

AI-induced stress and employee work engagement: the role of cognitive appraisal and IT mindfulness

Sheng Pan

E-mail: mailps@163.com

ORCID: <https://ORCID.org/0009-0005-0792-0349>

Affiliation: Business School, Zhengzhou

University of Aeronautics, China

ROR: <https://ror.org/01qjyzh50>

Zhuang Xiong (Corresponding Author)

E-mail: xiongzhuang@zua.edu.cn

ORCID: <https://ORCID.org/0000-0002-4586-4561>

Affiliation: Business School, Zhengzhou University

of Aeronautics, China

ROR: <https://ror.org/01qjyzh50>

Lingfu Kong

E-mail: kf@zua.edu.cn

ORCID: <https://ORCID.org/0009-0001-1291-7348>

Affiliation: Business School, Zhengzhou

University of Aeronautics, China

ROR: <https://ror.org/01qjyzh50>

Annotation. Although artificial intelligence (AI) offers numerous workplace conveniences to employees, it also poses challenges, such as occupational substitution risk and pressure to adapt to technology. Although existing studies have extensively examined the psychological stress induced by AI and its capacity for innovation, scant scholarly attention has been devoted to understanding how employees proactively manage such technological stress via job crafting—an interpersonal and cognitive process that may subsequently shape their work engagement. Grounded in the transactional model of stress (TMS) and work engagement theory, using the data collected from May to June 2025, comprising 319 valid questionnaires administered across diverse service-sector contexts, including hospitality, retail, catering, aviation, and e-commerce platforms, multiple regression analyses were employed to examine the mediating role of employees' cognitive appraisals in linking AI-induced stress to work engagement, and evaluate the extent to which information technology (IT) mindfulness moderates this sequential mechanism. Results indicate that AI-induced stress positively enhances employees' work engagement via challenge appraisal but negatively impairs work engagement through hindrance appraisal. Meanwhile, IT mindfulness exerts a significant moderating effect on the relationship between AI-induced stress and employees' cognitive appraisals. In particular, employees with high IT mindfulness tend to perceive AI-related stress as a challenge, thereby boosting work engagement, whereas those with low IT mindfulness are more inclined to frame AI-induced stress as a hindrance, leading to reduced work engagement. The conclusions enhance the theoretical model explaining how technological stress influences employees' psychological and behavioural outcomes. Furthermore, they offer valuable practical guidance for organizations to improve employees' coping strategies for technological stress and balance efficiency with employee well-being during AI implementation.

Keywords: human–AI Collaboration, AI-Induced Stress, challenge appraisal, hindrance appraisal, work engagement.

JEL classification: O15, D23.

Introduction

With the rapid advancement and widespread implementation of artificial intelligence (AI) technology, an increasing number of enterprises, particularly those within service industries (e.g., hotels, retail, aviation,

and e-commerce platforms), have incorporated AI into their operational workflows to enhance efficiency, reduce costs, and strengthen competitiveness (Koo *et al.*, 2021). Collaboration between AI and human employees is reshaping traditional work paradigms and has significantly improved service efficiency and customer experience (Brynjolfsson, Mitchell, 2017; Przegalinska *et al.*, 2025). While this collaborative framework creates new development opportunities for organizations, it simultaneously heightens employees' stress related to technological adaptation, role transformation, and work method adjustments, making it an important issue requiring prompt attention in organizational management and employee mental health governance (Nathan, Karthi, 2024; Sanjeeva Kumar, 2024).

AI-induced stress not only affects employees' work engagement and behavioral performance but may also profoundly impact the long-term performance and sustainable development of organizations. Employees' difficulties related to technological adaptation and the reshaping of their occupational roles often trigger anxiety and emotional distress (Jin *et al.*, 2024; Kim, Kim, 2024; Lu *et al.*, 2025). If organizations fail to promptly identify and effectively alleviate these stresses, it may lead to decreased work engagement, hindered team collaboration, and higher employee turnover (Hou, Fan, 2024). These problems not only reduce an organization's innovation capacity but may also endanger its market competitiveness and adaptability in a rapidly changing environment (Agrawal *et al.*, 2018).

From the perspective of employees' mental health, AI-induced stress also deeply affects their professional identity and psychological well-being (Chuang *et al.*, 2025). With the in-depth application of AI in the workplace, employees must continuously upgrade their skills to adapt to new technologies and grapple with the uncertainty and loss of control caused by AI (Wang *et al.*, 2024). Thus, if not effectively managed, stress can lead to mental health issues such as anxiety and depression, which can affect employees' work motivation and satisfaction (Wang *et al.*, 2025). In turn, long-term psychological distress may cause emotional exhaustion and occupational burnout, further impacting employees' career development and sense of happiness (Hai *et al.*, 2025; Wang *et al.*, 2025). Therefore, understanding how AI-induced stress affects work engagement through employees' cognitive appraisal mechanisms is critical. Exploring how organizations can regulate stress through effective management measures can help improve employee well-being and organizational effectiveness (Loureiro *et al.*, 2023).

Current academic circles have proposed multiple theoretical perspectives on the relationship between stress and work engagement, but none have fully adapted to the unique context of human-AI collaboration. For example, job stress theory clarifies the core logic that stressors affect employees' work engagement through emotional and cognitive responses (Olaus *et al.*, 2025). However, existing studies mostly focus on traditional work scenarios and ignore the compound characteristics of AI-induced stress in human-AI collaboration. The approach-inhibition theory of power focuses on the single response dimension of individuals when facing stress. This theory mainly explains individual behavior through the inhibitory response of avoiding stressors (Wang *et al.*, 2025). Nevertheless, AI-induced stress has a dual nature in which employees may experience both avoidance and pursuit psychological responses in the same context, representing a dual-response mechanism that existing studies have not fully explored. Cognitive resource theory focuses on employees' cognitive resource mobilization behavior in the context of new technologies (Gong, 2026). However, it fails to fully explore how employees mobilize cognitive resources through psychological mechanisms to indirectly affect the intensity and sustainability of the required work engagement.

Although existing studies have established a theoretical foundation for understanding human-AI collaboration and work engagement, insufficient research has explored how AI-induced stress influences work engagement through employees' cognitive appraisal mechanisms. On the one hand, most prior

investigations are confined to traditional work contexts, failing to fully account for the technological stress and complexity inherent in dynamic human–AI collaborative environments (Klonek, Parker, 2025). However, current studies rarely focus on the differentiated mediating roles of challenge and hindrance appraisals in the context of AI-induced stress, nor do they provide adequate empirical validation for how these two distinct cognitive appraisals exert divergent effects on work engagement. These research gaps limit the academic community’s in-depth understanding of employees’ psychological mechanisms in the era of human–AI collaboration and leave organizations without targeted strategic guidance when promoting human–AI collaborative models.

This study aimed to systematically unravel the impact mechanism of technological stress on work engagement amid AI integration into the workplace. In doing so, it addresses the research gap concerning how AI-induced stress during organizational change regulates work engagement through internal mechanisms. Specifically, grounded in the theoretical framework of the transactional model of stress (TMS) and work engagement theory, a dual-path mediation model was constructed to systematically explore how AI-induced stress affects employees’ work engagement via challenge and hindrance appraisals. Considering individual differences and varying levels of organizational support, information technology (IT) mindfulness was introduced as a moderating variable to examine how this construct regulates employees’ cognitive appraisals when confronting AI-related technological stress, further revealing the challenges and optimization potential within human–AI collaborative systems. Based on the aforementioned theoretical framework, two research questions are proposed: (1) how does AI-induced stress influence work engagement through cognitive appraisal? (2) How does IT mindfulness moderate the impact of AI-induced stress on the two types of cognitive appraisal? An in-depth exploration of these questions clarifies the psychological mechanisms through which AI-induced stress shapes employees’ work engagement and provides theoretical support and design insights to help organizations build efficient human–AI collaborative systems.

