of work engagement in the relationship between leader other-oriented perfectionism and radical innovation is 0.087, with a lower limit of 0.043 and an upper limit of 0.139. The display does not contain 0 between the upper and lower values, and therefore the effect of the parameter can be considered significant. Hence, hypothesis 4 is supported. Table 4 shows the results.

Leader other-oriented Perfectionism was set as the independent variable, Work Engagement was set as the dependent variable and Leader's Conscientiousness was set as the moderating variable for moderating effect analysis. From the effect coefficients in the above table, it can be seen that the regression coefficient between Leader other-oriented Perfectionism and Work Engagement is 0.402 and the significance level is $p < 0.001$ level, so there is a significant positive effect between Leader other-oriented Perfectionism and Work Engagement has a significant positive effect relationship and the regression coefficient of the interaction term (Leader other-oriented Perfectionism*Leader's Conscientiousness) is 0.187 and the level of significance $p < 0.001$ level, so Leader's Conscientiousness has a positive moderating role in the effect of Leader other-oriented Perfectionism on Work Engagement. Therefore, hypothesis 5 is supported. Figure 2 shows the graph related to the moderating effect of conscientiousness (Table 5).

Work Engagement was set as the independent variable, Radical Innovation as the dependent variable and Subordinate's Promotion Focus as the moderating variable for moderating effect analysis. From the effect coefficients in the above table, it can be seen that the regression coefficient between Work Engagement and Radical Innovation is 0.217, and the significance level is $p < 0.001$ level, so there is a significant positive effect relationship between Work Engagement and Radical Innovation, and the interaction terms (Work Engagement*Subordinate's Promotion Focus) has a regression coefficient of 0.185 and a significance level of $p < 0.001$ level, so there is a significant positive effect relationship between Work Engagement and Radical Innovation, and the interaction term (Work Engagement*Subordinate's Promotion Focus) has a positive moderating effect in the effect of Work Engagement on Radical Innovation. There is a positive moderating effect in the effect of Work Engagement on Radical Innovation. Therefore, hypothesis 6 is supported. Figure 3 shows the graph related to the moderating effect of promotion focus (Table 6).

This study used SmartPLS software to conduct hypothesis testing for structural equation modeling. The fit of the initial research model was first examined. In terms of model fit, the absolute fit index was $X^2(p) = 663.473(0.000)$, $X^2/df = 1.013$, RMSEA = 0.060, SRMR = 0.035, and the incremental fit index was IFI = 0.940, CFI = 0.940, and the results of the examination found that the model fit was good, indicating that the fit of the structural model was acceptable.

This study follows the division criteria of mean plus or minus one standard deviation to test whether there is a difference in the mediating effect of Work Engagement on the impact of Leader other-oriented Perfectionism on Radical Innovation at two different levels of Subordinate's Promotion Focus, low and high.

The results of the analysis of hypothesis 7 are shown in Table 7. Based on the test results, when Leader's Conscientiousness is held constant as the reference group, we examined the mediating effect of Work Engagement between Leader Other-Oriented Perfectionism and Radical Innovation at different levels of Subordinate's Promotion Focus. The results indicate that the mediating effect size of Work Engagement varies depending on the level of Subordinate's Promotion Focus. When Leader's Conscientiousness is at a lower level (M-1SD) and Subordinate's Promotion Focus is at a lower level (M-1SD), the

10.3389/fpsyg.2025.1387963

TABLE 2 The result of convergent validity and reliability analysis.

Variables		Estimate	S.E.	C.R.	*p*	Standardized regression weights	AVE	C.R	Cronbach's alpha
Leader other-oriented perfectionism (A)	A1	1				0.726	0.649	0.894	0.902
	A2	0.862	0.058	14.903	***	0.832			
	A3	0.811	0.055	14.814	***	0.827			
	A4	0.835	0.057	14.601	***	0.815			
	A5	0.801	0.054	14.729	***	0.823			
Work engagement (B)	B1	1				0.843	0.684	0.975	0.975
	B2	0.705	0.036	19.554	***	0.827			
	B3	0.699	0.036	19.380	***	0.822			
	B4	0.682	0.036	18.855	***	0.809			
	B5	0.675	0.035	19.417	***	0.823			
	B6	0.707	0.036	19.591	***	0.828			
	B7	0.699	0.036	19.194	***	0.817			
	B8	0.741	0.037	20.076	***	0.84			
	B9	0.727	0.036	20.157	***	0.842			
	B10	0.692	0.035	19.512	***	0.826			
	B11	0.712	0.037	19.454	***	0.824			
	B12	0.710	0.036	19.481	***	0.825			
	B13	0.702	0.037	19.148	***	0.816			
	B14	0.731	0.037	19.670	***	0.83			
	B15	0.681	0.035	19.195	***	0.818			
	B16	0.716	0.036	20.081	***	0.84			
	B17	0.741	0.037	19.986	***	0.837			
	B18	0.729	0.038	19.371	***	0.822			
Conscientiousness (C)	C1	1				0.81	0.681	0.912	0.914
	C2	0.746	0.042	17.671	***	0.836			
	C3	0.738	0.042	17.622	***	0.835			
	C4	0.748	0.043	17.231	***	0.821			
	C5	0.749	0.043	17.346	***	0.825			
Promotion focus (D)	D1	1				0.79	0.693	0.928	0.931
	D2	0.827	0.046	18.030	***	0.861			
	D3	0.800	0.045	17.909	***	0.857			
	D4	0.781	0.045	17.909	***	0.832			
	D5	0.772	0.045	17.233	***	0.832			
	D6	0.767	0.045	16.924	***	0.821			
Radical innovation (E)	E1	1				0.772	0.667	0.883	0.889
	E2	0.813	0.052	15.767	***	0.828			
	E3	0.826	0.053	15.715	***	0.825			
	E4	0.821	0.051	16.017	***	0.84			
Model fit index		$X^2(p) = 661.538(0.000)$, $X^2/df = 1.010$, RMSEA = 0.050, IFI = 0.941, CFI = 0.940, GFI = 0.912, RMR = 0.072, PGFI = 0.806, PNFI = 0.876, SRMR = 0.030							

mediated effect of Work Engagement has a value of 0.008, with a significance *p*-value of 0.626 which is greater than the significance threshold. Level 0.05 and the 95% confidence interval contains 0, so its indirect effect is not significant; when Subordinate's Promotion Focus is at a higher level (M + 1SD), the mediation effect of Work Engagement is 0.085, with a significance p-value of 0.008 which is smaller than the significance threshold level of 0.05 and 95% confidence interval does not contain 0, so its indirect effect is

TABLE 3 The results of descriptive statistics and correlation analysis.

Variables	Mean	SD	Leader other-oriented perfectionism	Work engagement	Conscientiousness	Promotion focus	Radical innovation
Leader other-oriented perfectionism	4.599	1.256	1				
Work engagement	4.429	1.223	0.436***	1			
Conscientiousness	4.546	1.263	0.262***	0.376***	1		
Promotion focus	4.301	1.345	0.142***	0.147***	0.082	1	
Radical innovation	4.098	1.366	0.250***	0.282***	0.189***	0.291***	1

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

TABLE 4 The results of mediating effect.

Path			Estimate	S.E.	*t*	*p*	LLCI	ULCI
Leader Other-oriented perfectionism	→	Work engagement	0.402	0.047	8.624	0.000	0.314	0.496
Work engagement	→	Radical innovation	0.217	0.056	3.887	0.000	0.108	0.325
Leader other-oriented perfectionism	→	Radical innovation	0.130	0.054	2.409	0.016	0.027	0.235
Total effect of X on Y								
Leader other-oriented perfectionism → Work engagement → radical innovation			0.217	0.049	4.457	0.000	0.123	0.314
Direct effect(s) of X on Y								
Leader other-oriented perfectionism → radical innovation			0.130	0.054	2.409	0.016	0.027	0.235
Indirect effect(s) of X on Y								
Leader other-oriented perfectionism → work engagement → radical innovation			0.087	0.024	3.576	0.000	0.043	0.139

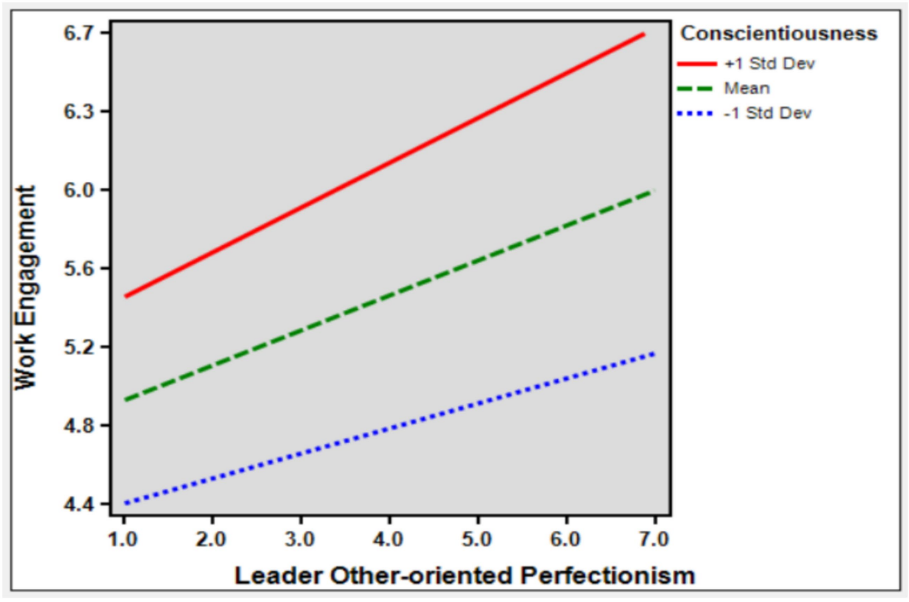


FIGURE 2
The moderating effect of conscientiousness.

significant. When Leader's Conscientiousness is at a Mean level and Subordinate's Promotion Focus is at a lower level (M-1SD), the mediated effect of Work Engagement has a value of 0.015, with a significance p-value of 0.610 which is greater than the significance threshold level 0.05 and the 95% confidence interval contains 0, so its indirect effect is not significant; when Subordinate's Promotion Focus is at a higher level (M + 1SD), the mediation effect of Work Engagement is 0.166, with a significance p-value of 0.000 which is smaller than the significance threshold level of 0.05 and 95% confidence interval does not contain 0, so its indirect effect is

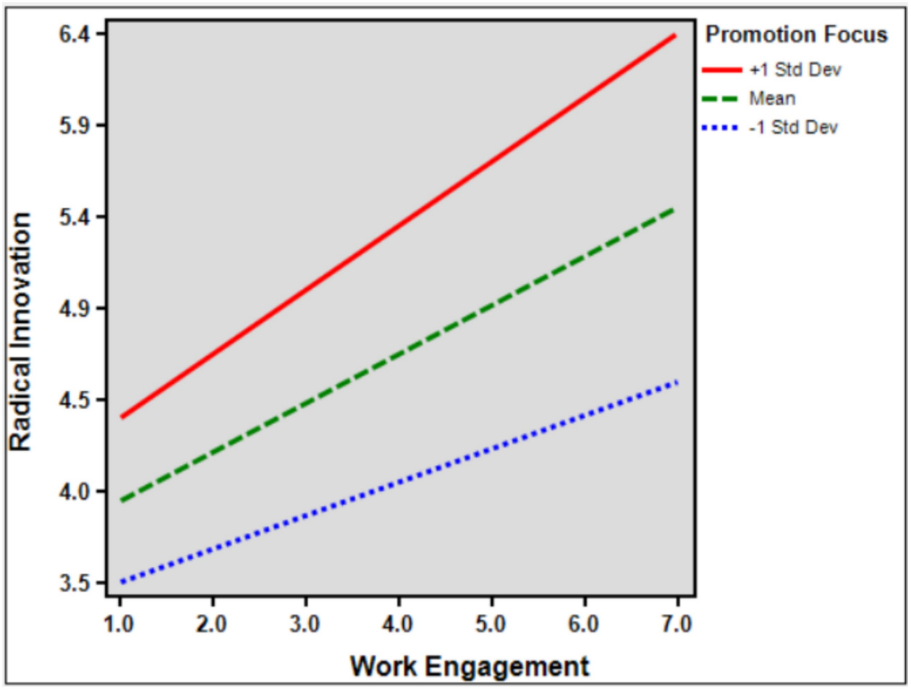


FIGURE 3
The moderating effect of promotion focus.

TABLE 5 The result of moderation.

Variable	Estimate	S.E.	*t*	*p*	95% CI	
Leader other-oriented perfectionism (A)	0.402	0.047	8.624	0.000	0.314	0.496
Leader's conscientiousness (B)	0.322	0.047	6.839	0.000	0.232	0.417
Interaction (A*B)	0.187	0.044	4.212	0.000	0.101	0.275

$^{**}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$.

significant. When Leader's Conscientiousness is at a higher level (M + 1SD) and Subordinate's Promotion Focus is at a lower level (M-1SD), the mediated effect of Work Engagement has a value of 0.022, with a significance p-value of 0.610 which is greater than the significance threshold level 0.05 and the 95% confidence interval contains 0, so its indirect effect is not significant; when Subordinate's Promotion Focus is at a higher level (M + 1SD), the mediation effect of Work Engagement is 0.246, with a significance p-value of 0.000 which is smaller than the significance threshold level of 0.05 and 95% confidence interval does not contain 0, so its indirect effect is significant. This suggests that there is a moderated mediating effect in this study, i.e., Subordinate's Promotion Focus moderates the mediating effect of Work Engagement between Leader other-oriented Perfectionism and Radical Innovation, and as Subordinate's Promotion Focus increases, the mediating effect of Work Engagement between Leader other-oriented Perfectionism and Radical Innovation increases, i.e., Subordinate's Promotion Focus positively moderates the mediating effect of Work Engagement between Leader other-oriented Perfectionism and Radical Innovation. So, hypothesis H7 is supported (Table 7).

5 Discussion

This study concentrates on employees of Chinese SMEs, specifically investigating how a leader's perfectionism predicts employee radical innovation. It tests the mediating effect of employee work engagement and the moderating effects of a leader's conscientiousness and employee promotion focus on the relationship between a leader's perfectionism and radical innovation. Based on the results, this study found that work engagement mediating the link between leader perfectionism and radical innovation, with leader conscientiousness and promotion focus moderating the effects.

5.1 Theoretical implications

First, this study's findings indicate that leadership perfectionism positively is an antecedent of employee work engagement. This implies that an increase in a leader's perfectionism corresponds to an increase in the level of employee work engagement. This contradicts Xiong and Zhang's (2023) conclusion that a leader's perfectionism leads to

TABLE 6 The result of moderation.

Variable	Estimate	S.E.	*t*	*p*	95% CI	
Work engagement (A)	0.217	0.056	3.887	0.000	0.108	0.325
Subordinate's promotion focus (B)	0.242	0.050	4.826	0.000	0.146	0.344
Interaction (A*B)	0.185	0.053	3.514	0.000	0.083	0.289

$^{**}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$.

TABLE 7 The moderated mediation effect of promotion focus.

Dependent variable: radical innovation								
Leader's conscientiousness	Moderator	Level	Indirect effect	SE	*t*	*p*	95% CI	
−1 SD	Promotion focus	−1 SD	0.008	0.016	0.487	0.626	−0.022	0.041
		M	0.046	0.019	2.483	0.013	0.015	0.088
		+1 SD	0.085	0.032	2.643	0.008	0.030	0.155
Mean	Promotion focus	−1 SD	0.015	0.029	0.510	0.610	−0.042	0.073
		M	0.090	0.027	3.373	0.001	0.041	0.147
		+1 SD	0.166	0.043	3.818	0.000	0.089	0.260
+1 SD	Promotion focus	−1 SD	0.022	0.043	0.510	0.610	−0.062	0.108
		M	0.134	0.040	3.318	0.001	0.061	0.220
		+1 SD	0.246	0.066	3.753	0.000	0.129	0.389

employee burnout. However, it is in line with the findings of Ocampo et al. (2020). Leaders' perfectionism inherently motivates employees because of their ability to facilitate the mastery of knowledge by meeting basic needs (Mazzetti et al., 2023). Therefore, a leader's perfectionism predicts employees' resilience by coaching and motivating them, promoting task-related knowledge and strategies, and affecting their work engagement to achieve organizational objectives.