The contributions of this study are reflected in three aspects. First, through a dual-path mediation model, this study clarifies the differentiated roles of challenge and hindrance appraisals in the context of AI technology stress. Thus, the study reveals how employees regulate work engagement through cognitive appraisal mechanisms when collaborating with AI. Second, this study introduced IT mindfulness as a moderating variable from the individual dimension and tested its moderating effect on employees’ cognitive appraisals. Hence, the study not only deepens our understanding of employees’ psychological mechanisms under AI-induced stress but also provides a new perspective and practical guidance for employee management in a human–AI collaborative environment. Finally, this work distinguishes between AI-induced stress and traditional technological stress, further improving technological stress theory. Particularly, in the dynamic context of human–AI collaboration and digital transformation, the findings of this research provide theoretical bases and practical strategies for organizations to optimize employees’ technological stress coping and enhance their work engagement.

The remainder of this paper is organized as follows: Section 2 presents the theoretical analysis and research hypotheses. This study constructs a research model based on TMS and work engagement theory and systematically analyzes the internal relationships between AI-induced stress, challenge and hindrance appraisals, work engagement, and IT mindfulness. Accordingly, research hypotheses are proposed. Section 3 introduces the research methods and results, including sample selection, variable measurement, data collection, and empirical analysis. Section 4 discusses the findings, and Section 5 summarizes the conclusions, managerial implications, and limitations.

1. Theoretical Analysis and Hypothesis Development

1.1 *AI-Induced Stress and Work Engagement from the Perspectives of the TMS and Work Engagement Theory*

The TMS explains how individuals respond to different stressors through cognitive appraisal (Lazarus & Folkman, 1987). When evaluating stressors, individuals consider their potential impact on personal goals, resources, and well-being, classifying stressors as either challenge stressors or hindrance stressors (Hou & Fan, 2024). Challenge stressors are usually motivating and capable of promoting personal growth and the achievement of work accomplishments, whereas hindrance stressors weaken individuals' motivation and performance, thus impeding the achievement of goals (Biggs *et al.*, 2017; Huang & Gursoy, 2024). Hence, in accordance with this theory, the way individuals appraise stressors plays a key role in determining their emotional and behavioral responses to such stressors. Therefore, in the context of the current study, how employees appraise the stressors brought by the introduction of AI technology may influence their emotional experiences, behavioral responses, and ultimately, their work engagement.

Meanwhile, work engagement theory (Bakker *et al.*, 2008) further clarifies the key role of individuals' comprehensive emotional, cognitive, and physical engagement in work on job performance. Work engagement refers to a state in which employees are highly active, enthusiastic, and wholeheartedly dedicated to their work—a state that can significantly improve their job performance, job satisfaction, and overall well-being. In accordance with work engagement theory, when employees face challenging stress, they are more likely to exhibit higher work engagement, as challenging stress can stimulate their intrinsic motivation, enhance self-efficacy, and strengthen their commitment to work (Bakker *et al.*, 2007). In contrast, hindrance stress often leads to a decline in employees' work engagement, as negative emotions, such as anxiety, frustration, and a sense of lack of resources, deplete the energy and enthusiasm required for them to properly engage in work (Maslach, Leiter, 2008).

Combining the perspectives of TMS and work engagement theory, the present study proposes an integrated framework designed to explore how AI-induced stress affects employees' work engagement levels through their appraisal methods. Enterprises can employ this theoretical framework to understand how employees appraise AI-induced stress and formulate targeted support measures to improve employees' work engagement and psychological well-being. Meanwhile, enterprises can also adjust the nature of stressors in ways that reduce hindrance stress or enhance challenge stress, which are strategies that help improve employee engagement and overall performance and promote the smooth implementation of organizational change.

1.2 *The Impact of AI-Induced Stress on Cognitive Appraisals*

Based on the TMS perspective, challenge and hindrance appraisals are not mutually exclusive binary opposites; rather, these are independent constructs that coexist in two dimensions. When facing stressors, individuals can generate challenge and hindrance appraisals, reflecting different psychological responses to stressors that focus on the potential opportunities and obstacles of stressors respectively (Gaudioso *et al.*, 2017; Lazarus, Folkman, 1987).

Challenge appraisal formation follows a two-stage process (primary and secondary appraisal) and is contingent upon specific appraisal criteria. During the primary appraisal phase, individuals perceive stressors as factors that foster personal growth, facilitate goal attainment, or enhance their capabilities. In the secondary appraisal phase, individuals evaluate whether they possess sufficient resources to cope with the stressor, believing that addressing it will yield positive outcomes (Lazarus, Folkman, 1987; Tomaka *et al.*, 1997). The propensity for challenge appraisal is strengthened when the potential benefits of

the stressor are substantial and when individuals perceive a high degree of alignment between their resources and the demands of the stressor (Huang, Gursoy, 2024). Hence, this theory provides a theoretical foundation for understanding the relationship between AI technology-induced stress and employees' challenge appraisal.

In the context of AI technology application, the levels of stress brought about by technological adaptation requirements and occupational role restructuring via AI implementation align with the potential benefit attributes of challenge appraisal. Specifically, during the primary appraisal phase, individuals assess whether AI technology can promote personal growth and help them achieve their career goals. For instance, the integration of AI technology has shifted work content from low-value repetitive tasks to more creative and challenging tasks (Cheng *et al.*, 2023). This transformation offers employees opportunities to enhance their skills, boost career competitiveness, and optimize work efficiency. Consequently, in the primary appraisal phase, employees perceive AI-induced stressors as challenge stressors closely linked to their career development. During the secondary appraisal phase, employees further evaluate whether they have adequate resources to cope with AI-induced stress. Existing research indicates that employees with a certain foundation in technical learning are more likely to believe that they possess the necessary abilities and resources to address AI-induced stress, and that overcoming these challenges will yield expected positive outcomes, such as skill improvement and work efficiency optimization (Ali *et al.*, 2024). Furthermore, when employees believe technological stress can be overcome through learning and could lead to enhanced capabilities, they are more inclined to perceive it as a challenge stressor (Biggs *et al.*, 2017). Based on this reasoning, the present study proposes the following hypothesis:

H1: AI-induced stress positively influences challenge appraisal.

The formation of hindrance appraisal also undergoes primary and secondary appraisal stages; however, its appraisal criteria are the opposite of those of challenge appraisal. In the primary hindrance appraisal phase, individuals perceive stressors as potentially conflicting with their personal goals and possessing detrimental attributes. During the secondary hindrance appraisal phase, individuals assess whether their resources are sufficient to cope with the stressors, believing that addressing such stressors will not generate positive benefits but may deplete existing resources instead (Cheng *et al.*, 2023). When the potential detrimental attributes of a stressor are prominent and the alignment between resources and demands is low, the tendency toward hindrance appraisal is enhanced (Zang *et al.*, 2024). This theory thus supports the understanding of the relationship between AI-induced stress and employees' hindrance appraisal.