Second, there is a positive correlation between employee work engagement and radical innovation. This aligns with the findings of Gupta et al. (2017), which suggest that employees with high work engagement are more likely to exhibit innovative behavior. Adopting innovative work practices requires a significant amount of work engagement. Radical innovation, which involves devising new solutions, requires employees to be focused, mentally resilient to resist distractions, and feel satisfied with their work, dedicating their time and energy to it (Agarwal, 2014). Therefore, this study concludes that employees who are fully engaged in their work are more likely to enhance their knowledge and skills and stimulate flexible thinking, which in turn leads to radical innovation.

Third, the mediating effect of employee work engagement is evident in the positive path of a leader's perfectionism influencing employee radical innovation. A leader's perfectionism may establish more stringent performance standards or elevate organizational goals for employees (Ocampo et al., 2020). According to self-regulation theory, a leader's perfectionism triggers the self-regulatory behavior of job crafting, which subsequently boosts employees' self-efficacy and intrinsic motivation for creativity, thereby fostering creativity (Yu et al., 2021). Therefore, a leader's perfectionism can serve as a motivational tool to ignite employees' intrinsic motivation, enhance work engagement, and ultimately improve their radical innovation significantly.

Fourth, the positive role of a leader's perfectionism on employee work engagement is moderated by the leader's conscientiousness. This study found that the higher the leader's conscientiousness, the stronger the effect of the leader's perfectionism on employee work engagement. This is in line with the findings of Shoss et al. (2015). Conscientious leaders maintain order, behave in a socially acceptable way, and are responsible for their employees and their work until the task is completed (Van Eeden et al., 2008). The high-performance traits of conscientious leaders also lead them to provide more resources, effectively enabling employees to increase their work engagement and successfully complete work-related tasks (Shoss et al., 2015). Therefore, while a leader's perfectionism sets high standards and demands, conscientiousness drives leaders to support employees with the resources they need to perform their jobs. When employees receive this support, their work engagement increases significantly.

Lastly, with high levels of leader conscientiousness and high levels of employee promotion focus, the mediating effect of work engagement in the pathway of perfectionism positively influencing radical innovation will be enhanced. Leaders with high levels of conscientiousness not only take responsibility for work outcomes, but also proactively provide employees with the resources and support they need to accomplish their tasks (Shoss et al., 2015). This support, which includes clear guidance, necessary tools, and emotional encouragement, can help employees better cope with the high standards and demands set by perfectionist leaders. Promotion focus individuals are more inclined to adopt exploratory behaviors and try new approaches and strategies when faced with complex or uncertain tasks (Zhou et al., 2012). This exploratory behavior not only enhances their work engagement, but also provides them with more opportunities for innovation. Therefore, when leaders have a high level of conscientiousness and at the same time employees have a high

level of promotion focus, the two have a synergistic effect. Conscientiousness leaders provide the necessary support and resources to their employees, while promotion focus employees take full advantage of these resources to actively explore and innovate. This synergy significantly enhances the mediating effect of work engagement in the pathway to perfectionism facilitates radical innovation.

The primary contribution of this study is the introduction of a research model that draws on previous studies on a leader's perfectionism, conscientiousness, employee work engagement, promotion focus, and radical innovation, suggesting correlations and implications among these variables. It also challenges the prevalent belief that the personality trait of other-oriented perfectionism results in negative outcomes. In contrast to prior research findings, this study asserts that a leader's perfectionism can also yield positive results, such as employee engagement and radical innovation. Therefore, it offers a fresh viewpoint that is insightful in understanding how a leader's perfectionism promotes employee radical innovation.

5.2 Practical implications

The research of Xu et al. (2022) findings suggest that perfectionism has a double-edged effect on employee creativity. Perfectionism has a double-edged effect to foster creativity, leaders must manage their level of perfectionism carefully to mitigate its negative effects. When perfectionism becomes extreme, its beneficial effect can diminish or disappear. Before setting goals, leaders should communicate with employees about their capabilities and resources to ensure that the goals are both challenging and within their capabilities. Provide employees with dedicated resource support for attempting innovative projects that are high-risk but potentially high-reward. Set up an innovation incentive program to reward employees who come up with innovative ideas or successfully implement innovative projects with material or spiritual rewards. In conclusion, to prevent the harmful desire for control due to an excessive pursuit of perfection, leaders should reduce their excessive supervision of employees, provide sufficient space for creativity, strengthen the employees' innovation role identity within the organization, and nurture the innovation awareness of employees who are pragmatic and realistic.

Second, to maintain high productivity and innovation, organizations must ensure that their employees are focused and fully committed to their tasks (Lai et al., 2020). Therefore, organizations should recognize the importance of employee work engagement. Organizations should establish open lines of communication and encourage employees to suggest improvements and innovative ideas. Additionally, leaders should publicly praise employees' efforts and achievements in a timely manner, as research shows that timely recognition enhances employees' sense of accomplishment and motivation. To further support employees, organizations should respect individual needs and values. For instance, HR departments can offer flexible work arrangements (e.g., remote work options) and create personalized development plans to align with employees' career growth aspirations. Beyond material incentives such as bonuses and pay raises, managers should also leverage spiritual incentives, such as public recognition, awards, and honors (e.g., employee-of-the-month programs), to enhance employee engagement and foster a sense of belonging.

Third, radical innovations can significantly enhance product performance and transform a company's market position. These innovations can also fundamentally alter its technological trajectory and organizational capabilities, which are crucial for companies to achieve and maintain a sustained competitive advantage (Slater et al., 2014). Organizations should attract and retain innovative talent by implementing high-performance work systems and competitive incentive programs. Additionally, managers should provide employees with training in innovation methods and tools, such as Design Thinking, to equip them with the skills needed to drive creative solutions. To further support innovation, organizations should allocate necessary resources, such as experimental equipment and R&D funding, to enable employees to test and implement their ideas. Leaders should also foster a culture of open communication by organizing regular "Innovation Workshops" or "Brainstorming Sessions," where employees are encouraged to freely express their ideas and collaborate on creative projects.

Fourth, conscientious leaders are goal-driven and dedicated to managing the work environment. They organize work responsibly, provide employees with necessary work resources, and structure teamwork effectively (Horowitz et al., 2006). Organizations should ensure employees have clear access to the resources they need, such as tools, equipment, information, and funds, to effectively accomplish their work. Managers can create a supportive work environment by establishing open communication channels and teamwork mechanisms. For example, regular team-building activities and cross-departmental collaboration projects can foster innovation and collaboration. Leaders should set an example by demonstrating a high level of responsibility and passion for their work. This can be achieved through public commitments and visible actions, such as actively participating in projects or recognizing team achievements. Additionally, leaders should proactively understand employees' needs and challenges. For instance, they can hold regular one-on-one meetings or team check-ins to provide tailored support and address any obstacles.

Finally, the significance of a promotional focus has been confirmed. Employees with a promotional focus center on their ambitions, maintain enthusiasm, foster an exploratory processing style, and possess the drive to acquire knowledge and overcome challenges successfully. This forms a key foundation for creative behavior (Zhou et al., 2012). As a result, organizations should focus on fostering employees' promotional focus. Organizations should develop facilitation-focused training programs to cultivate positive work attitudes and exploratory thinking among employees. For example, HR departments can design courses such as "Goal Orientation and Creative Thinking" to teach employees how to set aspirational goals and take proactive steps toward achieving them. During the hiring process, managers should incorporate a facilitative focus as a key assessment criterion. This can be achieved through behavioral interviews or psychometric assessments (e.g., the Big Five Personality Traits framework) to evaluate candidates' goal orientation and exploratory tendencies. In promotion evaluations, organizations should prioritize employees who demonstrate a facilitative focus. For instance, criteria such as "innovative contribution" and "ability to achieve goals" can be used as key indicators for advancement. To further motivate employees, organizations should establish achievement-oriented incentives, such as "Innovation Achievement Awards" or "Goal Achievement

Awards," to recognize and reward those who excel in innovation and goal attainment.

5.3 Limitations and directions for future research

Examining leadership traits, this study provides valuable insights for enhancing employees' radical innovations. However, there are several limitations.

First, the concept of perfectionism has evolved over time, with various scholars identifying different dimensions of it, such as normal and neurotic perfectionism (Hamachek, 1978), and perfectionist striving and concerns (Stoeber and Otto, 2006). However, this study only validated the trait of leader perfectionism based on a single dimension of other-oriented perfectionism, developed by Hewitt and Flett (1991). Therefore, future research should focus on the dimensions of a leader's perfectionism as precursors to examine their effect on radical innovation. Additionally, these leadership styles should be compared to identify the most critical elements that affect radical innovation.

Second, this research explored the mediating role of employee work engagement in the process through which leader perfectionism predicts employee radical innovation. We discovered that in the studies conducted by Yu et al. (2021) and Park and Shin (2022), job crafting and cognitive flexibility were investigated as mediating factors. Therefore, future studies should consider examining other potential mediating variables.

Third, research on regulatory focus theory (Higgins, 1998) differentiates between promotion focus and prevention focus. This study examined only the moderating effect of promotion focus on the effect of work engagement on radical innovation, without considering the moderating effect of prevention focus. Future studies could incorporate the prevention focus variable to examine whether it negatively predicts radical innovation.

A major limitation of this study is its correlational design (correlation). Although we found a significant positive correlation between leadership perfectionism and employee engagement and radical innovation, this correlation does not prove causality. Future research could use an experimental design or a longitudinal research approach to further validate the causal relationship between variables.

Lastly, the data for this study were gathered from a single sample during the same timeframe, yielding highly similar findings, which suggests potential issues with common method bias. The first factor analysis in this study accounted for over 50% of the total variance, indicating a possible common method bias problem (Podsakoff and Organ, 1986). Consequently, future research should aim to segregate the respondents. Questions pertaining to leaders should be directed at members, while inquiries about member behavior or attitudes should be posed to leaders.

6 Conclusion

This study addresses a gap in understanding how a leader's perfectionism predicts radical employee innovation within Chinese organizations, thereby expanding research on the positive effect of leadership on organizations. It also uncovers the mediating role of work engagement, exploring the connection between a leader's perfectionism and employee work engagement, and examining radical innovation as a result of work engagement. This provides evidence that work engagement mediates the pathway through which a leader's perfectionism predicts radical innovation. Furthermore, the study confirms the moderating effect of a leader's conscientiousness, showing that the higher the level of conscientiousness, the stronger the effect of a leader's perfectionism on work engagement. The moderating effect of an employee's promotion focus was also confirmed, indicating that the higher the level of promotion focus, the stronger the effect of employee work engagement on radical innovation. These findings offer a strategy for organizations to enhance employees' radical innovation. The results of this study can improve managers' understanding of a leader's perfectionism and radical innovation, providing valuable insights for organizations and managers.

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 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 participants or the participants' legal guardians/next of kin in accordance with the national legislation and the institutional requirements. The manuscript presents research on animals that do not require ethical approval for their study.

Author contributions

LW: Data curation, Formal analysis, Investigation, Writing – original draft. YW: Data curation, Formal analysis, Resources, Writing – review & editing. XJ: Resources, Writing – review & editing, Conceptualization, Methodology, Supervision.

Funding

The author(s) declare that no financial support was received for the research and/or publication of this article.

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.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

Agarwal, U. A. (2014). Examining the impact of social exchange relationships on innovative work behaviour: role of work engagement. *Team Perform. Manag.* 20, 102–120. doi: 10.1108/TPM-01-2013-0004

Aldabbas, H., Pinnington, A., and Lahrech, A. (2023). The influence of perceived organizational support on employee creativity: the mediating role of work engagement. *Curr. Psychol.* 42, 6501–6515. doi: 10.1007/s12144-021-01992-1

Amabile, T. M., and Pratt, M. G. (2016). The dynamic componential model of creativity and innovation in organizations: making progress, making meaning. *Res. Organ. Behav.* 36, 157–183. doi: 10.1016/j.riob.2016.10.001

Baas, M., De Dreu, C. K., and Nijstad, B. A. (2008). A meta-analysis of 25 years of mood-creativity research: hedonic tone, activation, or regulatory focus? *Psychol. Bull.* 134, 779–806. doi: 10.1037/a0012815

Bakker, A. B. (2011). An evidence-based model of work engagement. *Curr. Dir. Psychol. Sci.* 20, 265–269. doi: 10.1177/0963721411414534

Bakker, A. B., and Demerouti, E. (2007). The job demands-resources model: state of the art. *J. Manag. Psychol.* 22, 309–328. doi: 10.1108/02683940710733115

Bakker, A. B., Demerouti, E., and Sanz-Vergel, A. I. (2014). Burnout and work engagement: the JD–R approach. *Annu. Rev. Organ. Psychol. Organ. Behav.* 1, 389–411. doi: 10.1146/annurev-orgpsych-031413-091235

Bakker, A. B., and Schaufeli, W. B. (2008). Positive organizational behavior: engaged employees in flourishing organizations. *J. Organiz. Behav.* 29, 147–154. doi: 10.1002/job.515

Bhatnagar, J. (2012). Management of innovation: role of psychological empowerment, work engagement and turnover intention in the Indian context. *Int. J. Hum. Resour. Manag.* 23, 928–951. doi: 10.1080/09585192.2012.651313

Birch, H., Mcgann, D., and Riby, L. (2019). Perfectionism and PERMA: the benefits of other-oriented perfectionism. *Int. J. Wellbeing* 9, 20–42. doi: 10.5502/ijw.v9i1.749

Blank, T. H., and Naveh, E. (2018). Competition and complementation of exploration and exploitation and the achievement of radical innovation: the moderating effect of learning behavior and promotion focus. *IEEE Trans. Eng. Manag.* 66, 598–612. doi: 10.1109/TEM.2018.2849319

Breevaart, K., and de Vries, R. E. (2021). Followers' HEXACO personality traits and preference for charismatic, relationship-oriented, and task-oriented leadership. *J. Bus. Psychol.* 36, 253–265. doi: 10.1007/s10869-019-09671-6

Brockner, J., and Higgins, E. T. (2001). Regulatory focus theory: implications for the study of emotions at work. *Organ. Behav. Hum. Decis. Process.* 86, 35–66. doi: 10.1006/obhd.2001.2972

Brown, T. A., and Moore, M. T. (2012). Confirmatory factor analysis. *Handbook Structural Equation Modeling* 361:379.

Chang, H. T., Hsu, H. M., Liou, J. W., and Tsai, C. T. (2013). Psychological contracts and innovative behavior: a moderated path analysis of work engagement and job resources. *J. Appl. Soc. Psychol.* 43, 2120–2135. doi: 10.1111/jasp.12165

Cheng, L. W., and Wu, W. (2023). Policy support, research investment and firm's innovation:based on the dilemma of Chinese large enterprises breakthrough innovation. *Sci. Technol. Manag.* 25, 59–69. doi: 10.16315/j.stm.2023.02.009

Demerouti, E., Bakker, A. B., Nachreiner, F., and Schaufeli, W. B. (2001). The job demands-resources model of burnout. *J. Appl. Psychol.* 86, 499–512. doi: 10.1037/0021-9010.86.3.499

Flett, G. L., and Hewitt, P. L. (eds.). (2002). Perfectionism and maladjustment: An overview of theoretical, definitional, and treatment issues. *Perfectionism: Theory, research, and treatment*. (American Psychological Association). 5–31. doi: 10.1037/10458-001

Fowler, S. A., Davis, L. L., Both, L. E., and Best, L. A. (2018). Personality and perfectionism as predictors of life satisfaction: the unique contribution of having high standards for others. *Facets* 3, 227–241. doi: 10.1139/facets-2017-0084

Friedman, R. S., and Förster, J. (2001). The effects of promotion and prevention cues on creativity. *J. Pers. Soc. Psychol.* 81, 1001–1013. doi: 10.1037/0022-3514.81.6.1001

Gerlitz, J. Y., and Schupp, J. (2005). Zur Erhebung der Big-Five-basierten persoenlichkeitsmerkmale im SOEP. DIW Research Notes, 4 (10.1016).

Gilson, L. L., and Shalley, C. E. (2004). A little creativity goes a long way: an examination of teams' engagement in creative processes. *J. Manag.* 30, 453–470. doi: 10.1016/j.jm.2003.07.001

Gong, Y., Huang, J. C., and Farh, J. L. (2009). Employee learning orientation, transformational leadership, and employee creativity: the mediating role of employee creative self-efficacy. *Acad. Manag. J.* 52, 765–778. doi: 10.5465/amj.2009.43670890

Grant, A. M., and Berry, J. W. (2011). The necessity of others is the mother of invention: intrinsic and prosocial motivations, perspective taking, and creativity. *Acad. Manag. J.* 54, 73–96. doi: 10.5465/amj.2011.59215085

Guo, Y., and Hou, X. (2022). The effects of job crafting on tour leaders' work engagement: the mediating role of person-job fit and meaningfulness of work. *Int. J. Contemp. Hosp. Manag.* 34, 1649–1667. doi: 10.1108/IJCHM-09-2021-1082

Gupta, V., Singh, S., and Bhattacharya, A. (2017). The relationships between leadership, work engagement and employee innovative performance: empirical evidence from the Indian R&D context. *Int. J. Innov. Manag.* 21:1750055. doi: 10.1142/S1363919617500554

Hakanen, J. J., Perhoniemi, R., and Toppinen-Tanner, S. (2008). Positive gain spirals at work: from job resources to work engagement, personal initiative and work-unit innovativeness. *J. Vocat. Behav.* 73, 78–91. doi: 10.1016/j.jvb.2008.01.003

Hamachek, D. E. (1978). Psychodynamics of normal and neurotic perfectionism. *Psychology* 15, 27–33.

Henker, N., Sonnentag, S., and Unger, D. (2015). Transformational leadership and employee creativity: the mediating role of promotion focus and creative process engagement. *J. Bus. Psychol.* 30, 235–247. doi: 10.1007/s10869-014-9348-7

Hetland, J., Hetland, H., Bakker, A. B., and Demerouti, E. (2018). Daily transformational leadership and employee job crafting: the role of promotion focus. *Eur. Manag. J.* 36, 746–756. doi: 10.1016/j.emj.2018.01.002

Hewitt, P. L., and Flett, G. L. (1991). Perfectionism in the self and social contexts: conceptualization, assessment, and association with psychopathology. *J. Pers. Soc. Psychol.* 60, 456–470. doi: 10.1037/0022-3514.60.3.456

Higgins, E. T. (1997). Beyond pleasure and pain. *Am. Psychol.* 52:1280. doi: 10.1037/0003-066X.52.12.1280

Higgins, E. T. (1998). "Promotion and prevention: Regulatory focus as a motivational principle," in Advances in experimental social psychology. 30, 1–46. (Academic Press).

Hoang, G., Luu, T. T., Nguyen, T. T., Du, T., and Le, L. P. (2022). Examining the effect of entrepreneurial leadership on employees' innovative behavior in SME hotels: a mediated moderation model. *Int. J. Hosp. Manag.* 102:103142. doi: 10.1016/j.ijhm.2022.103142

Hofstee, W. K., de Raad, B., and Goldberg, L. R. (1992). Integration of the big five and circumplex approaches to trait structure. *J. Pers. Soc. Psychol.* 63, 146–163. doi: 10.1037/0022-3514.63.1.146

Horowitz, L. M., Wilson, K. R., Turan, B., Zolotsev, P., Constantino, M. J., and Henderson, L. (2006). How interpersonal motives clarify the meaning of interpersonal behavior: a revised circumplex model. *Personal. Soc. Psychol. Rev.* 10, 67–86. doi: 10.1207/s15327957pspr1001_4

Jason, V., and Geetha, S. N. (2021). Regulatory focus and innovative work behavior: the role of work engagement. *Curr. Psychol.* 40, 2791–2803. doi: 10.1007/s12144-019-00220-1

Johnson, J. A., and Ostendorf, F. (1993). Clarification of the five-factor model with the abridged big five dimensional Circumplex. *J. Pers. Soc. Psychol.* 65, 563–576. doi: 10.1037/0022-3514.65.3.563

Judge, T. A., Bono, J. E., Ilies, R., and Gerhardt, M. W. (2002). Personality and leadership: a qualitative and quantitative review. *J. Appl. Psychol.* 87, 765–780. doi: 10.1037/0021-9010.87.4.765

Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Acad. Manag. J.* 33, 692–724. doi: 10.5465/256287

Kim, S. L., Kim, M., and Yun, S. (2017). What do we need for creativity? The interaction of perfectionism and overall justice on creativity. *Pers. Rev.* 46, 154–167. doi: 10.1108/PR-06-2015-0187

Kinman, G., and Grant, L. (2022). Being 'good enough': perfectionism and well-being in social workers. *Br. J. Soc. Work.* 52, 4171–4188. doi: 10.1093/bjsw/bcac010

Kleszewski, E., and Otto, K. (2020). The perfect colleague? Multidimensional perfectionism and indicators of social disconnection in the workplace. *Personal. Individ. Differ.* 162:110016. doi: 10.1016/j.paid.2020.110016

Koberg, C. S., Detienne, D. R., and Heppard, K. A. (2003). An empirical test of environmental, organizational, and process factors affecting incremental and radical innovation. *J. High Technol. Managem. Res.* 14, 21–45. doi: 10.1016/S1047-8310(03)00003-8

Lai, F. Y., Tang, H. C., Lu, S. C., Lee, Y. C., and Lin, C. C. (2020). Transformational leadership and job performance: the mediating role of work engagement. *SAGE Open* 10:2158244019899085. doi: 10.1177/2158244019899085

Leifer, R., O'connor, G. C., and Rice, M. (2001). Implementing radical innovation in mature firms: the role of hubs. *Acad. Manag. Perspect.* 15, 102–113. doi: 10.5465/ame.2001.5229646

Li, Y. Z., Guan, Y. Y., and Zhang, Y. (2010). Hierarchical and progressive incentive model of high-level innovative talents and its application. *Sci. Technol. Progress Policy* 27, 145–148. doi: 10.3969/j.issn.1001-7348.2010.20.036

Li, Y., Liu, Y., Li, M., and Wu, H. (2008). Transformational offshore outsourcing: empirical evidence from alliances in China. *J. Oper. Manag.* 26, 257–274. doi: 10.1016/j.jom.2007.02.011

Li, S. W., Luo, J. L., Tang, H. J., Hu, W. A., and Liu, L. (2023). Realization path for radical product innovation of the mission-driven S&T enterprises. *Sci. Res. Manag.* 44, 164–172. doi: 10.19571/j.cnki.1000-2995.2023.01.017

Li, L., Tao, H. Y., and Song, H. (2022). A multilevel research of playfulness Climate,Creative process engagement and radical innovation. *Scie. Technol. Progress Policy* 39, 142–149. doi: 10.6049/kjjbydc.2021040510

Lichtenthaler, P. W., and Fischbach, A. (2019). A meta-analysis on promotion-and prevention-focused job crafting. *Eur. J. Work Organ. Psy.* 28, 30–50. doi: 10.1080/1359432X.2018.1527767

Lin, M., Zhang, X., Ng, B. C. S., and Zhong, L. (2022). The dual influences of team cooperative and competitive orientations on the relationship between empowering leadership and team innovative behaviors. *Int. J. Hosp. Manag.* 102:103160. doi: 10.1016/j.ijhm.2022.103160

Liu, Y., Qu, R. J., Shi, K., and Deng, M. C. (2022). When supervisory support for creativity facilitates employee radical creativity: a role identity-behavioral plasticity perspective. *Sci. Sci. Manag.* 43, 168–182.

Madrid, H. P., Patterson, M. G., Birdi, K. S., Leiva, P. I., and Kausel, E. E. (2014). The role of weekly high-activated positive mood, context, and personality in innovative work behavior: a multilevel and interactional model. *J. Organ. Behav.* 35, 234–256. doi: 10.1002/job.1867

Malik, M. F. (2023). "Perfectionism is a debacle" how a perfectionist leader hinders in business processes? A multiple mediated model. *Bus. Process. Manag. J.* 29, 1184–1203. doi: 10.1108/BPMJ-10-2022-0534

Mazzetti, G., Robledo, E., Vignoli, M., Topa, G., Guglielmi, D., and Schaufeli, W. B. (2023). Work engagement: a meta-analysis using the job demands-resources model. *Psychol. Rep.* 126, 1069–1107. doi: 10.1177/00332941211051988

Mitchell, M. S., Greenbaum, R. L., Vogel, R. M., Mawritz, M. B., and Keating, D. J. (2019). Can you handle the pressure? The effect of performance pressure on stress appraisals, self-regulation, and behavior. *Acad. Manag. J.* 62, 531–552. doi: 10.5465/amj.2016.0646

Molden, D. C., Lucas, G. M., Finkel, E. J., Kumashiro, M., and Rusbult, C. (2009). Perceived support for promotion-focused and prevention-focused goals: associations with well-being in unmarried and married couples. *Psychol. Sci.* 20, 787–793. doi: 10.1111/j.1467-9280.2009.02362.x

Montani, F., Vandenberghe, C., Khedhaouria, A., and Courcy, F. (2020). Examining the inverted U-shaped relationship between workload and innovative work behavior: the role of work engagement and mindfulness. *Hum. Relat.* 73, 59–93. doi: 10.1177/0018726718819055

Ocampo, A. C. G., Wang, L., Kiazad, K., Restubog, S. L. D., and Ashkanasy, N. M. (2020). The relentless pursuit of perfectionism: a review of perfectionism in the workplace and an agenda for future research. *J. Organ. Behav.* 41, 144–168. doi: 10.1002/job.2400

O'Connor, G. C., and Ayers, A. D. (2005). Building a radical innovation competency. *Res. Technol. Manag.* 48, 23–31. doi: 10.1080/08956308.2005.11657292

Park, S., and Shin, Y. (2022). Is perfectionism beneficial or detrimental to creativity? Relationships between creativity, regulatory focus, cognitive flexibility, and creative performance. Korean. *J. Manag.* 30, 237–263. doi: 10.26856/kjom.2022.30.3.237

Park, Y. K., Song, J. H., Yoon, S. W., and Kim, J. (2014). Learning organization and innovative behavior: the mediating effect of work engagement. *Eur. J. Training Dev.* 38, 75–94. doi: 10.1108/EJTD-04-2013-0040

Parker, S. K., and Griffin, M. A. (2011). Understanding active psychological states: embedding engagement in a wider nomological net and closer attention to performance. *Eur. J. Work Organ. Psy.* 20, 60–67. doi: 10.1080/1359432X.2010.532869

Podsakoff, P. M., and Organ, D. W. (1986). Self-reports in organizational research: problems and prospects. *J. Manag.* 12, 531–544. doi: 10.1177/014920638601200408

Raza, M. I., and Shah, T. A. (2023). Role of perfectionistic leader on employee creativity with mediating role of psychological distress and moderating role of trait mindfulness. *J. Policy Res.* 9, 279–289. doi: 10.5281/zenodo.8169815

Rich, B. L., Lepine, J. A., and Crawford, E. R. (2010). Job engagement: antecedents and effects on job performance. *Acad. Manag. J.* 53, 617–635. doi: 10.5465/amj.2010.51468988

Roberts, B. W., Jackson, J. J., Fayard, J. V., Edmonds, G., and Meints, J. (2009). "Conscientiousness," in *Handbook of individual differences in social behavior*. eds. M. R. Leary and R. H. Hoyle (The Guilford Press), 369–381.

Shoss, M. K., Callison, K., and Witt, L. A. (2015). The effects of other-oriented perfectionism and conscientiousness on helping at work. *Appl. Psychol.* 64, 233–251. doi: 10.1111/apps.12039

Slater, S. F., Mohr, J. J., and Sengupta, S. (2014). Radical product innovation capability: literature review, synthesis, and illustrative research propositions. *J. Prod. Innov. Manag.* 31, 552–566. doi: 10.1111/jpim.12113

Smithikrai, C., and Suwannadet, J. (2018). Authentic leadership and proactive work behavior: moderated mediation effects of conscientiousness and organizational commitment. *J. Behav. Sci.* 13, 94–106. https://so06.tci-thaijo.org/index.php/IJBS/article/view/136333

Stoeber, J. (2014). How other-oriented perfectionism differs from self-oriented and socially prescribed perfectionism. *J. Psychopathol. Behav. Assess.* 36, 329–338. doi: 10.1007/s10862-013-9397-7

Stoeber, J. (2015). How other-oriented perfectionism differs from self-oriented and socially prescribed perfectionism: further findings. *J. Psychopathol. Behav. Assess.* 37, 611–623. doi: 10.1007/s10862-015-9485-y

Stoeber, J., and Otto, K. (2006). Positive conceptions of perfectionism: approaches, evidence, challenges. *Personal. Soc. Psychol. Rev.* 10, 295–319. doi: 10.1207/s15327957pspr1004_2

Stoeber, J., and Rennert, D. (2008). Perfectionism in school teachers: relations with stress appraisals, coping styles, and burnout. *Anxiety Stress Coping* 21, 37–53. doi: 10.1080/10615800701742461

Tierney, P., and Farmer, S. M. (2004). The Pygmalion process and employee creativity. *J. Manag.* 30, 413–432. doi: 10.1016/j.jm.2002.12.001

Tierney, P., and Farmer, S. M. (2011). Creative self-efficacy development and creative performance over time. *J. Appl. Psychol.* 96, 277–293. doi: 10.1037/a0020952

Tupes, E. C., and Christal, R. E. (1992). Recurrent personality factors based on trait ratings. *J. Pers.* 60, 225–251. doi: 10.1111/j.1467-6494.1992.tb00973.x

Van Eeden, R., Cilliers, F., and Van Deventer, V. (2008). Leadership styles and associated personality traits: support for the conceptualisation of transactional and transformational leadership. *S. Afr. J. Psychol.* 38, 253–267. doi: 10.1177/008124630803800201

Wallace, C., and Chen, G. (2006). A multilevel integration of personality, climate, self-regulation, and performance. *Pers. Psychol.* 59, 529–557. doi: 10.1111/j.1744-6570.2006.00046.x

Walumbwa, F. O., Morrison, E. W., and Christensen, A. L. (2012). Ethical leadership and group in-role performance: the mediating roles of group conscientiousness and group voice. *Leadersh. Q.* 23, 953–964. doi: 10.1016/j.leaqua.2012.06.004

Wang, W., Du, M. L., Ran, H. Y., and Yu, Q. Y. (2023). Impact of leading talents, knowledge breadth and tie strength on breakthrough innovations. *Innovation Science and Technology* 23, 59–77. doi: 10.19345/j.cxkj.1671-0037.2023.9.006

Wang, X., Li, H., and Yin, H. (2020). Antecedents and consequences of creativity in teams: when and how leader humility promotes performance via team creativity. *J. Creat. Behav.* 54, 843–856. doi: 10.1002/jocb.410

Wang, W., Xing, W. Y., and Liu, X. L. (2022). Enterprise growth and breakthrough technological innovation:a case study of BOE. *Innovation Science and Technology* 22, 58–70. doi: 10.19345/j.cxkj.1671-0037.2022.11.006

Wu, S. J., Gao, W. C., and Quan, Y. (2021). The impact of work pressure on employees' creativity: the chain mediating effect of regulatory focus and creative self-efficacy. *Sci. Technol. Progress Policy* 38, 132–140. doi: 10.6049/kjjbydc.2020070800

Wu, Q., and Zhang, X. (2023). A Meta-analysis on the relationship between regulatory focus and innovation. *Soft Sci.* 38, 61–69.