In the context of AI technology application, AI-induced stressors, particularly the adjustment of human–AI task boundaries and technological adaptation requirements (Huang, Gursoy, 2024), may sometimes meet the criteria for judging potentially detrimental attributes in hindrance appraisal. From the perspective of primary appraisal, the introduction of AI technology may disrupt employees' existing work processes and skill systems, eroding their professional advantages (Ali *et al.*, 2024). This perception of resource depreciation and threats to job stability may lead employees to view AI-induced stress as conflicting with their professional well-being and potentially detrimental to their well-being. During the secondary appraisal phase, if employees lack a solid foundation in AI technology and the organization fails to provide adequate training support (Wang *et al.*, 2025), employees may perceive that their resources are insufficient to meet the demands of technological adaptation. Forcibly addressing these challenges will only increase their burden, reduce efficiency, and fail to yield positive benefits—fully aligning with the secondary appraisal criteria for hindrance appraisal. Relevant empirical studies have validated this theory. Yin *et al.* (2024), for instance, noted that in the context of technological change, a hindrance appraisal is triggered if

employees believe their resources are inadequate to cope with stressors. Based on this information, the following hypothesis is proposed:

H2: AI-induced stress positively influences hindrance appraisal.

1.3 Dual-Path Mediation Mechanism of Challenge and Hindrance Appraisals

In accordance with TMS (Lazarus, Folkman, 1987), individuals' appraisal of stressors directly determines their emotional and behavioral responses, which in turn influence their work engagement and job performance. Challenge and hindrance appraisals coexist; they are two independent dimensions that are not mutually exclusive (Goh *et al.*, 2010). When facing stressors, individuals may simultaneously experience challenge and hindrance perceptions, leading to distinct emotional, cognitive, and behavioral responses that ultimately affect their work engagement and job performance.

Challenge appraisal refers to employees' perception of stressors as opportunities to enhance their personal abilities and promote career development. In this process, employees convert stress into motivation for work engagement through positive emotional and cognitive responses, such as increased self-efficacy and sense of achievement (Searle, Auton, 2015). From the perspective of work engagement theory, work engagement denotes employees' comprehensive emotional, cognitive, and physical involvement in work, which is a key factor in improving their work efficiency, performance, and innovation capacity. When employees perceive work tasks as challenging, such challenge stress is typically accompanied by positive emotions, such as satisfaction, a sense of control, and a sense of achievement. These emotions not only promote employees' active participation in daily work but also stimulate innovative behaviors and problem-solving abilities, thereby enhancing their overall work performance (Cheng *et al.*, 2023).

Within the context of AI technology implementation, employees who perceive AI adoption as an avenue for personal capability enhancement tend to frame the accompanying technological shifts as challenges that must be overcome. This perceptual orientation elicits positive emotional responses and fosters elevated work engagement when navigating technological transformation. Furthermore, this cognitive restructuring process empowers employees to derive heightened self-efficacy from stressors, thereby reinforcing their work engagement. Therefore, this study proposes the following hypothesis:

H3a: AI-induced stress is effectively transformed through challenge appraisal, thereby enhancing employees' work engagement.

Hindrance appraisal refers to employees' perception of work-related stressors as burdens or obstacles that hinder the achievement of personal goals, leading to negative emotional responses, such as anxiety, helplessness, and frustration (Huang, Gursoy, 2024). In turn, these negative emotions diminish employees' self-efficacy, making them feel that they are unable to cope effectively with stressors, thereby generating avoidance tendencies and reducing emotional and cognitive engagement. In accordance with work engagement theory, when employees hold negative appraisals of work tasks, their emotional and cognitive engagement declines, resulting in reduced work engagement.

In the context of AI technology application, if employees believe that AI technology cannot deliver practical benefits but will increase work burdens instead, they often experience a sense of resource inadequacy and difficulty coping with technological changes, thereby leading to reduced work engagement (Klonek, Parker, 2025). When employees perceive stressors as hindrances, they typically exhibit higher stress levels and lower work engagement, and these negative emotional and cognitive responses significantly impact their job performance (Schaufeli *et al.*, 2006). In particular, when employees believe that AI implementation

increases work stress without yielding the expected benefits, their stress perception is further exacerbated, which in turn inhibits their work engagement and motivation. Therefore, this study proposes the following hypothesis:

H3b: AI-induced stress is effectively intensified through hindrance appraisal, thereby reducing employees' work engagement.

Challenge and hindrance appraisals constitute dual-path mediation mechanisms through which AI-induced stress affects employees' work engagement. In accordance with TMS, the manner of stressor appraisal directly determines individuals' emotional, cognitive, and behavioral responses, which in turn influence their work engagement (Lazarus, Folkman, 1987; Schaufeli *et al.*, 2006). These two appraisal paths exert mediating effects by promoting or weakening self-efficacy and emotional engagement, directly shaping the impact of AI-induced stress on work engagement (Schaufeli *et al.*, 2006).

1.4 Moderating Role of IT Mindfulness

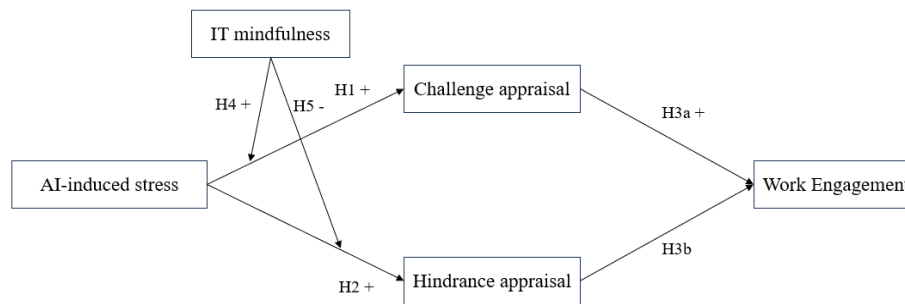
Mindfulness is typically defined as a state of nonjudgmental awareness of the present moment, focusing on one's perceptions, emotions, and thoughts without being dominated by external pressures or internal emotions (Shapiro *et al.*, 2006). Mindfulness helps individuals enhance their awareness of internal and external stimuli and enables them to effectively regulate their emotional responses and cognitive appraisals (Glomb *et al.*, 2011). As a specific form of mindfulness, IT mindfulness emphasizes the importance of maintaining awareness and focus when using IT, as it can help enhance emotional regulation and cognitive restructuring abilities. This also reduces negative emotional responses, such as anxiety and fear, maintains calmness and rationality, and ultimately improves self-efficacy, enabling individuals to cope with IT-induced stress more positively (Chen *et al.*, 2022).

In the context of AI technology introduction, a high level of IT mindfulness helps employees perceive technology-induced stress as a manageable challenge rather than an insurmountable obstacle to be avoided. This cognitive transformation enhances their self-efficacy. Specifically, high IT mindfulness enables employees to rationally view stressors, thereby strengthening their challenge appraisal. In contrast, employees with low IT mindfulness often lack sufficient emotional regulation abilities and are prone to perceiving AI-induced stress as an insurmountable obstacle, thus generating negative emotions, such as anxiety and helplessness, which reinforce hindrance appraisal (Yu, Shen, 2025). Therefore, IT mindfulness plays distinct regulatory roles in challenge and hindrance appraisals. Based on the above reasoning, this study proposes the following hypotheses:

H4: IT mindfulness positively moderates the relationship between AI-induced stress and challenge appraisal. Specifically, the positive impact of AI-induced stress on challenge appraisal is strengthened as the level of IT mindfulness increases.