Xiong, L., and Zhang, H. (2023). Effects of leader perfectionism on employee innovative behavior: chain mediating role of perceived control and emotional exhaustion. *Soc. Behav. Personal. Int. J.* 51, 1–10. doi: 10.2224/sbp.12248

Xu, L., Liu, Z., Ji, M., Dong, Y., and Wu, C. H. (2022). Leader perfectionism—friend or foe of employee creativity? Locus of control as a key contingency. *Acad. Manag. J.* 65, 2092–2117. doi: 10.5465/amj.2019.0165

Xue, J., Mo, Z., Liu, M. T., and Gao, M. (2023). How does leader conscientiousness influence frontline staff under conditions of serious anxiety? An empirical study from integrated resorts (IRs). *J. Hospitality Tourism Insights* 6, 90–109. doi: 10.1108/JHTI-07-2021-0160

Yang, G., and Wang, J. Q. (2023). Research on the chain influence mechanism of raises values on employee radical innovation behavior. *Soft Sci.* 27, 9–15. doi: 10.13956/j.ss.1001-8409.2023.08.02

Yidong, T., and Xinxin, L. (2013). How ethical leadership influence employees' innovative work behavior: a perspective of intrinsic motivation. *J. Bus. Ethics* 116, 441–455. doi: 10.1007/s10551-012-1455-7

Yu, W. N., Tarnoff, K. A., Yang, Z. H., and Li, D. D. (2021). A "strict" Mentor produces" outstanding" Proteges? The dual influence path of Mentor perfectionism. *Sci. Technol. Prograss Policy* 38, 141–150. doi: 10.6049/kjjbydc.2020070537

Zhang, X., and Bartol, K. M. (2010). Linking empowering leadership and employee creativity: the influence of psychological empowerment, intrinsic motivation, and creative process engagement. *Acad. Manag. J.* 53, 107–128. doi: 10.5465/amj.2010.48037118

Zhou, Q., Hirst, G., and Shipton, H. (2012). Context matters: combined influence of participation and intellectual stimulation on the promotion focus–employee creativity relationship. *J. Organ. Behav.* 33, 894–909. doi: 10.1002/job.779

Zhou, K. Z., and Li, C. B. (2012). How knowledge affects radical innovation: knowledge base, market knowledge acquisition, and internal knowledge sharing. *Strateg. Manag. J.* 33, 1090–1102. doi: 10.1002/smj.1959

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 23 June 2025
DOI 10.3389/fpsyg.2025.1430125

Check for updates

OPEN ACCESS

EDITED BY
Mike James Mustafa,
University of Nottingham Malaysia, Malaysia

REVIEWED BY
Karuppiah Koppiahraj,
Saveetha University, India
Mathew Hughes,
University of Leicester, United Kingdom
Veronika Agustini Srimulyani,
Widya Mandala Catholic University Surabaya, Indonesia

*CORRESPONDENCE
Shuming Li
gansushuming@163.com

RECEIVED 09 May 2024
ACCEPTED 19 May 2025
PUBLISHED 23 June 2025

CITATION
Li S, Yang C and Zhai G (2025) How employees can break out of their learning comfort zone in green innovation scenarios: a nudging experiment based on the pressures of sustainable development in China. *Front. Psychol.* 16:1430125. doi: 10.3389/fpsyg.2025.1430125

COPYRIGHT
© 2025 Li, Yang and Zhai. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

How employees can break out of their learning comfort zone in green innovation scenarios: a nudging experiment based on the pressures of sustainable development in China

Shuming Li[1]*, Chuanxi Yang[2] and Guangyu Zhai[1]

[1]School of Economics and Management, Lanzhou University of Technology, Lanzhou, China, [2]School of Business, Guilin Tourism University, Guilin, China

The use of nudging tools to motivate employees to actively participate in corporate green innovation has not yet received sufficient attention. Designing and implementing effective nudging strategies to push employees out of their comfort zones and actively learning green knowledge can bridge the research gap based on the expectancy theory. In this study, 2,253 participants from Chinese manufacturing firms were divided into five groups to investigate the effect of different nudges on green knowledge acquisition. The findings indicate that the combined nudges of social norm and social status have a greater impact than their individual counterparts, and there is no evidence of a crowding out effect. It is more meaningful for employee learning and corporate green development that the efficacy of praising before pressuring is greater in the two combined interventions. Furthermore, we revalidated the efficacy of nudging tactics by carrying out robustness tests and heterogeneity verification for subdivided samples of enterprise ownership and employee position. This study offers a viable operational pathway for theoretical research and business practice on green innovation. We are willing to suggest that stakeholders devote more effort to studying various types of innovation nudging methods.

KEYWORDS

green innovation, combination nudge, isolation nudge, green knowledge, sustainable development

1 Introduction

Under the surge of green innovation, cultivating workforce engagement in perpetual skill enhancement and renewing green knowledge constitutes an indispensable strategy for mitigating sustainability dilemmas (Behera and Sethi, 2022; Xavier et al., 2016). However, due to the inherent learning inertia of individuals, employees are prone to remain entrenched in their comfort zones, exhibiting resistance to altering the status quo (Ritala et al., 2015). How to choose tools with high freedom, low cost and high efficiency to motivate employees' green knowledge learning becomes a significant and important fundamental task (Benartzi et al., 2017). It is very necessary that we figure out the interaction between employee psychology, nudges, and external influences (Charness, 2004; Chen et al., 2024). Regrettably, academics have not paid as much attention to motivating employees to learn about green knowledge as it deserves, and there is an even greater lack of research that attempts to utilize nudges (either

jointly or individually). This study fills the knowledge gap in this area based on the underlying logic of expectancy theory by linking employees' psychological needs through the execution of a nudging experiment, which in turn stimulates proactive green knowledge learning. Our research posits that stimulating employees' enthusiasm for green knowledge acquisition can effectively drive corporate green innovation (Bukoye et al., 2022). Green innovation, conceptually multidimensional, encompasses transformative activities across production processes, product development, managerial systems, and market strategies (Chiou et al., 2011). These organizational innovations demonstrate dual functionality: simultaneously reducing energy consumption and emissions while enhancing operational performance (Cuerva et al., 2014). As a systematic body of theoretical understanding and practical competencies pertaining to ecological conservation and sustainable development, the conceptualization of green knowledge has evolved from its initial environmental protection focus to a balanced paradigm emphasizing both ecological preservation and economic benefits (Gupta and Barua, 2018). Crucially, green innovation constitutes an outcome, whereas green knowledge learning serves as the instrumental means. The latter provides indispensable support for the realization of the former.

Papers exploring employees' behaviors in green innovation reveal the vital precursors shaping their attitudes and actions. Individual factors such as green cognition and prospective earnings play a role (Chen et al., 2024). Organizational factors, such as the green innovation climate, resources, compensation, and appraisal system, as evidenced by Tulsi and Ji (2020), also sway employee involvement in green creativity and innovation. Additionally, the impact of social factors relating to environmental regulations and social oversight (Behera and Sethi, 2022) should not be overlooked. It is worth noting that many strategies aimed at fostering employees' behaviors in green innovation are either costly or short-term, failing to fulfill the demands of sustainable development and resulting in a financial burden to some degree. Some scholars have conducted studies on how to encourage employees to engage in pro-environmental commercial activities at lower costs, based on the cognition of individual mental behaviors such as loss aversion (Dorschner and Musshoff, 2015) and peer pressure (Sayer and Cassman, 2013). As an economically feasible and psychologically receptive intervention, nudges are increasingly applied in various domains such as augmenting retirement savings, boosting education enrollment, and facilitating vaccination shots (Benartzi et al., 2017). The literature on nudges in production domains is less extensive than in consumption areas, particularly regarding promoting employees' behaviors in green innovation. The ambiguity around the conceptual boundaries of green innovation and the complexity of staff behavior may be principal elements contributing to the limited research in this area. Existing literature suggests that nudge strategies are effective in promoting innovation among autoworkers (Tanaiutchawoot et al., 2019), foresters (Valatin et al., 2016), and project managers (Bukoye et al., 2022). Therefore, it is optimistic to assume that such strategies may also be applicable to promoting manufacturing employees' green knowledge learning through similar individual psychological mechanisms. This study synthesizes theoretical results and practical explorations from previous studies to explore how different nudging tactics can be used to motivate employees to actively break out of their career comfort zones and learn green knowledge.

The distinctive feature of this study lies in its application of multiple behavioral nudging tools to measure shifts in employees' behavioral tendencies toward green knowledge learning, using self-reported weekly time investment in green knowledge learning as the key metric. The study explored two nudge interventions: (I) providing information about injunctive social norms to stimulate peer comparison, and (II) releasing social status signals via compliments to encourage behavioral change. On this basis, the research also focus on evaluating the combined effects of both interventions and testing for the presence of crowding out effects. Against the backdrop of the important position occupied by nationalized business and the obvious power distance within firms, we divide the sample according to the dimensions of firm ownership and managerial position and conduct robustness tests and heterogeneity tests. The two tests help us to dig deeper into the differences in the effects of different nudging programs and may be one of the highlights of this study.

Starting with a literature review and hypothesis derivation, this study conducts a main effects analysis and heterogeneity analysis of survey data on employees' green knowledge learning in Chinese manufacturing firms through a detailed research design and nudging experiment. Further, the study engages in an ethical discussion, emphasizing the breadth of application of boosting tools in economies under pressure from the dual goals of economic development and ecological protection. Finally, the study elucidates important application implications for business management practices and sustainable development, as well as contributions to academic research, and suggests limitations and future research directions.

2 Literature review and hypothesis development

2.1 China's sustainable development pressures and efforts

Academic Literature Shows Humanity is encountering severe ecological challenges in recent decades, including the greenhouse effect (Parmesan and Yohe, 2003), biodiversity reduction (Cardinale et al., 2012), and depletion of natural resources (Lotze et al., 2006). To achieve a sustainable balance between economic growth, social progress, and environmental protection, many governments have implemented green development initiatives (Rosen et al., 2008). Some companies also aim to execute environmentally friendly business practices, such as reducing emissions, enhancing resource efficiency, utilizing purification technology, and promoting circular production, in both advanced and emerging economies (Chiou et al., 2011; Cuerva et al., 2014; Gupta and Barua, 2018; Fernando et al., 2019). In addition, there are producers who are actively exploring key elements of sustainable manufacturing practices and sustainable development strategies (Koppiahraj et al., 2023). As a globally important manufacturing base, the indicators of energy consumption, emissions, waste recycling and investment in innovative activities in the production of Chinese enterprises show us how serious the ecological situation facing mankind is and how strong the determination to pursue green development is (see Figure 1). The upper two panels of Figure 1 illustrate the pressure levels of energy consumption and pollutant emissions across provincial-level administrative regions in 2022, with darker shading indicating higher pressure intensity. The

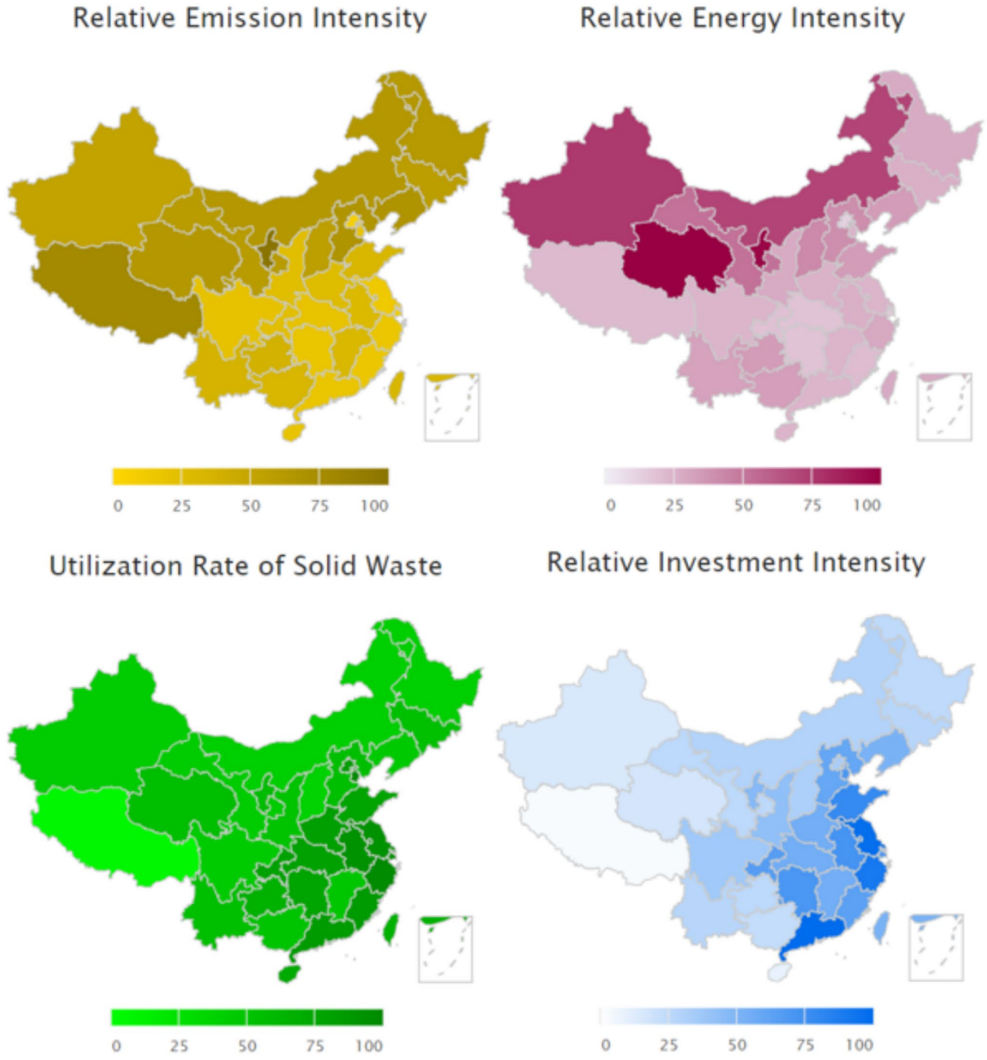


FIGURE 1
Environmental impacts of economic activities in China.

lower two panels depict regional efforts in waste utilization and innovation investment, where darker coloration represents superior performance.[1] This is like the ecological and employee health impacts of the mining industry in India (Marimuthu et al., 2023). There are many barriers to the implementation of green production in manufacturing in developing countries, as evidenced in Ponnambalam et al.'s (2023) study.

2.2 Nudging tools: social norms and social status

Regarding social norm nudging, some researchers propose utilizing peer comparison as a means of achieving diverse expected outcomes. The effectiveness of interventions has been demonstrated in practical applications, such as combating alcoholism (Werch et al., 2000), towel reuse (Goldstein et al., 2008), charitable donation (Shang and Croson, 2009), voting (Gerber and Rogers, 2009), contributions to online communities (Allcott, 2011), household energy saving (Allcott and Rogers, 2014), water conservation (Ferraro and Price, 2013; Jaime Torres and Carlsson, 2018), tax compliance (Hallsworth et al., 2017), and food consumption (Sparkman and Walton, 2017). Social norm intervention is commonly considered a cost-effective and beneficial approach to changing individual or group behavior by promoting conformity with prevailing social values, reducing the uncertainty inherent in decision-making, promoting social approval and respect, and enhancing psychological security (Farrow et al., 2017; Earnhart and Ferrart, 2021). Nonetheless, it is important to be wary of potential negative consequences, such as the backfire effect, which may arise from relying too heavily on peer comparisons or social norms. Beshears et al. (2015) discovered that informing individuals of their peers' participation rate in a retirement savings example led to a corrosion of target object aspiration. There are several typical explanations for the emergence of negative effects, such as frustration

1 Data source: www.stats.gov.cn/sj/ndsj/2023/indexch.htm.

induced by comparison, an insurmountable gap, dissimilar reference peers with the target object, forgetting information related to self-interest principle, and the presence of distractions (Dimant et al., 2020).

The implementation of social norms induces the transformation of individual motivation and behavior, which can be achieved through two typical ways, including informing respondents what other people do—descriptive norms or what other people think should be done—injunctive norms (Farrow et al., 2017; Dessart et al., 2019). Given that green innovation remains in its nascent stage globally, we chose to apply injunctive norms, which encourage rather than prohibit, to examine changes in employees' green knowledge learning in industrial firms. Houdek (2024) provides useful lessons on how we can sensibly move forward with boosting and avoiding the associated pitfalls in organizational behavioral change. Specifically, this study shows why the injunctive norm of encouraging style can be more suitable for depicting individual green knowledge learning driven by the goals of carbon peaking and carbon neutrality. On the one hand, the conception and scope of green innovation is controversial as well as the action routine and critical process is multitudinous, so it may struggle to get the key point when informing the specific activities of their peers (i.e., leveraging descriptive norms) and may be in favor of recognizing important tasks and significant meaning when telling the expectation and values of cohorts (implementing injunctive norms) (Chen et al., 2010). On the other hand, as the backbone of industrial enterprises, occupational groups born in the range of 1970–1990s have stronger self-esteem and aversion to rough command, therefore, there is feasible for applying injunctive norms of encouraging genre rather than prohibiting type. Although the field of research on employee green knowledge learning is still in its infant stage, it may have unexplored differences from other individual behavioral traits. However, based on the successful application of social norms in facilitating individual behavior change, we anticipate that this nudging tool may also be useful in promoting employee green knowledge learning. We therefore propose:

> *Hypothesis A:* The external modeling effect generated by social norms is transmitted to employees' psychology, which is expected to enhance employees' motivation for green knowledge learning.