H5: IT mindfulness negatively moderates the relationship between AI-induced stress and hindrance appraisal. Specifically, the positive impact of AI-induced stress on hindrance appraisal is weakened as the level of IT mindfulness increases.

Based on the above hypotheses, this study proposes its research model, shown in *Figure 1*. The model considers AI-induced stress as the independent variable, work engagement as the dependent variable, and challenge and hindrance appraisals as dual-path mediation mechanisms. It also considers the moderating effect of IT mindfulness in the early stage of the path. To test the structural relationships and mechanisms of this theoretical model, this study employs multiple regression analysis to systematically evaluate the impact of AI-induced stress on employees' work engagement.



Source: authors' drawing.

Figure 1. Research Model

2. Methodology

2.1 Sample and Data Collection

This study explores the impact of work stress induced by AI technology on employees' work engagement. The research participants were employees of service-oriented enterprises, including hotels, retail, catering, and airline companies, that have integrated AI technology into their operational processes. These employees' daily work processes and task requirements are directly affected by AI technology, exposing them to new skill demands and work method adjustments that, in turn, generate specific AI-related work stressors. Compared with employees of other service enterprises that have not widely adopted AI technology, the work stress of these employees exhibits distinct characteristics. Additionally, the high emphasis placed by service-oriented enterprises on service quality and customer experience makes employees more likely to bear additional pressure due to AI applications. For example, AI-driven performance tracking systems and real-time customer feedback mechanisms impose higher requirements on employees' skills and adaptability than traditional systems. This work environment not only raises customer expectations but also increases their time pressure and sense of being monitored, further intensifying AI-related work stress.

This study recruited participants through the Credamo (<https://www.credamo.com/>) online survey platform and confirmed, via screening questions, that their respective enterprises had integrated AI technology into service creation and delivery. To ensure data validity, the questionnaire design referenced the recommendations of DeSimone *et al.* (2015) by incorporating multiple attention-check items. To mitigate potential common method bias, this study adopted a two-stage data collection approach, following the suggestions of Podsakoff *et al.* (2003). Data on AI-induced stress, IT mindfulness, and demographic variables were gathered in the first stage of data collection (May 2025). A total of 410 questionnaires were distributed, and 372 valid responses were obtained. In the second stage (June 2025), data on employees' challenge and hindrance appraisals of AI technology were collected, along with an assessment of employees' work engagement, ultimately yielding 319 valid questionnaires.

To ensure accurate data matching, the participants were required to enter the last six digits of their mobile phone numbers as a unique identifier each time they completed the questionnaires. To improve the response rate, they were also clearly informed that all collected data would be used exclusively for academic research and destroyed after use. Each participant was compensated with 15 CNY upon completing the questionnaire.

2.2 Measurement

The measurement indicators in this study were adapted from validated scales in the existing literature and translated following the standard back-translation procedure proposed by Brislin (1970) to ensure their suitability for the research context. *Table 1* presents the specific measurement items used in this study. All measurements were assessed using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Additionally, considering that demographic characteristics may influence employees' proactive service behaviors (Zhu et al., 2017), the present study included gender, age, educational level, and job type as control variables for the sample descriptive analysis and potential confounding factor control. *Table 2* provides the demographic information of the participants.

Table 1. Constructs and Items

Constructs	Items	Sources
AI-induced Stress (AIS)	<ol style="list-style-type: none"> 1. Since the enterprise integrated AI technology into the operational process, my overall workload has increased. 2. When collaborating with AI to provide services to customers, I need to process more information and tasks simultaneously than before. 3. Due to the frequent changes and updates of AI-related tools and processes, I have to continuously learn and adjust my work methods. 4. To keep up with AI-related work requirements, I often handle work outside of official working hours. 5. I am worried that as the capabilities of AI in the enterprise improve, important parts of my work may be replaced or weakened. 6. When the suggestions generated by AI are inconsistent with the actual situation or customer needs, coordinating and resolving these inconsistencies requires me to put in extra effort. 	Tarafdar <i>et al.</i> (2007)
Challenge Appraisal (CA)	<p>The “these work requirements” in the following items refer to the work requirements arising from the enterprise’s integration of AI technology into the operational process. Please judge the extent to which these work requirements reflect the following descriptions based on your feelings.</p> <ol style="list-style-type: none"> 1. These work requirements help me learn a lot of new knowledge and skills. 2. These work requirements make my work experience more learning-oriented and developmental. 3. These work requirements make me see that I can be competent for new tasks or roles at work. 4. These work requirements urge me to focus more on doing my work well and continuously improving myself. 	Searle & Auton (2015)
Hindrance Appraisal (HA)	<p>These “work requirements” in the following items refer to the work requirements arising from the enterprise’s integration of AI technology into the operational process. Please judge the extent to which these work requirements reflect the following descriptions based on your feelings.</p> <ol style="list-style-type: none"> 1. These work requirements will hinder the achievements I could have made at work. 2. These work requirements limit the space in which I can exert my abilities at work. 3. These work requirements restrict me from doing my work to the best of my ability. 4. These work requirements make it difficult for me to truly master the more difficult parts of the work. 	Searle & Auton (2015)

Table 1 (continuation). Constructs and Items

Work Engagement (WE)	In the context where the enterprise has integrated AI into the operational process, recall your work status in the current position: 1. In this job, I often feel energetic. 2. At work, I feel full of strength and vitality. 3. When I get up in the morning, I look forward to engaging in this job. 4. I am very passionate about my current job. 5. My work often inspires and enlightens me. 6. I am proud of what I do in this job. 7. When I concentrate on work, I feel very happy. 8. I often immerse myself in work wholeheartedly. 9. At work, I often forget the time and fully engage in it.	Schaufeli <i>et al.</i> (2006)
IT Mindfulness (IM)	The IT here includes various systems, software, and applications you use at work, including AI-related applications. Please answer based on your true feelings. 1. When using information technology at work, I am usually very creative. 2. At work, I am often willing to learn new ways to use information technology. 3. At work, I like to figure out different ways to use information technology by myself. 4. When using IT at work, I am usually very engaged.	Chen <i>et al.</i> (2022)

Source: authors' own results.

Table 2. Demographic Information of the Participants

Variables	Categories	Number	Percentage
Gender	Male	183	57.37%
	Female	136	42.63%
Age	≤20	48	15.05%
	>20 and ≤30	119	37.30%
	>30 and ≤40	93	29.15%
	>40	59	18.50%
Education Level	High School and Below	98	30.72%
	Junior College	124	38.87%
	Bachelor's Degree	68	21.32%
	Master's Degree and Above	29	9.09%
Job Type	Frontline Employees	128	40.13%
	Technical Support Employees	61	19.12%
	Logistics Support Employees	39	12.23%
	Management Employees	91	28.53%

Source: authors' own results.

3. Results Analysis

3.1 Reliability, Validity Tests, and Correlation Analysis

Prior to hypothesis testing, this study conducted a confirmatory factor analysis (CFA) on the data using AMOS 22.0 statistical software to assess the fit of the measurement model. As shown in *Table 3*, the five-factor measurement model exhibited better data fit than the other tested models, thus supporting the proposed model's validity.

Table 3. Model Fit Results of Confirmatory Factor Analysis

Models	χ^2	df	χ^2/df	CFI	TLI	RMSEA	SRMR
Five-factors	831.531	305	2.726	0.92	0.91	0.074	0.045
Four-factors	1025.467	309	3.319	0.88	0.86	0.085	0.057
Three-factors	1248.696	312	4.002	0.78	0.72	0.097	0.083
Single-factor	1537.152	314	4.895	0.60	0.57	0.111	0.105

Note: N=319; the five-factor model includes five independent dimensions: AI-induced stress, challenge appraisal, hindrance appraisal, work engagement, and IT mindfulness. The four-factor model combines challenge and hindrance appraisals into a single dimension; the three-factor model combines AI-induced stress, challenge appraisal, and hindrance appraisal into a single dimension; and the single-factor model integrates all variables into a single dimension.

Source: authors' own results.

All item loadings exceeded 0.50 (Hulland, 1999), indicating a strong correlation between each item and its corresponding construct. Both Cronbach's alpha and composite reliability (CR) values exceeded the recommended threshold of 0.70, and the average variance extracted (AVE) was greater than 0.50, demonstrating good reliability and convergent validity of the constructs. The results are presented in *Table 4*.

Table 4. Items and Reliability Tests

Constructs/Items	Loadings	Alpha	CR	AVE
AI-induced Stress (A/S)		0.830	0.876	0.541
AIS1	0.723			
AIS2	0.762			
AIS3	0.732			
AIS4	0.716			
AIS5	0.739			
AIS6	0.741			
Challenge Appraisal (CA)		0.734	0.834	0.556
CA1	0.716			
CA2	0.753			
CA3	0.771			
CA4	0.742			

Table 4 (continuation). Items and Reliability Tests

Hindrance Appraisal (<i>HA</i>)		0.758	0.847	0.580
HA1	0.736			
HA2	0.775			
HA3	0.781			
HA4	0.753			
Work Engagement (<i>WE</i>)		0.882	0.905	0.514
WE1	0.692			
WE2	0.686			
WE3	0.713			
WE4	0.748			
WE5	0.739			
WE6	0.681			
WE7	0.741			
WE8	0.732			
WE9	0.717			
IT Mindfulness (<i>IM</i>)		0.783	0.860	0.606
IM1	0.806			
IM2	0.754			
IM3	0.765			
IM4	0.788			

Source: authors' own results.

Table 5. Correlation Matrix of Variable

Variables	1	2	3	4	5	6	7	8
1 AI-induced Stress	1							
2 Challenge Appraisal	0.302*	1						
3 Hindrance Appraisal	0.485**	0.252**	1					
4 Work Engagement	-0.356***	0.423**	-0.325**	1				
5 IT Mindfulness	-0.408**	0.457**	-0.472**	0.523**	1			
6 Gender	0.124	0.098	0.156*	-0.113	-0.087	1		
7 Age	0.187**	0.132	0.214**	-0.179*	0.105	0.076	1	
8 Education Level	-0.103	-0.145*	-0.128	0.167*	-0.092	-0.054	0.236**	1
9 Job Type	0.164*	0.182*	-0.195*	-0.158*	0.173*	0.063	0.427***	0.356***

Note: *** indicates $p < 0.001$, ** indicates $p < 0.01$, * indicates $p < 0.05$. The values in the table are Pearson correlation coefficients.

Source: authors' own results.

Apart from convergent validity and reliability indicators, we also verified discriminant validity. In particular, the correlations between all constructs were below 0.85, and the square root of the AVE for each construct exceeded its highest correlation with any other construct, thus meeting the Fornell–Larcker discriminant validity criterion. The specific intervariable correlations are presented in *Table 5*. Additionally, the heterotrait–monotrait ratio (HTMT) remained below 0.90, further confirming sufficient discrimination between constructs and ensuring the model’s discriminant validity. Overall, these findings support the discriminant and convergent validity of the measurement indicators and constructs.

3.2 Hypothesis Testing

3.2.1 Main Effect and Moderating Effect Analysis

We used the SPSS software for the multiple regression analysis. We tested the impact of AI-induced stress on challenge and hindrance appraisals and also verified the moderating role of IT mindfulness between AI-induced stress and challenge and hindrance appraisals. After centralizing all variables, the variance inflation factor (VIF) was less than 3. This result indicates that there is no multicollinearity in the model. The regression results are presented in *Table 6*.

The regression analysis results indicated that the impact of AI-induced stress on challenge appraisal was significantly positive ($\beta = 0.255$, $p < 0.001$, Model 2). This result indicates that AI-induced stress can positively promote individuals’ challenge appraisal, directly supporting H1. From a theoretical perspective, as an emerging transformative factor in the workplace, the stress brought by AI technology, such as workflow restructuring and skill updates, can stimulate individuals’ self-development awareness. This forms a cognitive path of “stress \rightarrow growth motivation \rightarrow challenge appraisal.” Meanwhile, the regression coefficient of AI-induced stress on hindrance appraisal was also significantly positive ($\beta = 0.146$, $p < 0.01$, Model 5), thus verifying H2. In particular, this result indicates that when individuals perceive that AI technology may threaten their career security (e.g., job replacement risk) and increase their work burden (e.g., additional learning costs), they tend to regard AI technology as a negative factor hindering the achievement of work goals. This ultimately leads to an increase in individuals’ hindrance appraisal levels.

In addition, as shown in *Table 6*, based on the model including AI-induced stress, the explanatory power of the model continued to improve after further introducing IT mindfulness and interaction terms. The regression coefficients of the interaction terms were significant ($\beta = 0.162$, $p < 0.01$, Model 3; $\beta = 0.141$, $p < 0.01$, Model 6). These results indicate that IT mindfulness plays a significant moderating role between AI-induced stress and challenge and hindrance appraisals, thus supporting H4 and H5 (see *Figure 2* for details). Specifically, the path analysis of challenge appraisal showed that IT mindfulness played a significant positive moderating role between AI-induced stress and challenge appraisal. Its core mechanism lays in the fact that IT mindfulness—a cognitive trait specific to the technological context—helps individuals shift from passive stress perception to active deconstruction. Individuals with high IT mindfulness can more acutely identify skill upgrading and career development opportunities brought about by AI technology. As they are capable of transforming the stress of adapting to AI into motivation to improve themselves, this enhances the positive effect of AI-induced stress on challenge appraisal. In contrast, individuals with low IT mindfulness are prone to being troubled by the short-term discomfort caused by stress. They find it difficult to identify the potential value brought by AI, leading to a weakening of AI’s positive impact on challenge appraisal.