The second nudge tactic of this study is social status through the attribution of compliments to industrial employees to examine the impact of the intervention on individual green knowledge learning. Employees' pro-social actions can be stimulated by money or other material gifts, while they can also be encouraged by genuine recognition and compliments as part of the social system. In terms of pro-social behavior, some studies find that monetary rewards and material gifts help increase charity participation (Falk, 2007), reduce antibiotic use (Currie et al., 2013), and increase employees' work enthusiasm (Akerlof, 1982; Fehr et al., 1993; Charness, 2004; Cohn et al., 2015). However, scholars who have researched the use of intangibles motivators, such as compliments and kindness, to stimulate good personal behavior are less relative to the above. Tidd and Lockard (1978) confirm that when employees in the service industry are friendly to customers, it helps them receive more tips. Subsequent studies provide evidence that complimenting service staff can achieve more qualitative and lasting effects on reciprocity than tipping (Kirchler and Palan, 2018; Lavoie et al., 2021). Julia et al. (2023) use status and reputation to examine their effects on positive reciprocal behavior among insurance brokers and suggest that attributing compliments to these professionals can improve their questionnaire response rate in the absence of clear commercial interest. Compliments can be found in everyday life and in the workplace to maintain a good relationship, which may cause confusion as to whether praise should be unhesitatingly classified as a nudge tactic.

According to the concept of social status signal, attributing compliments to individuals can release a kind of connotation that makes one feel a stronger competitive advantage compared to their peers. Moreover, the pursuit of higher social status is an instinct at the personal level, although it may not bring direct financial returns (Duesenberry, 1949), which comes from comparison with similar people (Bitektine, 2011). As a product of social relations (Patterson et al., 2014), status is highly integrated with hierarchical position and serves as a tool of social public evaluation. Manufacturing is an important part of global supply chains, where many outstanding talents are absorbed, and opportunities and challenges coexist. As such, if an employee occupies a higher status in the industry, it can increase the possibility of promotion post and increase wages, whether the industrial cycle is at a peak or a trough. In the context of the global wave of green innovation, superimposing the change of social evaluation system, we optimistically infer that manufacturing employees have a greater interest than in the past in pursuing an environmentally friendly reputation. In a word, if we give them commendation based on guiding future actions, these employees can be motivated to engage in green innovation, such as learning green knowledge, participating in green supply chain management, trying to solve new or old problems through creative production methods with environmental protection (Klewitz and Hansen, 2014). Against the backdrop of the global wave of sustainable development and increasing competitive pressures in the labor market, employees may be interested in green knowledge learning to meet corporate sustainability requirements and enhance their competitiveness in the industry. In other words, the industry may be able to enhance employees' green knowledge learning if the industry puts a demand for green knowledge and grants a higher industry status to employees with green knowledge. Accordingly, we propose:

> *Hypothesis B:* Social status enhancement is expected to enhance employees' green knowledge learning by stimulating their desire to achieve.

2.3 Combination nudging and isolation nudging

Assuming again that the two boosting tools are effective, we investigated whether the size of treatment effect differs when managers simultaneously utilize two or more nudge tactics. Several influential studies have indicated that combination nudging could be effective in inducing pro-environmental behavior in a desired direction. Brandon et al. (2019) confirmed that implementing peak energy reports or home energy reports as intervention measures can decrease household electricity usage during peak load events and simultaneously executing both strategies does not result in a "crowd out" effect. Howley and Ocean (2022) found that informing farmers

about the injunctive norm and social signaling helps increase their willingness to adopt new farming technology, specifically a smartphone app. Combining these two treatments results in a significantly greater impact. To assess the effects of isolation and combination based on the same psychological mechanism, this study employed four tactics to extend nudge analysis on individual behaviors. In this study we also validate the difference between joint and individual nudging through different boosting experimental designs. Specifically, we divided the combined group into two subgroups, "Norm + Status" group (first conducting peer comparison, then implementing compliments) and "Status + Norm" group (first conducting compliments, then implementing peer comparison). We argue that the size effect may be discrepant because of the different orders of stimuli, namely feeling the pressure first or feeling the pleasure first. In general, people seem to be more cooperative and positive when the mood is light, so we think it might be better to praise employees first (Bukoye et al., 2022). Because social norms and social status have different mechanisms of action on the individual's psyche, their joint use may have complementary effects if properly operationalized. Further, in joint boosting, using the social status tool first for praise and then the social norm tool to provide comparative pressure may be more acceptable to subjects. We propose:

> *Hypothesis C:* The selection of complementary tools for joint nudging may be more effective than individual boosting.

3 Materials and methods

3.1 Design

The aim of this study is to assess the effects of varied nudging interventions on employees' green knowledge learning time. Our research strictly adheres to the ethical standards of behavioral science research. The experimental protocol underwent comprehensive evaluation by the Academic Committee of the School of Economics and Management at Lanzhou University of Technology, with particular emphasis on the following aspects: (I) psychological impact assessment of the intervention measures, (II) safeguarding mechanisms for voluntary participation, and (III) potential coercive effects arising from power dynamics in organizational settings. The informed consent procedure followed a two-phase implementation framework: Prior to the experiment, participants were fully informed via an independent online platform about the research objectives, experimental procedures (including randomization mechanisms), data usage scope, and privacy protection measures. It was explicitly stated that participation was voluntary and anonymous, and that involvement (or lack thereof) would not affect performance evaluations. All procedures complied with the Ethical Principles of Psychologists and Code of Conduct (APA) and the International Labour Organization (ILO) ethical standards for workplace research. Periodic ethical reviews were conducted throughout the study to ensure full compliance during the entire experimental process.

The subjects were randomly divided into five groups: control group, social norm group, social status group, "Norm + Status" group, and "Status + Norm" group (see Figures 2, 3). The random grouping of the boosted subjects is mainly based on the following considerations. The first is to eliminate the influence of heterogeneous factors, such as age, gender, years of working experience, nature of the working enterprise, geographical environment, etc., which are likely to interfere with the experimental results when the intensity of the above factors is large. Second, the number of employees included in each group is larger and the characteristics of all employees are more diversified, which enables us to test the effectiveness of the booster tool in a more open environment. Third, during the analysis of our results, we selected the nature of business ownership and the management level of the employees for targeted validation, which balances general and specific analytical needs.

In the control group, we emphasized the environmental threat of human social development and the necessity of promoting green innovation, as well as indicated that studying green knowledge is the entry point of personal participation in green innovation. The respondents rated the preferred extra time to learn green knowledge per week on a scale from 0 to 10. We temporarily set the maximum time as 10 h per week, due to the high work intensity of employees in manufacturing companies, and to protect the initiative for

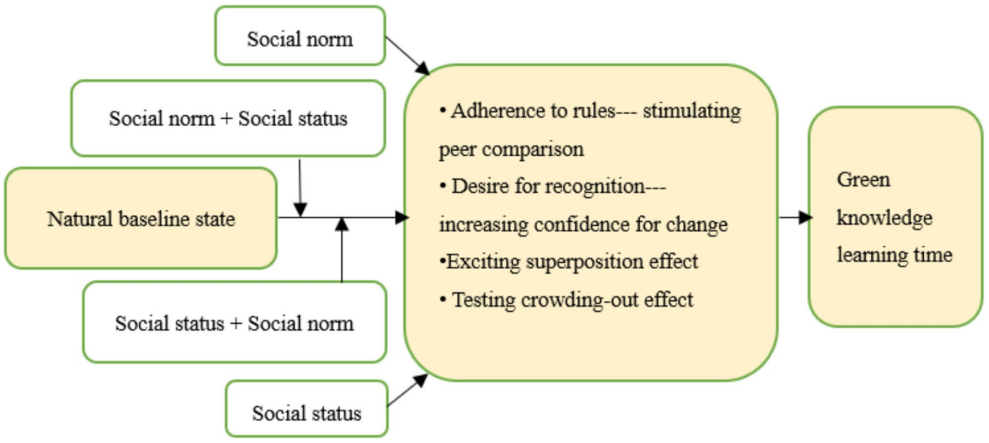


FIGURE 2
Experimental design logic.

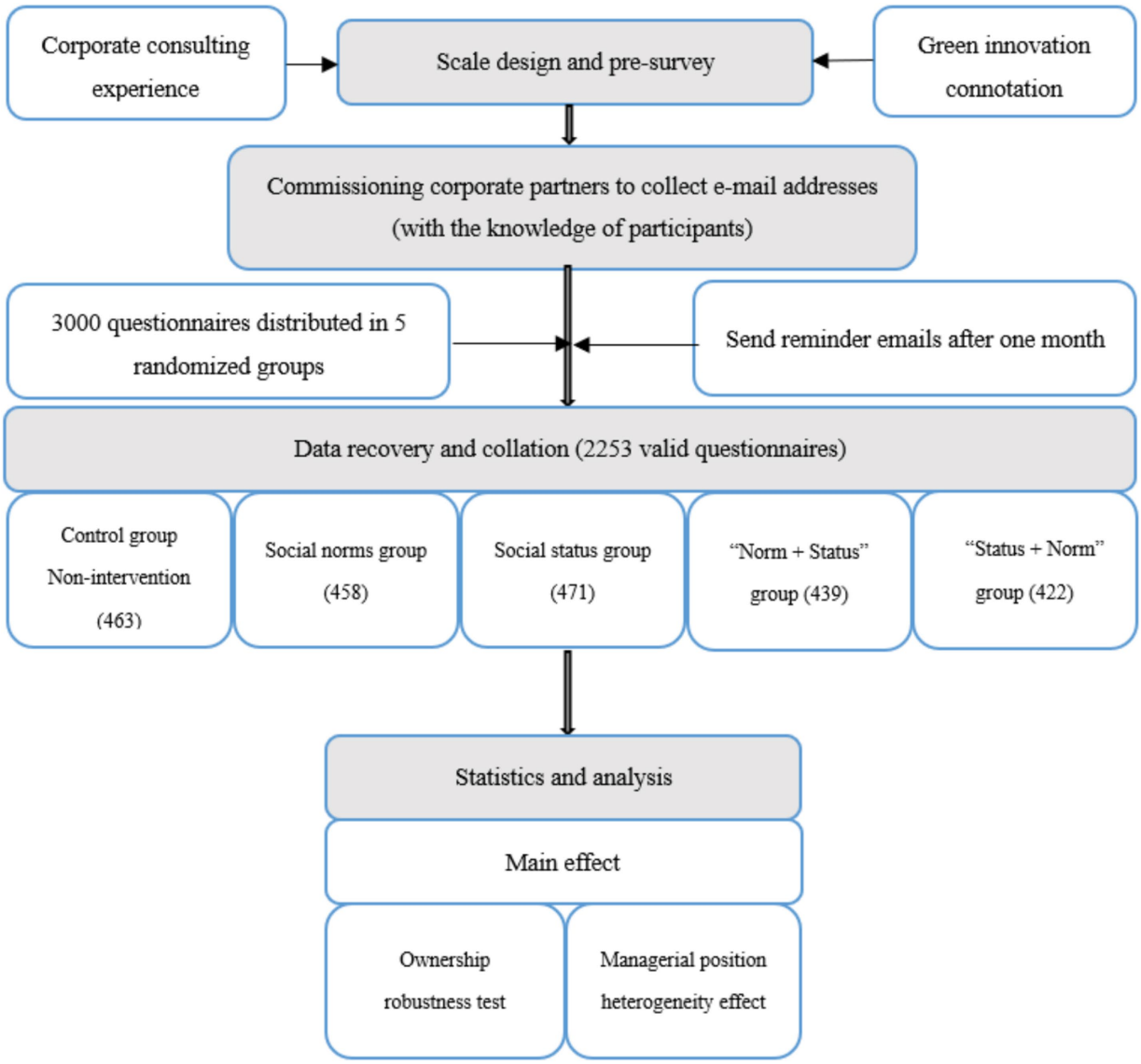


FIGURE 3
The overall research process.

learning green knowledge among the surveyed employees. Reassuringly, our goal was to examine the relative effects of diversiform nudge tactics rather than to measure study time accurately, so setting the 0–10 scale did not conflict with the goals of this research. In the social norm group, we added a paragraph at the beginning of the questionnaire text to demonstrate the practice attitude of peers, in which we had given a favorable rating of 95% based on our experience in providing consulting services to manufacturing companies. In the social status group, we added a paragraph to praise the respondent's action and painted a bright career future near the end of the text. In the "Norm + Status" group, we first informed the respondents about the actions and attitudes of their peers in the opening section and then praised and encouraged them at the end. In "Status + Norm" group, however, we began with praise and then applied pressure. The complete questionnaire can be found in Appendix.

The core problem with our design was how much extra time per week employees would be willing to spend studying green knowledge. We wanted to test three different types of effects: (I) in the control condition, what was the effect size of implementing the social norm and social status interventions separately, (II) in contrast to the independent stimulus, whether there would be a crowding out effect of implementing the combined intervention, and (III) in the joint interference, what would happen because of the different order of implementation of social norm and social status. If there was a crowding out effect, then the combined effect would be less than the sum of the effect of implementing social norm and social status, respectively. The design of our boosting experiment is also in line with the design of Brandon et al.'s (2019) energy use boosting experiment and Howley and Ocean's (2022) innovation application nudging experiment, whose explorations in the areas of joint and individual nudging provide useful lessons for this study.

3.2 Procedure and participants

For the sake of clarity, after designing the questionnaire, we randomly conducted two rounds of pre-surveys among students as well as our relatives and friends, including different ages, genders, and educational levels (see Figure 3). Through continuous perfection, we believed that the questionnaire statements could clearly express our true intention. In addition, we obtained information other than commitment learning time, such as the ownership of the company (state-owned or private) and the employee's position (manager or non-manager). To reduce the respondents' burden and avoid negative irritation that might lead to biased responses, we did not ask respondents about their age, gender, education, location, etc. Meanwhile, we argued that it would increase the difficulty and cost of the nudge intervention to take too much account of demographic characteristics. Frankly speaking, it is impossible to develop a variety of nudges for the same occupational group, and it is extremely costly if someone persists, which may also violate the principle of nudging.

Prior to contacting interviewees, we conservatively calculated the minimum sample size to meet the research requirements according to G*Power 3 and 3.1 (Faul et al., 2007, 2009). In general, the effect size related to behavioral intervention research is small (Cohen's $d < 0.2$, or $0.2 < d < 0.5$), we used $d = 0.2$ as well as 5 percent level (two-sided) and 0.8 power level as the calculation basis. For each group of our study, we needed at least 394 samples, or a total of 1,970 valid questionnaires. To ensure an adequate sample size, we intended to administer 3,000 questionnaires, a process that required logistical support from the university's alumni network. We selected 851 manufacturing firms from the alumni enterprise database, assigned each a unique identifier, and randomly chose 300 for our study. Two of the paper's authors conducted individual phone calls with the alumni representatives of these 300 firms, explaining the purpose of the experiment and requesting each alumnus to provide 10 employee email addresses from their respective companies. The email addresses collected were then grouped based on the alphabetical order of their initials, with each group allocating 600 questionnaires. Employees from the same firm were randomly distributed across different groups to ensure randomization. This approach also helped mitigate potential interference from participants' demographic characteristics on the experimental outcomes. The survey was conducted between October and December 2022, during which we sent a questionnaire along with a thank-you letter to each email address. One month after the survey invitation, we sent another email to remind the respondents. To ensure respondents' informational privacy, all survey responses were directly submitted to the corresponding author without intermediary transmission (e.g., via email collectors). Consequently, no individuals other than the research team had access to completed questionnaires, while respondents' identities remained anonymized throughout the study. Furthermore, this research strictly adhered to ethical guidelines by: (I) maintaining full transparency in all research communications, (II) avoiding categorical labeling of participants, and (III) preserving complete behavioral autonomy. In the end, we took back 2,253 questionnaires (75.10% effective response rate), which included 463 questionnaires of control group (77.17% effective response rate), 458 questionnaires of social norm group (76.33% effective response rate), 471 questionnaires of social status group (78.50% effective response rate), 439 questionnaires of "Norm + Status" group (73.17% effective response rate), and 422 questionnaires of "Status + Norm" group (70.33% effective response rate), respectively. State-owned enterprises respondents are 1,051, 46.65 percent proportion, and managers respondents are 1,119, 49.67 percent proportion.