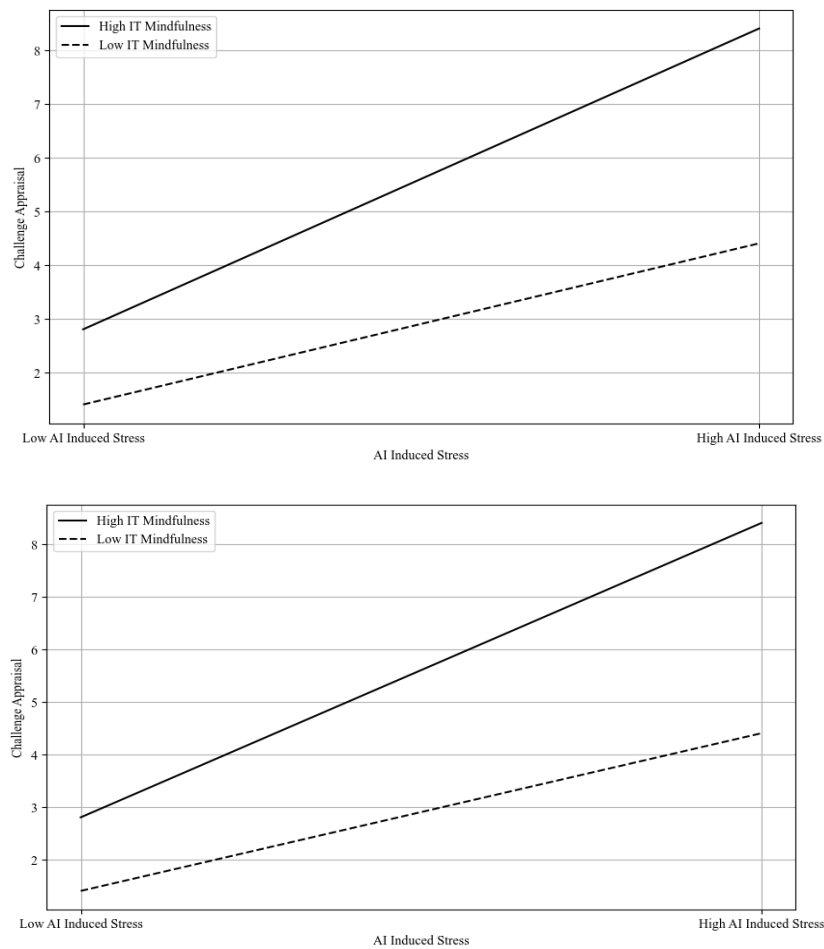
Table 6. Analysis of the Main Effect and Moderating Effect

Variables	Challenge Appraisal			Hindrance Appraisal		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Control Variables						
Gender	0.078 (0.049)	0.051 (0.037)	0.043 (0.037)	0.132* (0.055)	0.102* (0.047)	0.075 (0.045)
Age	0.105* (0.045)	0.078* (0.036)	0.032* (0.016)	0.176** (0.059)	0.141* (0.053)	0.113* (0.048)
Education Level	- 0.082** (0.028)	-0.065** (0.023)	- 0.047*** (0.018)	-0.116* (0.052)	-0.105 (0.067)	- 0.073** (0.025)
Job Type	0.105* (0.048)	0.088* (0.039)	0.052* (0.025)	-0.174* (0.083)	-0.151* (0.064)	0.107 (0.061)
Independent Variables						
AI-induced Stress		0.255*** (0.068)	0.138** (0.046)		0.146** (0.049)	0.134* (0.062)
Moderating Variables						
IT Mindfulness			0.341* (0.158)			-0.215* (0.093)
AI-induced Stress * IT Mindfulness			0.162** (0.055)			0.141** (0.052)
R ²	0.252	0.315	0.332	0.109	0.198	0.240
ΔR ²	0.252	0.063	0.017	0.109	0.089	0.042
Adjusted R ²	0.241	0.303	0.317	0.097	0.185	0.223
F Value	2.992	6.144	7.703	2.910	4.552	7.981

Note: *** indicates $p < 0.001$, ** indicates $p < 0.01$, * indicates $p < 0.05$.

Source: authors' own results.

In addition, individuals with high IT mindfulness have a strong positive cognitive tendency, providing internal support for strengthening the challenging interpretation of AI stress. IT mindfulness, in contrast, plays a negative moderating role in the hindrance appraisal path. As the level of IT mindfulness increases, the positive impact of AI-induced stress on hindrance appraisal gradually weakens. Individuals with high IT mindfulness can objectively view the changes brought about by AI technology through rational awareness and cognitive adjustment. They neither overestimate potential risks, such as job replacement, nor reduce the sense of work hindrance brought about by AI through active learning and process adaptation. Therefore, this effectively alleviates the negative cognitive effects of AI-induced stress. In comparison, individuals with low IT mindfulness tend to develop anxious cognitive biases toward AI technology. As they focus excessively on the negative consequences of stress, this strengthens the positive impact of AI-induced stress on their hindrance appraisal.



Source: authors' own results.

Figure 2. The Moderating Effect of IT Mindfulness on the Relationship between AI-Induced Stress and Challenge Appraisal (Upper) and Hindrance Appraisal (Lower)

3.2.2 Mediation Effect Test

Finally, we used the PROCESS model in SPSS (Model 4, 5000 bootstrap samples) to test whether the impact of AI-induced stress on work engagement was mediated by challenge and hindrance appraisals. Table 7 presents the results of the mediation effect analysis of AI-induced stress on work engagement. Overall, the analysis results support H3, indicating that challenge and hindrance appraisals play important mediating roles in the impact of AI-induced stress on work engagement. Specifically, AI-induced stress further enhanced work engagement by increasing challenge appraisal, and this indirect effect significantly supported H3a ($p = 0.028$). At the same time, AI-induced stress reduced work engagement by increasing hindrance appraisal, and this indirect effect significantly supported Hypothesis H3b ($p = 0.031$). However, the direct impact of AI-induced stress on work engagement was not significant ($p = 0.457$), indicating that the mediation effect was dominant.

Table 7. Mediation Effect Results

Paths	Coefficients	SE	95% Confidence Interval Lower	95% Confidence Interval Upper	p
AI-induced Stress → Challenge Appraisal	0.157	0.045	0.061	0.239	0.035
AI-induced Stress → Hindrance Appraisal	0.106	0.050	0.022	0.218	0.021
Challenge Appraisal → Work Engagement	0.213	0.095	0.027	0.399	0.012
Hindrance Appraisal → Work Engagement	-0.172	0.102	-0.372	-0.028	0.001
AI-induced Stress → Work Engagement (Direct Effect)	-0.032	0.040	-0.237	0.045	0.457
AI-induced Stress → Challenge Appraisal → Work Engagement	0.033	0.015	0.003	0.063	0.028
AI-induced Stress → Hindrance Appraisal → Work Engagement	-0.018	0.009	-0.035	-0.001	0.031

Source: authors' own results.

4. Discussion

First, the dual effects of AI-induced stress subvert the single negative cognitive paradigm in technological-stress research. In examining stress from technological change as a purely hindering factor that reduces work engagement by depleting individuals' psychological resources, traditional technological stress research has long adhered to the single logical chain of "stressor → resource consumption → performance decline" (Hobfoll, 2002). This paradigm, however, overlooks the dual attributes of emerging technologies, which are both disruptive and constructive in nature. The present study found that AI-induced stress is not an inherent inhibitor of engagement; instead, it exerts parallel promoting and inhibiting effects on work engagement through the dual-path differentiation of challenge and hindrance appraisals. Specifically, AI-induced stress, such as that from skill update requirements and workflow restructuring, triggers individuals' "growth motivation → self-efficacy" chain (Bakker *et al.*, 2008). This leads to stress being interpreted as a necessary cost for career development, which in turn positively drives work engagement through challenge appraisal. In contrast, AI-induced stress from factors such as job replacement risks and rule uncertainty activate threat perception and anxiety responses (Maslach, Leiter, 2008), causing individuals to view stress as an external obstacle to goal achievement, which then negatively impairs work engagement through hindrance appraisal. More importantly, the nonsignificant direct effect of AI-induced stress on work engagement indicates that its impact is entirely dependent on the transformation of individuals' cognitive appraisals, thereby shifting technological stress research from stressor attribute determinism to cognitive appraisal mediation theory. Therefore, this study fills the research gap regarding the differences in the mechanism of action between emerging and traditional technological stress (Przegalinska *et al.*, 2025).

Second, as a context-specific cognitive restructuring of stress appraisal in the technological domain, IT mindfulness reveals the key boundary conditions of the AI stress effect on users' well-being. Existing

research has confirmed that mindfulness can alleviate technological stress through emotional regulation (Chen *et al.*, 2022; Kim, Kim, 2024). However, these studies mostly focus on general mindfulness and ignore the specificity of individual cognitive traits in technology contexts.

In comparison, the present study introduces IT mindfulness into AI stress research and finds that it is not a simple stress buffer but functions by bidirectionally regulating cognitive appraisal. On the one hand, individuals with high IT mindfulness can enhance the positive impact of AI-induced stress on challenge appraisal through technological opportunity identification and value restructuring. The core mechanism here lies in IT mindfulness improving individuals' systematic awareness of technological changes, enabling them to look beyond short-term adaptation discomfort and identify long-term values, such as skill upgrading and efficiency improvement, brought about by AI technology adoption (Chuang *et al.*, 2025). In this way, they are able to convert adaptation stress into dynamic resources for self-improvement.

On the other hand, individuals with high IT mindfulness weaken the positive impact of AI-induced stress on hindrance appraisal through risk rationalization and action adaptation. Through active learning and process optimization, they objectively decompose the potential risks posed by AI (e.g., the actual probability of job replacement and the compensability of skill gaps) to avoid anxious cognitive biases and reduce technology-induced hindrance perceptions (Chen *et al.*, 2022). This finding expands the application boundary of the TMS, extends mindfulness research from general emotional regulation to the specific cognitive regulation of technological stress, and provides a new perspective for understanding individual adaptation mechanisms in the era of technological change.

Finally, the independent and parallel mediation paths of challenge and hindrance appraisals not only deepen the core logic of the TMS (Lazarus, Folkman, 1987) but also fill the contextual gap in existing research. Although this theory clarifies the decisive role of cognitive appraisal in the stress effect, it fails to specify the independence and differentiated transmission mechanisms of the multiple appraisal paths. Subsequent studies have confirmed their independence and respective impacts on work engagement (Bakker *et al.*, 2008); however, they are limited to traditional work stressors, failing to address the uniqueness of dual paths in the context of emerging technological stress, such as AI, which coexists with opportunities and threats. The present study empirically demonstrates that the two paths are completely independent and exhibit differentiated transmission mechanisms in the context of AI-induced psychological stress.

In particular, challenge appraisal aligns with the conservation of resources theory (Hobfoll *et al.*, 2018), interpreting AI stress as a potential resource gain and positively driving work engagement by activating resource investment motivation and enhancing self-efficacy (Bakker *et al.*, 2008). In comparison, hindrance appraisal echoes stress threat and avoidance theory (Roth, Cohen, 1986), defining AI stress as a threat of resource loss and reducing work engagement by triggering defensive avoidance and exacerbating negative emotions (Liang, Xue, 2009). Notably, unlike the conclusion in traditional stressor research, which states that the negative effect of hindrance appraisal is stronger, the gap in effect intensity between the two paths in this study is significantly reduced. Therefore, this finding confirms Przegalinska *et al.* (2025) conclusion that AI is a creatively destructive stressor in which the developmental opportunities it brings offset the threat perception. Hence, this result not only provides new evidence for the applicability of the TMS in the AI context but also corrects the literature's understanding of the dual-path effect intensity of technological stress. It does so by offering an accurate perspective for understanding the formation mechanism of work engagement in the era of technological change.

Conclusions and Recommendations

Conclusions

This study explores the impact mechanism of AI-induced stress on employees' work engagement, focusing on the roles of challenge and hindrance appraisals in this process, as well as examining the moderating role of IT mindfulness. The main conclusions are as follows.

(1) AI-induced stress exerts a dual impact on employees' work engagement. Through challenge appraisal, AI-induced stress can positively promote employees' work engagement, whereas through hindrance appraisal, it negatively affects employees' work engagement. These findings not only echo the view on the duality of stress in existing technological stress research but also further verify the applicability of the TMS in the context of AI application, emphasizing the core role of employees' cognitive appraisals in the formation of work engagement.

(2) IT mindfulness plays a significant moderating role in the relationship between AI-induced stress and employees' work engagement. Specifically, employees with higher IT mindfulness are more likely to perceive AI-induced stress as a challenge, thereby enhancing work engagement. In comparison, employees with lower IT mindfulness are more prone to viewing stress as a hindrance, leading to reduced work engagement. Thus, by verifying the moderating role of IT mindfulness in the context of AI-induced stress, this study provides a new perspective on how employees can effectively manage stress during technological change.

(3) The mediating roles of challenge and hindrance appraisals in how AI-induced stress affects work engagement. Specifically, challenge appraisal promotes work engagement by enhancing employees' self-efficacy, whereas hindrance appraisal inhibits work engagement by reducing employees' self-efficacy. This result is consistent with work engagement theory, further expanding the understanding of the impact of technological stress on employees' behaviors and providing a more detailed theoretical framework for future research.

Managerial Implications

At the organizational level, organizations should focus on providing comprehensive support to help employees cope effectively with AI-induced technological stress. First, organizations must be able to offer technical training to enhance employees' understanding of AI. Doing so helps them recognize the potential of AI technology in optimizing workflows and improving work efficiency. More importantly, organizations should alleviate employees' anxieties regarding technological changes by ensuring continuous communication and providing supportive measures, such as psychological counseling, flexible work arrangements, and clear career development paths. Through such a supportive environment, employees can actively appraise the changes brought about by AI technology, convert challenge appraisals into work motivation, and enhance their work engagement (Bakker *et al.*, 2008). Conversely, in the absence of support, employees may perceive AI as a threat, leading to job burnout and reduced employee engagement. Therefore, organizations must implement measures to guide employees in facing AI-induced challenge stress through positive incentives.

From the perspective of human-AI collaboration, organizations should strive to design human-AI collaborative systems that maximize the complementarity between AI technology and employees' abilities, rather than solely focus on efficiency improvement. Furthermore, AI should be tasked with highly repetitive and low-value work, freeing employees' time and energy to focus on more creative and decision-making tasks (Einola & Khoreva, 2023). In this process, organizations should not only design reasonable task

allocations but also ensure that employees maintain a sufficient sense of participation and control when collaborating with AI to avoid anxieties about being eventually replaced by technology. By endowing employees with greater decision-making power and autonomy, organizations can enhance employees' work engagement and AI acceptance, thereby improving the organization's overall work efficiency and innovation capacity. Additionally, when designing a collaboration model between AI and employees, organizations must balance the integration of technology and employees' creative work to ensure that technology complements rather than undermines employees' work experience.