4 The results

4.1 Main effects

We analyzed the overall survey samples and compared them with the effects of five experimental groups that were similar in sample size. Table 1 shows detailed statistical results. In the control group, without any intervention, the mean value of preferred extra time was 4.432 in the range of 0–10 h. In the social norm group, study time increased to some extent, with a mean of 4.795. We found an increase of 8.12 percent according to the sample t-test and an effect size of 0.136, more strikingly, it was statistically significant ($t = 2.904$, two-sided $p = 0.004$). In the social status group, the results showed a higher mean (4.909), a more pronounced increase (10.72 percent), a larger effect (0.163), and a stronger level of significance ($t = 3.498$, two-sided $p < 0.001$). An exciting consequence was that nudging strategies can achieve a better intervention effect than the baseline level, even when used alone. Hypothesis A and hypothesis B are confirmed. This fits with Sanchayan et al.'s (2023) conclusions in their study of online boosting of sustainable behavior in individuals. This strongly suggests that, as in other fields, the implementation of nudging tactics can significantly improve employees' green knowledge learning. It also gives us more confidence to further study the combined effect, and that is, whether there is a crowding out effect or not, we have something to gain.

In addition, we conducted the analysis of combined treatments from two aspects of "Norm + Status" group and "Status + Norm" group. In "Norm + Status" group, there was a stunning investment of average additional learning time of 5.355 h, as well as a dramatic reinforcement of 20.46 percent. T-test showed that Cohen's d is 0.341,

TABLE 1 Core statistical indicators for main effects analysis.

Statistic	Control	Norm	Status	Norm + Status	Status + Norm
Sample size (N)	463	458	471	439	422
Mean value	4.432	4.795	4.909	5.355	5.545
Standard deviation	1.876	1.946	2.131	1.851	1.817
Cohen's d (Effect size)		0.136	0.163	0.341	0.421
Treatment mean vs. Control mean		0.360	0.475	0.907	1.104
p value vs. Control (two-sided)		0.004	<0.001	<0.001	<0.001

which exceeds the level of 0.2 and is highly significant ($t = 7.136$, two-sided $p < 0.001$). In the "Status + Norm" group, there was a result of both joy and fear for us. It was natural to be happy because the statistics were so good (mean = 5.545, 24.91 percent increase, Cohen's $d = 0.421$, $t = 8.641$, two-sided $p < 0.001$). Hypothesis C is confirmed.

It may be puzzling when it comes to fear after the event. The truth is clear that if we do not carefully divide the combined group into "Norm + Status" group and "Status + Norm" group, some valuable conclusions may be obscured. Compared with the former, the latter showed a more outstanding nudging effect in stimulating the green knowledge learning of manufacturing employees. It seems that the type of reward before pressure, i.e., social status intervention first and then social norm intervention, can help to achieve a more significant effect in the context of green innovation. Overall, we sorted these nudging tools in order of mean value from small to large in our study scenario: social norm (denoted by "norm"), social status (denoted by "status"), "Norm + Status" (denoted by "xnost") and "Status + Norm" (denoted by "xstno") in Figure 4. It is believed that nudging strategies are effective and low-cost instruments under the circumstances of promoting green knowledge learning of manufacturing enterprises, as well as a strong complement to fiscal, monetary, and industrial policies of governments and financial institutions, when they are used either alone or in combination with each other. In addition, the combined effect of using two nudge strategies simultaneously is greater than the individual effect of implementing social norm or social status separately, while it is greater than the sum of both independent effects. Therefore, we found no crowding out effect in both combined groups, which also means that we can further explore the relationship between multiple nudging tactics and selectively apply them in green knowledge learning.

4.2 Robustness tests

To verify the robustness of the nudging experiment, we peel the 2,253 respondents based on the ownership of the enterprise and repeat a series of analyses as above. More critically, this stripping provided us with a channel to thoroughly understand the differences in the effect size as well as other key indicators between state-owned enterprises and private enterprises. This robustness test, unlike others such as gender, age, location, and educational attainment, more fully reflected the status quo of China's manufacturing industry, in which state-owned enterprises occupy a significant proportion and play an important role (Zhang et al., 2024). In mainland China, data from the National Bureau of Statistics (NBS) show that private companies are far more enthusiastic about innovation activities than state-owned enterprises (SOEs). In 2022, 20.6% of SOEs realize product innovation, compared to 35.5% of private enterprises. The share of state-owned enterprises realizing process innovations is 30.3%, compared to 40.8% for private enterprises (see text footnote 1). The ratio of state-owned enterprises and private enterprises were almost identical in this study, the former was 53.35% and the latter was 46.65%. Table 2 shows the main indices of the robustness test.

Among the 1,202 state-owned enterprise respondents, we found roughly the same mean and standard deviation as the full sample, and some difference in effect size and p-value. Meanwhile, there were also some potentially revealing gaps (see Figure 5) between state-owned enterprises (control group, social norm group, social status group, "Norm + Status" group, and "Status + Norm" group are denoted by "sc," "sno," "sst," "sxnost," and "sxstno," respectively) and private firms (denoted by "pc," "pno," "pst," "pxnost," and "pxstno," respectively).

On the one hand, the mean value of private firms revealed a greater intervention effect than the other two samples, either alone or in combination, the effect size is also larger. On the other hand, the p-value of private enterprises showed better significance than state-owned enterprises. It is a pity that the latter did not pass the significance test on norm treatment and status treatment at the level of two-sided 0.05 in the sample of SOE employees. This could mean that it is more adaptable to promote behavioral change among

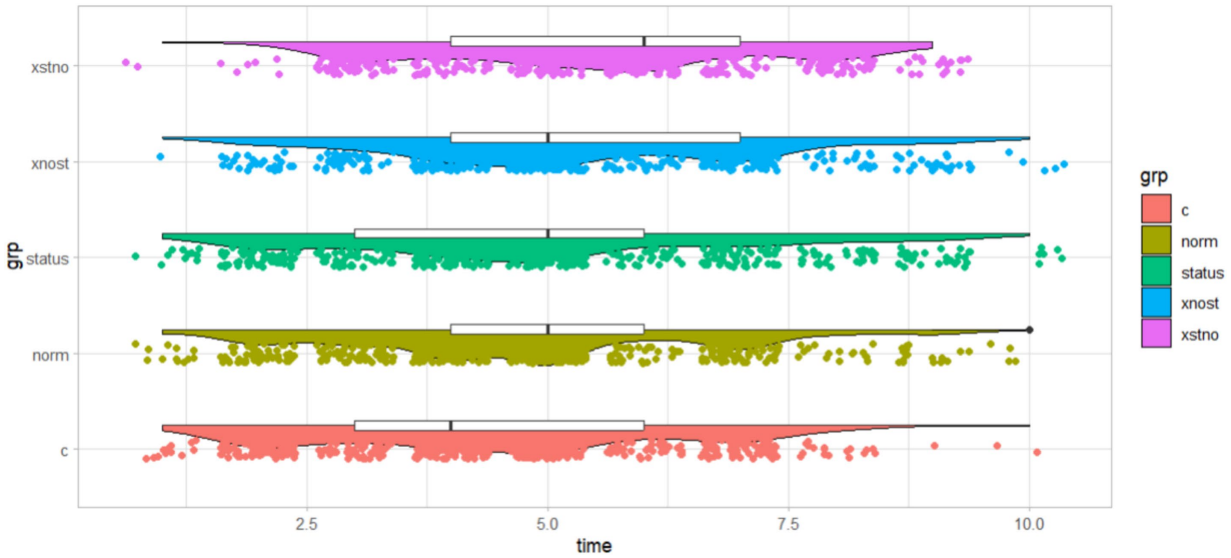


FIGURE 4
Effects of different nudging strategies.

TABLE 2 Robustness tests based on business ownership.

Statistic	Control	Norm	Status	"Norm + Status"	"Status + Norm"
Sample size (N)	259/204	245/213	238/233	232/207	228/194
Mean value	4.479/4.373	4.739/4.859	4.824/4.996	5.263/5.459	5.483/5.619
Standard deviation	1.868/1.888	1.922/1.976	2.145/2.118	1.772/1.935	1.828/1.806
Cohen's *d* (Effect size)		0.081/0.161	0.105/0.188	0.296/0.403	0.377/0.490
Treatment mean vs. Control mean		0.216/0.456	0.303/0.534	0.763/1.098	0.982/1.268
p value vs. Control (two-sided)		0.205/0.022	0.107/0.008	<0.001/<0.001	<0.001/<0.001

The data before "/" are affiliated with state-owned enterprises and after "/" are indicators of private businesses.

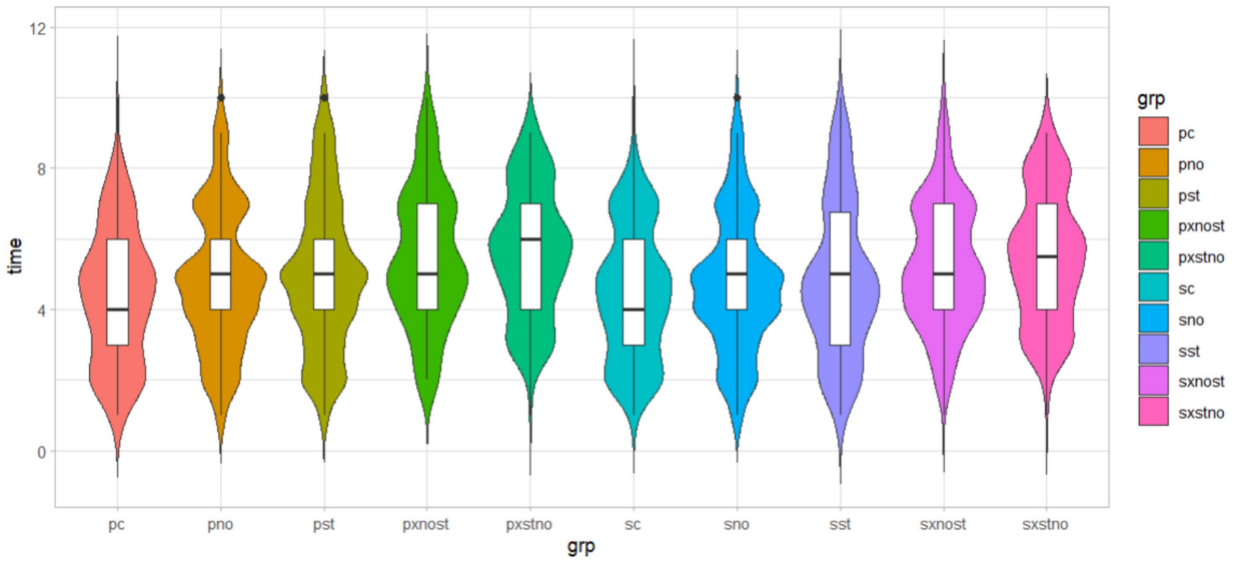


FIGURE 5
Nudging effects of different ownership.

employees of private enterprises using nudge strategies. These findings reaffirm that the simultaneous use of social norm and social status does not induce a crowding out effect in nudging behavior change, and the effect of combination is more effective than separation. In the group "Status + Norm," the effect values for state-owned enterprises and private enterprises reached 0.377 and 0.490, respectively.

4.3 Heterogeneity effects

Given the behavioral differences between managers and non-managers (Nyberg et al., 2015), we conducted heterogeneity analysis to explore whether such discrepancy exists in the green innovation scene. We expressed this confusion in the introduction section of this paper, based on the motivational orientation of personnel at different levels in the business organization. Another reason that encouraged this study to conduct heterogeneity tests is our confidence in sample size. We divided the total sample into manager subgroup and non-manager subgroup, in which respondents of both teams were almost equal (49.67 percent versus 50.33 percent). In one control group and four treatment groups, respondents differ by a maximum of 4.78 percentage points and a minimum of 1.75 percentiles. See Table 3 for details.

On average, the initial level of managers is lower than that of non-managers. However, managers' level was increased more significantly by social norm stimuli, combined treatment of "Norm + Status" and "Status + Norm," not including the social status group. Figure 6 shows the effectiveness of the different boosting schemes in a peak-to-peak diagram, where the red peaks represent the areas with the highest concentration of data.

The control group, social norm group, social status group, "Norm + Status" group, and "Status + Norm" group are denoted by "nc," "nno," "nst," "nxnost," "nxstno" in the community of non-managers, and denoted by "mc," "mno," "mst," "mxnost," "mxstno" in the community of managers. On Cohen's *d*, managers' scores were higher than non-managers in four experimental groups, with the gap widening from 0.067 (social status group) to 0.188 ("Status + Norm" group). On *p*-value, managers in each group all passed significant test at two-sided 0.05 level, non-managers did just as well in "Norm + Status" group and "Status + Norm" group. So far, comparing the above three aspects, we argued that the effect was better in managers than non-managers implementing nudging tactics.

TABLE 3 Heterogeneity analysis—staff position.

Statistic	Control	Norm	Status	"Norm + Status"	"Status + Norm"
Sample size (N)	237/226	225/233	229/242	209/230	219/203
Mean value	4.300/4.571	4.898/4.695	4.856/4.959	5.450/5.270	5.639/5.443
Standard deviation	1.855/1.892	1.981/1.911	2.088/2.175	1.837/1.864	1.865/1.763
Cohen's *d* (Effect size)		0.213/0.052	0.198/0.131	0.460/0.283	0.492/0.304
Treatment mean vs. Control mean		0.573/0.142	0.572/0.376	1.129/0.712	1.320/0.872
p value vs. Control (two-sided)		0.002/0.432	0.003/0.050	<0.001/<0.001	<0.001/<0.001

The data before "/" are affiliated with managers and after "/" are indicators of non-managers.

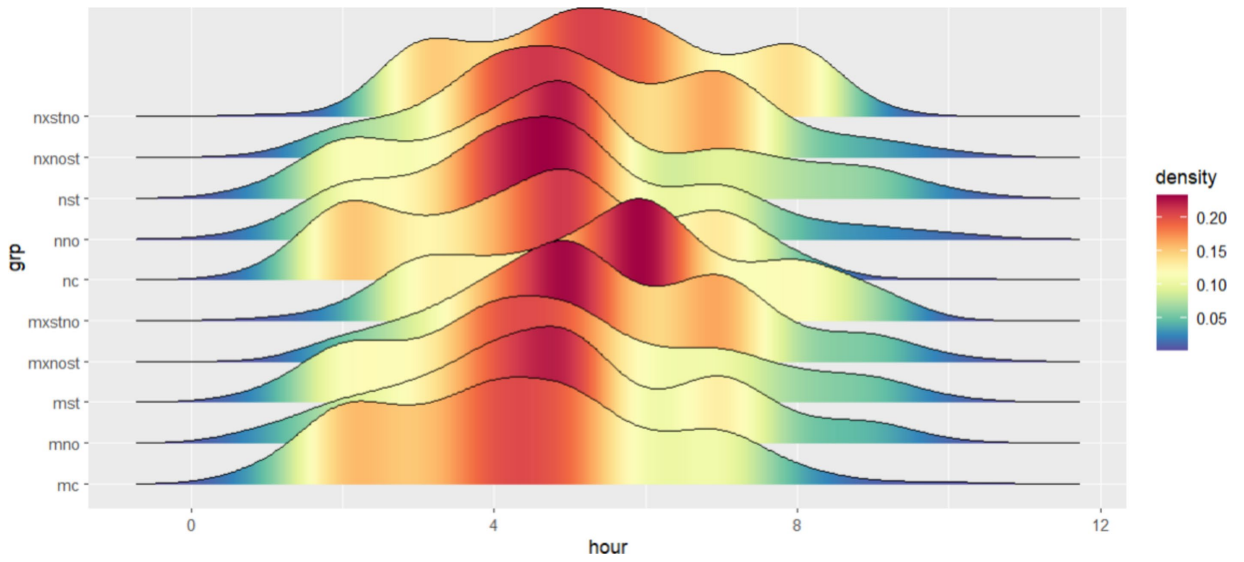


FIGURE 6
Nudging effects of managerial and non-managerial groups.

4.4 Discussions of the experimental process

To avoid counteracting each other, we still need to pay attention to a few details in accordance with the operational procedure of the experimental study. First, the stimulus sequence is a crucial factor that can be easily overlooked. We all know that effective communication must be done in a relaxed atmosphere, or at least not in a way that makes the other person resistant. Compliments before pressure, we strongly believe, create a more conducive environment for collaboration than the opposite approach, especially when communicating with strangers online. The empirical results support our view, and this experimental design is also a value of this paper. Second, sentence expression is a key factor in ensuring the smooth conduct of research due to the differences in language habits in diversified cultural backgrounds. Experimental designers might do well to make subjects feel concise, clear, sincere, and friendly when implementing the nudging strategy, especially when we make compliments. Giving respondents a sense of both responsibility and accomplishment in behavioral tests is a challenge for any research team (Allcott and Mullainathan, 2010). Third, the number of items plays an imperceptible role. Frankly, our team members are often the subjects of various studies and especially hate surveys with too many questions. Although we do not express this dislike verbally, our actions are honest, i.e., we answer items mechanically without thinking and strive to complete the questionnaire in the shortest time possible. Based on empathy, we recommend designing as few central questions as possible and not making the options too complex. For example, this study did not include demographic characteristics such as age, education, and gender because it is impossible to break down the implementation of the nudging strategy into such detail from a cost and operational perspective. Finally, partnering with reputable platforms or channels is an important guarantee that they will enroll active participants in the experiment, which helps reduce research costs and improve the effective questionnaire rate. Although partners may pool highly cooperative employees based on high efficiency, it does not undermine the credibility of the results because the conditions are the same for all experimental groups.

4.5 Discussion of ethicality

Our nudge of green knowledge learning for corporate employees is primarily based on employee perceptions, such as observations of the Earth's greenhouse effect, concerns about the depletion of non-renewable energy sources, and perceptions of pollutant emissions

from production. Based on cognition, employees' needs for socialization, respect, and achievement are utilized to influence their choice architecture by encouraging the application of type social norms, using the provision of information rather than coercive commands. The nudging experiment consists of the mainstream ethical and moral norms of human society and strengthens employees' choice autonomy to a certain extent. First, in the competitive and motivated corporate workplace environment, especially in industries where productivity enhancement is the action guideline, the corporate management style very often reflects command or obedient characteristics, and it is difficult for employees to have the opportunity to rationally question management decisions. The application of boosting tools retains employees' free choice to learn green knowledge and there is no punishment for employees who do not actively participate in green innovation. Driving employees to break out of their comfort zones mainly caters to their values of pursuing excellence and social responsibility. Second, a significant portion of our experimental sample is managers. There is a high chance that our boosting experiment will inspire managers. Managers may reflect on what kind of leadership style is both effective and acceptable to their employees (Tonglet et al., 2004). Boosters that appeal to the glowing human values of employees have a chance to become a powerful weapon in the managerial toolbox. Optimistically, more and more managers will consider adopting facilitation as the experimental use of facilitation in business management continues. Our study indirectly enhances employees' self-efficacy, career fulfillment or job satisfaction, and psychological well-being through the medium of management practices. Finally, through subtle boosting of employees' willingness to learn green knowledge, employees will have a stronger understanding of green innovation. Instead of setting the scope of green innovation, we encourage employees to rethink their workflow or work content through the lens of green innovation in their own jobs and encourage them to explore on their own ways of working that are both ecologically and economically efficient. This approach not only reserves green innovation momentum for society but also enhances employees' sense of value and production ethics, i.e., realizing a balance between economic and ecological benefits.

5 Conclusions and discussions

5.1 Conclusion

In this research, we investigated the effect of diversiform nudging modes on motivating employees' green knowledge learning through randomized experiments among five groups. Not only were individual effects evaluated, but two types of combined effects were also examined. There is a striking increase when the social norm or social status interventions are implemented separately. Our study builds upon Farrow et al.'s (2017) and Dessart et al.'s (2019) conceptual definitions of descriptive norms and injunctive norms, extending the latter's research to the context of green innovation. Moreover, the studies by Lavoie et al. (2021) on service personnel and Julia et al. (2023) on insurance brokers regarding behavior changes induced by praise nudge provide valuable references for our research on green knowledge learning among manufacturing employees and bolster confidence in extending nudging tools such as praise and social status to other behavioral domains within green innovation contexts. The effect size of the social norm is 0.136 and that of the social status is 0.163, which is an increase of 8.12 percent and 10.72 percent, respectively, over the control level. Meanwhile, both types of nudges are statistically significant, with two-tailed p-values less than 0.01. Like Jennifer et al.'s (2024) study, both reflect the important role of person-centeredness in fueling experimentation. In two other combined effects experiments, we found a more pronounced nudging role, which is the effect size increment of 20.46 percent or 24.91 percent compared to the baseline state, and both p-values less than 0.01. We verified two important findings that there is no crowding out effect and praise before pressure is more effective. The findings of this study align with and extend the seminal work of Brandon et al. (2019) on energy use boosting experiment and Howley and Ocean's (2022) research on innovation application nudging experiment, collectively contributing to a coherent theoretical framework.

After the main effect analysis, we conducted robustness test and heterogeneity test for subdivided samples of firm ownership and employee position. These two methods of sample division are useful for studying green knowledge learning, based on the reality that state-owned manufacturing enterprises account for a certain proportion and management positions influence employees' attitudes and behaviors. Our results also show significant differences in the sub-sample analysis under the premise of supporting no crowding out effect. Robustness test echoes Liu et al.'s (2024) view of promoting responsible corporate environmental engagement in China. Of course, this result may not be convincing due to the limited sample size and can be further confirmed by increasing the sample size and elaborating the experimental design. The results of heterogeneity test could be an indication to practitioners that motivating managers with nudges may be more valuable. This echoes Ren et al.'s (2024) research on firms' green innovation behavioral boosts. It is a little unfortunate that this study did not distinguish the sample of senior managers, middle managers, and junior managers, which could also be one of the directions of our follow-up research. Moreover, it is possible to implement the nudging strategy according to the type of firm and employee position from the perspective of cost saving or ease of operation. From a micro-level analytical perspective, this study contributes a cost-effective and flexible managerial framework for motivating employee-driven green knowledge learning while theoretically extending four established motivational paradigms—Expectancy Theory (Vahe and Shen, 2024), Achievement Motivation Theory (Rachmatullah et al., 2021), Maslow's Hierarchy of Needs (Carpenito-Moyet, 2003), and Herzberg's Two-Factor Theory (Alrawahi et al., 2020)—into the organizational sustainability domain. Macro-level implications suggest this research holds substantial transformative potential for reconciling corporate profit-ecology tensions and advancing the United Nations Sustainable Development Goals (Behera and Sethi, 2022; You et al., 2015).

5.2 Theoretical implications

The indeterminate interaction effects arising from the concurrent application of multiple nudges on individual psychological cognition processes underscore the imperative for our investigation into green knowledge learning. To improve treatment effectiveness and reduce costs, we focused on analyzing the combined effect of implementing injunctive social norms and social status signals. First, the use of social norms and social status in this study echoes the ideas proposed by the hierarchy of needs theory (Carpenito-Moyet, 2003), in which

social norms are closely linked to employees' social needs and social status is linked to employees' respect needs. Further, employees' behaviors of learning about green knowledge and breaking out of their occupational comfort zones through self-directed learning are also aligned with the self-actualization needs proposed by the hierarchy of needs theory. The use of the combination of social norms and social status satisfies the three needs of employees to receive incentives, which also provides a theoretical explanation and rationale for the superiority of the combination over isolated use. Secondly, in relation to the two-factor theory (Alrawahi et al., 2020), the two enablers mainly echo motivational factors rather than health care factors. The use of the combination of social norms and social status is better able to satisfy the motivational factors of achievement, appreciation, challenging work, increased job opportunities, and opportunities for growth and development. Further, how to match more efficient and cost-effective health care factors, corresponding to boosting tools that aim to provide motivational factors, also suggests new topics for theoretical reflection. Third, echoing achievement motivation theory (Rachmatullah et al., 2021), social norms are directly related to the need for conformity, and social status is directly related to the need for achievement, and the combination of the two enablers can satisfy the needs of employees in more diversified dimensions and show a more powerful driving effect than the use of the two enablers in isolation.

5.3 Practical implications

Building upon the empirically established efficacy of individual nudging strategies, we posit that stakeholders—encompassing policymakers, scholars, and corporate leaders—should prioritize investigating the synergistic effects of nudge combinations. A systematic differentiation of nudge attributes is methodologically essential, given the demonstrable heterogeneity in their underlying psychological activation mechanisms (Lades and Delaney, 2020). In this research, we compared the effect of psychological interventions on respondents by implementing the combination of social norm and social status, whether it is pressure or reward first. In other words, although we implemented various experimental stimuli, the target point was accordant, that is, to motivate the social comparative psychology of employees (Gul and Ak, 2018). The respondents viscerally felt that if they did not conform to the behavior of other majority members, especially their peers, they might face obstacles from the mainstream group, and this is the common nature of humans and similar social animals. This behavioral trajectory exhibits congruence with the empirical findings of Brandon et al. (2019) and the theoretical framework advanced by Howley and Ocean (2022). Determining the existence of such ostensibly enhanced effects when employing divergent psychological mechanisms for intervention presents notable methodological challenges. In the scenario of stimulating employees' green knowledge learning, if we simultaneously trigger productivity and innovation, or financial performance evaluation and ecological benefits, there is likely to be a crowding out effect. Once extrusion occurs, it can reduce the push effect in the short run and make the subject immune to the nudge in the long run.

The empirical findings of this study yield substantive implications for global industrial advancement and green innovation across diverse geographical contexts. First, although this paper mainly focuses on the employees of Chinese manufacturing companies as the experimental sample, the boosting tools used closely echo the mainstream employee motivation theories such as the Hierarchy of Needs Theory, the Two-Factor Theory, and the Need for Achievement Theory. These well-established motivation theories emerged through systematic observation, synthesis, and empirical validation across diverse temporal, geographical, and industrial contexts, thereby substantiating the potential for broad applicability of the motivational instruments examined in this study across multiple regions and industrial sectors (Della and Linos, 2020). Second, our research process is also consistent with the boosting process in different regional samples over time, and the standardization of the boosting scheme provides a solid foundation for the generalization of the findings of this study. Third, numerous developing nations, particularly China, confront the fundamental dilemma of reconciling economic growth imperatives with ecological conservation requirements (Simon and Eric, 2007). In the face of the arduous historical mission of green innovation, it is difficult for many regions to provide sufficient incentives to enterprises in terms of policies, funds, and taxes, which provides a wide space for the use of low-cost boosting tools. Finally, although there are differences in the history, culture and industrial characteristics of countries around the world, at the macro level, human beings share the same desire to win social recognition and respect, to pursue better personal development, and to look forward to the improvement of the ecological environment. This investigation substantiates and extends the conceptual framework and empirical findings of Kalamaras et al. (2024) regarding boosting interventions for residential energy efficiency in developed economies, thereby demonstrating the extensive applicability spectrum of boosting methodologies across diverse contexts. Our promotion program is well suited to the underlying needs of human survival and can therefore be used as a universal reference across cultural, regional and industrial differences.

5.4 Limitations and future scopes

We explicitly acknowledge the inherent methodological limitations that characterize all empirical research endeavors. In designing and executing the booster experiment, we faced several obstacles and puzzles, which pointed the way to continued research in the future. First, we used the method of sending text via e-mail for the nudging intervention, and although we made fine refinements to the text semantics and reminder e-mails, it is inevitable that there may still be cases in which respondents are unclear about the semantics or negatively cooperate with the experiment. In the future, we will try to use field experiments to enhance the control of the experimental sessions, which may lead to more credible conclusions. Second, notwithstanding our deliberate exclusion of demographic variables (e.g., age, educational attainment, income, and geographical location) to minimize respondent burden and enhance participation rates, this methodological choice may have compromised our ability to detect potentially significant patterns. Specifically, climate-conscious younger cohorts—socialized in an era of heightened environmental discourse—likely exhibit greater cognitive engagement with sustainability issues, while highly-educated individuals may demonstrate stronger orientation toward economy-society-ecology synergies. These observed limitations underscore the imperative for future research to systematically incorporate sociodemographic

analyses when examining employee behavioral responses within green innovation paradigms. Third, while the current study employs a relatively robust sample size, constraints in data structuring and analytical sophistication may limit comprehensive data mining capabilities, potentially obscuring additional empirically significant relationships. In the future, we will continue to improve the level of data analysis and try to use more diversified statistical analysis methods to mine the underlying logic of the data. Finally, while social norms and social status demonstrate efficacy in enhancing employees' green knowledge learning engagement, our study may not have captured potentially more impactful behavioral enablers. Future research should systematically explore a broader spectrum of behavioral interventions and their synergistic combinations to optimize the facilitation of employees' pro-environmental innovative behaviors.

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 were not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the participants was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

SL: Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft. CY: Funding acquisition, Resources, Validation, Writing – review & editing. GZ: Data curation, Investigation, Software, Visualization, Writing – review & editing.

Funding

The author(s) declare that financial support was received for the research and/or publication of this article. National Natural Science Foundation of China (72264008). "Research on the Role Mechanism, Effect Identification and Realization Path of Optimization of Agricultural Science and Technology Resource Allocation to Boost High-Quality Agricultural Development." The fund provides financial support for this research experiment.

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.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2025.1430125/full#supplementary-material

References

Akerlof, G. A. (1982). Labor contracts as partial gift exchange. *Q. J. Econ.* 97, 543–569. doi: 10.2307/1885099

Allcott, H. (2011). Social norms and energy conservation. *J. Public Econ.* 95, 1082–1095. doi: 10.1016/j.jpubeco.2011.03.003

Allcott, H., and Mullainathan, S. (2010). Behavior and energy policy. *Science* 327, 1204–1205. doi: 10.1126/science.1180775

Allcott, H., and Rogers, T. (2014). The short-run and long-run effects of behavioral interventions: experimental evidence from energy conservation. *Am. Econ. Rev.* 104, 3003–3037. doi: 10.1257/aer.104.10.3003

Alrawahi, S., Sellgren, S. F., Altouby, S., Alwahaibi, N., and Brommels, M. (2020). The application of Herzberg's two-factor theory of motivation to job satisfaction in clinical laboratories in Omani hospitals. *Heliyon* 6:e04829. doi: 10.1016/j.heliyon.2020.e04829

Behera, P., and Sethi, N. (2022). Nexus between environment regulation, FDI, and green technology innovation in OECD countries. *Environ. Sci. Pollut. Res.* 29, 52940–52953. doi: 10.1007/s11356-022-19458-7

Benartzi, S., Beshears, J., Milkman, K. L., Sunstein, C. R., Thaler, R. H., Shankar, M., et al. (2017). Should governments invest more in nudging? *Psychol. Sci.* 28, 1041–1055. doi: 10.1177/0956797617702501

Beshears, J., Choi, J. J., Laibson, D., Madrian, B. C., and Milkman, K. L. (2015). The Effect of providing peer information on retirement savings decisions. *J. Fin.* 70, 1161–1201.

Bitektine, A. (2011). Toward a theory of social judgments of organizations: the case of legitimacy, reputation, and status. *Acad. Manag. Rev.* 36, 151–179. doi: 10.5465/amr.2009.0382

Brandon, A., List, J. A., Metcalfe, R. D., Price, M. K., and Rundhammer, F. (2019). Testing for crowd out in social nudges: evidence from a natural field experiment in the market for electricity. *Proc. Natl. Acad. Sci.* 116, 5293–5298. doi: 10.1073/pnas.1802874115

Bukoye, O. T., Ejohwomu, O., Roehrich, J., and Too, J. (2022). Using nudges to realize project performance management. *Int. J. Proj. Manag.* 40, 886–905. doi: 10.1016/j.ijproman.2022.10.003

Cardinale, B. J., Duffy, J. E., Gonzalez, A., Hooper, D. U., Perrings, C., Venail, P., et al. (2012). Biodiversity loss and its impact on humanity. *Nature* 486, 59–67. doi: 10.1038/nature11148

Carpenito-Moyet, L. J. (2003). Maslow's hierarchy of needs - revisited. *Nurs. Forum* 38, 3–4. doi: 10.1111/j.1744-6198.2003.tb01204.x

Charness, G. (2004). Attribution and reciprocity in an experimental labor market. *J. Labor Econ.* 22, 665–688. doi: 10.1086/383111

Chen, Y., Harper, F. M., Konstan, J., and Li, S. X. (2010). Social comparison and contributions to online communities: a field experiment on MovieLens. *Am. Econ. Rev.* 100, 1358–1398. doi: 10.1257/aer.100.4.1358

Chen, J. L., Zhang, A. Q., Rhee, S. Y., and Park, H. (2024). Exploring how and when environmental corporate social responsibility impacts employees' green innovative work behavior: the mediating role of creative self-efficacy and environmental commitment. *Sustain. For.* 16:234. doi: 10.3390/su16010234

Chiou, T. Y., Chan, H. K., Lettice, F., and Chung, S. H. (2011). The influence of greening the suppliers and green innovation on environmental performance and

competitive advantage in Taiwan. *Transp. Res. Part E Logist. Transp. Rev.* 47, 822–836. doi: 10.1016/j.tre.2011.05.016

Cohn, A., Fehr, E., and Goette, L. (2015). Fair wages and effort provision: combing evidence from a choice experiment and a field experiment. *Manag. Sci.* 61, 1777–1794. doi: 10.1287/mnsc.2014.1970

Cuerva, M. C., Triguero-Cano, A., and Corcoles, D. (2014). Drivers of green and non-green innovation: empirical evidence in low-tech SMEs. *J. Clean. Prod.* 68, 104–113. doi: 10.1016/j.jclepro.2013.10.049

Currie, J., Lin, W., and Meng, J. (2013). Social networks and externalities from gift exchange: evidence from a field experiment. *J. Public Econ.* 107, 19–30. doi: 10.1016/j.jpubeco.2013.08.003

Della, V. S., and Linos, E. (2020). RCTs to scale: comprehensive evidence from two nudge units. *Econometrica* 88, 567–600. doi: 10.3982/ECTA18709

Dessart, F. J., Barreiro-Hurle, J., and van Bavel, R. (2019). Behavioural factors affecting the adoption of sustainable farming practices: a policy-oriented review. *Eur. Rev. Agric. Econ.* 46, 417–471. doi: 10.1093/erae/jbz019

Dimant, E., van Kleef, G. A., and Shalvi, S. (2020). Requiem for a nudge: framing effects in nudging honesty. *J. Econ. Behav. Organ.* 172, 247–266. doi: 10.1016/j.jebo.2020.02.015

Dorschner, T., and Musshoff, O. (2015). How do incentive-based environmental policies affect environment protection initiatives of farmers? An experimental economic analysis using the example of species richness. *Ecol. Econ.* 114, 90–103. doi: 10.1016/j.ecolecon.2015.03.013

Duesenberry, J. S. (1949). Income, saving, and the theory of consumer behavior. Cambridge, MA: Harvard University Press.

Earnhart, D., and Ferrart, P. J. (2021). The effect of peer comparison on polluters: a randomized field experiment among wastewater dischargers. *Environ. Resour. Econ.* 79, 627–652. doi: 10.1007/s10640-020-00522-0

Falk, A. (2007). Gift exchange in the field. *Econometrica* 75, 1501–1511. doi: 10.1111/j.1468-0262.2007.00800.x

Farrow, K., Grolleau, G., and Ibanez, L. (2017). Social norms and pro-environmental behavior: a review of the evidence. *Ecol. Econ.* 140, 1–13. doi: 10.1016/j.ecolecon.2017.04.017

Faul, F., Erdfelder, E., Buchner, A., and Lang, A. G. (2009). Statistical power analyses using G*power 3.1: tests for correlation and regression analyses. *Behav. Res. Methods* 41, 1149–1160. doi: 10.3758/BRM.41.4.1149

Faul, F., Erdfelder, E., Lang, A. G., and Buchner, A. (2007). G*power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav. Res. Methods* 39, 175–191. doi: 10.3758/BF03193146

Fehr, E., Kirchsteiger, G., and Riedl, A. (1993). Does fairness prevent market clearing? An experimental investigation. *Q. J. Econ.* 108, 437–459. doi: 10.2307/2118338

Fernando, Y., Jabbour, C. J. C., and Wah, W. X. (2019). Pursuing green growth in technology firms through the connections between environmental innovation and sustainable business performance: does service capability matter? *Resour. Conserv. Recycl.* 141, 8–20. doi: 10.1016/j.resconrec.2018.09.031

Ferraro, P. J., and Price, M. K. (2013). Using nonpecuniary strategies to influence behavior: evidence from a large-scale field experiment. *Rev. Econ. Stat.* 95, 64–73. doi: 10.1162/REST_a_00344

Gerber, A. S., and Rogers, T. (2009). Descriptive social norms and motivation to vote: everybody's voting and so should you. *J. Polit.* 71, 178–191. doi: 10.1017/S0022381608090117

Goldstein, N. J., Cialdini, R. B., and Griskevicius, V. (2008). A room with a viewpoint: using social norms to motivate environmental conservation in hotels. *J. Consum. Res.* 35, 472–482. doi: 10.1086/586910

Gul, M., and Ak, M. F. (2018). A comparative outline for quantifying risk ratings in occupational health and safety risk assessment. *J. Clean. Prod.* 196, 653–664. doi: 10.1016/j.jclepro.2018.06.106

Gupta, H., and Barua, M. K. (2018). A framework to overcome barriers to green innovation in SMEs using BWM and fuzzy TOPSIS. *Sci. Total Environ.* 633, 122–139. doi: 10.1016/j.scitotenv.2018.03.173

Hallsworth, M., List, J. A., Metcalfe, R. D., and Vlaev, I. (2017). The behavioralist as tax collector: using natural field experiments to enhance tax compliance. *J. Public Econ.* 148, 14–31. doi: 10.1016/j.jpubeco.2017.02.003

Houdek, P. (2024). Nudging in organizations: how to avoid behavioral interventions being just a façade. *J. Bus. Res.* 182:114787:114781. doi: 10.1016/j.jbusres.2024.114781

Howley, P., and Ocean, N. (2022). Can nudging only get you so far? Testing for nudge combination effects. *Eur. Rev. Agric. Econ.* 49, 1086–1112. doi: 10.1093/erae/jbab041

Jaime Torres, M. M., and Carlsson, F. (2018). Direct and spillover effects of a social information campaign on residential water-savings. *J. Environ. Econ. Manag.* 92, 222–243. doi: 10.1016/j.jeem.2018.08.005

Jennifer, S., Anjali, B., Hui, W. L., Phillip, P., Mehul, M., and Amartya, M. (2024). Developing an artificial intelligence-driven nudge intervention to improve medication adherence: a human-centred design approach. *J. Med. Syst.* 48, 3–12. doi: 10.1007/s10916-023-02024-0

Julia, R., Michael, K., and Stefan, Palan. (2023). Status and reputation nudging. *J. Behav. Exp. Econ.* 105:102031. doi: 10.1016/j.socec.2023.102031

Kalamaras, I., Sánchez-Corcuera, R., Casado-Mansilla, D., Tsolakis, A., Gómez-Carmona, O., Krinidis, S., et al. (2024). A cascading model for nudging employees towards energy-efficient behaviour in tertiary buildings. *PLoS One* 19:e0303214. doi: 10.1371/journal.pone.0303214

Kirchler, M., and Palan, S. (2018). Immaterial and monetary gifts in economic transactions: evidence from the field. *Exp. Econ.* 21, 205–230. doi: 10.1007/s10683-017-9536-1

Klewitz, J., and Hansen, E. G. (2014). Sustainability-oriented innovation of SMEs: a systematic review. *J. Clean. Prod.* 65, 57–75. doi: 10.1016/j.jclepro.2013.07.017

Koppiahraj, K., Bathrinath, S., Venkatesh, V. G., Mani, V., and Shi, Y. Y. (2023). Optimal sustainability assessment method selection: a practitioner perspective. *Ann. Oper. Res.* 324, 629–662. doi: 10.1007/s10479-021-03946-z

Lades, L. K., and Delaney, L. (2020). Nudge FORGOOD: effectiveness and sustainability of nudges in organizations. *Behav. Public Policy* 4, 183–196. doi: 10.1017/bpp.2019.53

Lavoie, R., Main, K., Hoegg, J., and Guo, W. (2021). Employee reactions to preservice tips and compliments. *J. Serv. Res.* 24, 421–434. doi: 10.1177/1094670520960231

Liu, Y., Huang, H. Y., William, M., Wang, F. R., and Liu, H. L. (2024). Does the issuance of green bonds nudge environmental responsibility engagements? Evidence from the Chinese green bond market. *Financ. Innov.* 10, 92–133. doi: 10.1186/s40854-024-00620-8

Lotze, H. K., Lenihan, H. S., Bourque, B. J., Bradbury, R. H., Cooke, R. G., Kay, M. C., et al. (2006). Depletion, degradation, and recovery potential of estuaries and coastal seas. *Science* 312, 1806–1809. doi: 10.1126/science.1128035

Marimuthu, M., Sankaranarayanan, B., and Karuppiah, K. (2023). Prioritizing the factors affecting the occupational health and safety of workers in the mining industry using the SWARA technique. *J. Curr. Sci. Technol.* 13, 59–73. doi: 10.14456/jcst.2023.6

Nyberg, A., Leineweber, C., and Hanson, L. M. (2015). Gender differences in psychosocial work factors, work-personal life interface, and well-being among Swedish managers and non-managers. *Int. Arch. Occup. Environ. Health* 88, 1149–1164. doi: 10.1007/s00420-015-1043-0

Parmesan, C., and Yohe, G. (2003). A globally coherent fingerprint of climate change impacts across natural systems. *Nature* 421, 37–42. doi: 10.1038/nature01286

Patterson, K., Cavazos, D., and Washington, M. (2014). It does matter how you get to the top: differentiating status from reputation. *Admin. Sci.* 4, 73–86. doi: 10.3390/admsci4020073

Ponnambalam, S. G., Sankaranarayanan, B., Karuppiah, K., Thinakaran, S., Chandravelu, P., and Lam, H. L. (2023). Analysing the barriers involved in recycling the textile waste in India using fuzzy DEMATEL. *Sustain. For.* 15:8864. doi: 10.3390/su15118864

Rachmatullah, A., Reichsman, F., Lord, T., Dorsey, C., Mott, B., Lester, J., et al. (2021). Modeling secondary students' genetics learning in a game-based environment: integrating the expectancy-value theory of achievement motivation and flow theory. *J. Sci. Educ. Technol.* 30, 511–528. doi: 10.1007/s10956-020-09896-8

Ren, S. G., Liu, D. H., and Yan, J. (2024). How officials' political incentives influence corporate green innovation. *J. Bus. Ethics* 194, 633–653. doi: 10.1007/s10551-024-05622-1

Ritala, P., Olander, H., and Husted, K. (2015). Knowledge sharing, knowledge leaking and relative innovation performance: an empirical study. *Technovation* 35, 22–31. doi: 10.1016/j.technovation.2014.07.011

Rosen, M. A., Dincer, I., and Kanoglu, M. (2008). Role of exergy in increasing efficiency and sustainability and reducing environmental impact. *Energy Policy* 36, 128–137. doi: 10.1016/j.enpol.2007.09.006

Sanchayan, B., Matteo, M. G., Peter, J., and Susana, M. (2023). Sustainable dietary choices improved by reflection before a nudge in an online experiment. *Nat. Sustain.* 6, 1632–1642. doi: 10.1038/s41893-023-01235-0

Sayer, J., and Cassman, K. G. (2013). Agricultural innovation to protect the environment. *Proc. Natl. Acad. Sci. U. S. A.* 110, 8345–8348. doi: 10.1073/pnas.1208054110

Shang, J., and Croson, R. (2009). A field experiment in charitable contribution: the impact of social information on the voluntary provision of public goods. *Econ. J.* 119, 1422–1439. doi: 10.1111/j.1468-0297.2009.02267.x

Simon, D., and Eric, N. (2007). Weak and strong sustainability in the SEEA: concepts and measurement. *Ecol. Econ.* 61, 617–626. doi: 10.1016/j.ecolecon.2006.09.007

Sparkman, G., and Walton, G. M. (2017). Dynamic norms promote sustainable behavior, even if it is counternormative. *Psychol. Sci.* 28, 1663–1674. doi: 10.1177/0956797617719950

Tanaiutchawoot, N., Bursac, N., Rapp, S., Albers, A., and Heimicke, J. (2019). Nudges: an assisted strategy for improving heuristic decision in PGE-product generation engineering. *Proc. CIRP* 84, 820–825. doi: 10.1016/j.procir.2019.04.294

Tidd, K. L., and Lockard, J. S. (1978). Monetary significance of the affiliative smile: a case for reciprocal altruism. *Bull. Psychon. Soc.* 11, 344–346. doi: 10.3758/BF03336849

Tonglet, M., Phillips, P. S., and Bates, M. P. (2004). Determining the drivers for householder pro-environmental behaviour: waste minimisation compared to recycling. *Resour. Conserv. Recycl.* 42, 27–48. doi: 10.1016/j.resconrec.2004.02.001

Tulsi, P., and Ji, Y. H. (2020). A conceptual approach to green human resource management and corporate environmental responsibility in the hospitality industry. *J. Asian Finance Econ. Bus.* 7, 195–203. doi: 10.13106/jafeb.2020.vol7.no1.195

Vahe, P., and Shen, T. (2024). Assessing the predictive validity of expectancy theory for academic performance. *BMC Psychol.* 12, 437–454. doi: 10.1186/s40359-024-01935-y

Valatin, G., Mosely, D., and Dandy, N. (2016). Insights from behavioral economics for forest economics and environmental policy: potential nudges to encourage woodland creation for climate change mitigation and adaption. *Forest Policy Econ.* 72, 27–36. doi: 10.1016/j.forpol.2016.06.012

Werch, C. E., Pappas, D. M., Carlson, J. M., DiClemente, C. C., Chally, P. S., and Sinder, J. A. (2000). Results of a social norm intervention to prevent binge drinking among first-year residential college students. *J. Am. Coll. Heal.* 49, 85–92. doi: 10.1080/07448480009596288

Xavier, F., Lluís, G., and Steve, J. (2016). Sustainability motivations and practices in small tourism enterprises in European protected areas. *J. Clean. Prod.* 137, 1439–1448. doi: 10.1016/j.jclepro.2014.01.071

You, D., Lucia, H., Simon, E., Priscila, I., Daniel, H., Colin, M., et al. (2015). Global, regional, and national levels and trends in under-5 mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Inter-agency Group for Child Mortality Estimation. *The Lancet*. 386, 2275–2286. doi: 10.1016/S0140-6736(15)00120-8

Zhang, Z. B., Zhang, L. S., and Xiong, A. H. (2024). The influence of non-state-owned shareholder governance on the governance level of state-owned enterprises-based on the perspective of board resolution behavior and party organization governance. *PLoS One* 19:e0301788. doi: 10.1371/journal.pone.0301788

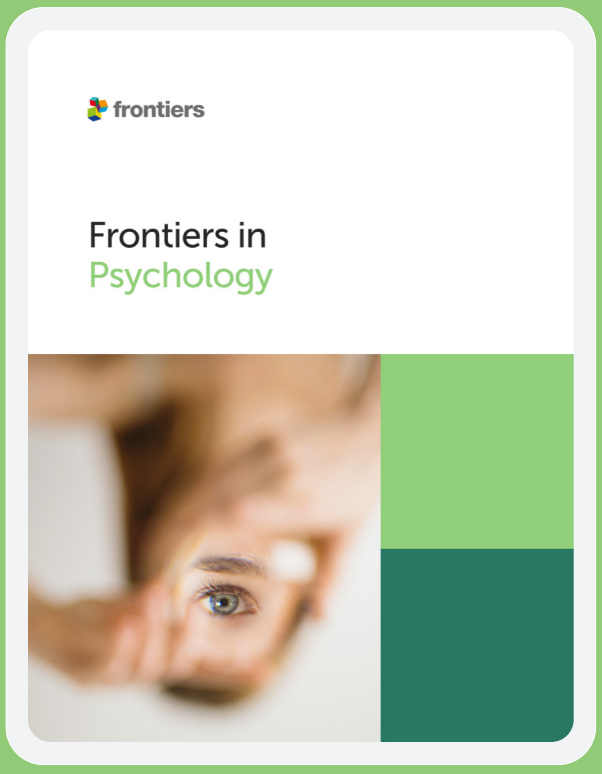
Frontiers in Psychology

Paving the way for a greater understanding of human behavior

The most cited journal in its field, exploring psychological sciences - from clinical research to cognitive science, from imaging studies to human factors, and from animal cognition to social psychology.

Discover the latest Research Topics

See more →



Frontiers

Avenue du Tribunal-Fédéral 34
1005 Lausanne, Switzerland
frontiersin.org

Contact us

+41 (0)21 510 17 00
frontiersin.org/about/contact