At the individual level, employees should take the initiative to improve their IT mindfulness to better adapt to AI-induced stress and enhance their self-regulatory abilities. They must develop their adaptability in the face of technological changes and reduce anxiety through emotional regulation and stress management. Additionally, employees should enhance their sense of control and confidence in AI technology by actively learning about new technologies, improving their skills, and engaging in cross-departmental collaboration. Such an active approach not only helps employees cope better with the challenges brought by AI but also enhances their work engagement and overall performance (Pajares, 1997). At the same time, by improving self-efficacy, employees can effectively avoid negative emotions and job burnout caused by technological stress, maintain a positive work attitude, and achieve long-term benefits in personal career development.

Limitations and Future Directions

First, although our findings illuminate the pathway through which AI-induced stress influences work engagement and the conditional role of IT mindfulness, the sample was restricted to employees in service-sector occupations. As such, future research would benefit from extending their sampling frames to encompass additional industries, such as manufacturing and finance. In doing so, they can more accurately assess the generalizability of our theoretical model and potential industry heterogeneity in employees' psychological responses and work engagement trajectories. Given that the deployment and functional attributes of AI technologies differ markedly across sectors, the industry context may systematically moderate the observed relationships.

Second, the cross-sectional design employed in the present study constrains our ability to capture temporal dynamics and infer causal sequencing in the emergence of AI-induced stress and subsequent changes in work engagement. As such, employing a longitudinal approach would enable scholars to trace intra-individual variation over time, thereby elucidating how employees' cognitive appraisals and engagement levels evolve following the introduction of AI systems, particularly beyond the initial adaptation phase. Such designs are essential for disentangling short-term versus sustained effects and mapping adjustment processes in ongoing human–AI collaborations.

Third, our focus treats AI as a monolithic construct, yet distinct categories of AI technology, such as machine learning algorithms, task-automation systems, and advanced data-analytics tools, may exert qualitatively different influences on employees' psychological experiences and work engagement. Hence, future investigations could disaggregate AI into functionally distinct types to examine differential mediatory pathways via cognitive appraisals and compare their respective impact trajectories. Parsing these nuances advances the theoretical precision in how specific technological affordances shape employee outcomes.

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Literature

Agrawal, A., Gans, J., Goldfarb, A. (2018), *Prediction machines, updated and expanded: The simple economics of artificial intelligence*. Harvard Business Review Press.

Ali, T., Hussain, I., Hassan, S., Anwer, S. (2024), "Examine how the rise of AI and automation affects job security, stress levels, and mental health in the workplace", *Bulletin of Business and Economics*, Vol. 13, No 2, pp.1180–1186. <https://doi.org/10.61506/01.00506>.

Bakker, A.B., Hakanen, J.J., Demerouti, E., Xanthopoulou, D. (2007), "Job resources boost work engagement, particularly when job demands are high", *Journal of Educational Psychology*, Vol. 99, No 2, pp.274–284. <https://doi.org/10.1037/0022-0663.99.2.274>.

Bakker, A.B., Schaufeli, W.B., Leiter, M.P., Taris, T.W. (2008), "Work engagement: An emerging concept in occupational health psychology", *Work & Stress*, Vol. 22, No 3, pp.187–200. <https://doi.org/10.1080/02678370802393649>.

Biggs, A., Brough, P., Drummond, S. (2017), "Lazarus and Folkman's psychological stress and coping theory", in: Cooper, C.L., Quick, J.C. (Eds.), *The handbook of stress and health: A guide to research and practice*, Wiley Blackwell, pp.349–364. <https://doi.org/10.1002/9781118993811.ch21>.

Brislin, R.W. (1970), "Back-translation for cross-cultural research", *Journal of Cross-Cultural Psychology*, Vol. 1, No 3, pp.185–216. <https://doi.org/10.1177/135910457000100301>.

Brynjolfsson, E., Mitchell, T. (2017), "What can machine learning do? Workforce implications", *Science*, Vol. 358, No 6370, pp.1530–1534. <https://doi.org/10.1126/science.aap8062>.

Chen, Y., Wang, X., Benitez, J., Luo, X., Li, D. (2022), "Does techno-invasion lead to employees' deviant behaviors?", *Journal of Management Information Systems*, Vol. 39, No 2, pp.454–482. <https://doi.org/10.1080/07421222.2022.2063557>.

Cheng, B., Lin, H., Kong, Y. (2023), "Challenge or hindrance? How and when organizational artificial intelligence adoption influences employee job crafting", *Journal of Business Research*, Vol. 164, pp.113987. <https://doi.org/10.1016/j.jbusres.2023.113987>.

Chuang, Y.T., Chiang, H.L., Lin, A.P. (2025), "Insights from the job demands–resources model: AI's dual impact on employees' work and life well-being", *International Journal of Information Management*, Vol. 83, pp.102887. <https://doi.org/10.1016/j.ijinfomgt.2025.102887>.

DeSimone, J.A., Harms, P.D., DeSimone, A.J. (2015), "Best practice recommendations for data screening", *Journal of Organizational Behavior*, Vol. 36, No 2, pp.171–181. <https://doi.org/10.1002/job.1962>.

Einola, K., Khoreva, V. (2023), "Best friend or broken tool? Exploring the co-existence of humans and artificial intelligence in the workplace ecosystem", *Human Resource Management*, Vol. 62, No 1, pp.117–135. <https://doi.org/10.1002/hrm.22160>.

Gaudioso, F., Turel, O., Galimberti, C. (2017), "The mediating roles of strain facets and coping strategies in translating techno-stressors into adverse job outcomes", *Computers in Human Behavior*, Vol. 69, pp.189–196. <https://doi.org/10.1016/j.chb.2016.12.041>.

Glomb, T.M., Duffy, M.K., Bono, J.E., Yang, T. (2011), "Mindfulness at work", in: Joshi, A., Liao, H., Martocchio, J.J. (Eds.), *Research in personnel and human resources management*, Vol. 30, Emerald Group Publishing Limited, pp.115–157. [https://doi.org/10.1108/S0742-7301\(2011\)0000030005](https://doi.org/10.1108/S0742-7301(2011)0000030005).

Goh, Y.W., Sawang, S., Oei, T.P. (2010), "The revised transactional model (RTM) of occupational stress and coping: An improved process approach", *The Australasian Journal of Organisational Psychology*, Vol. 3, pp.13–20. <https://doi.org/10.1375/ajop.3.1.13>.

Gong, T. (2026), "The dark side of robot anthropomorphism: Cognitive load, stress, and dysfunctional customer behavior", *The Service Industries Journal*, Vol. 46, No 1-2, pp.153–181. <https://doi.org/10.1080/02642069.2025.2500320>.

Hai, S., Long, T., Honora, A., Japutra, A., Guo, T. (2025), "The dark side of employee-generative AI collaboration in the workplace: An investigation on work alienation and employee expediency", *International Journal of Information Management*, Vol. 83, pp.102905. <https://doi.org/10.1016/j.ijinfomgt.2025.102905>.

Hobfoll, S.E. (2002), "Social and psychological resources and adaptation", *Review of General Psychology*, Vol. 6, No 4, pp.307–324. <https://doi.org/10.1037/1089-2680.6.4.307>.

- Hobfoll, S.E., Halbesleben, J., Neveu, J.P., Westman, M. (2018), "Conservation of resources in the organizational context: The reality of resources and their consequences", *Annual Review of Organizational Psychology and Organizational Behavior*, Vol. 5, No 1, pp.103–128. <https://doi.org/10.1146/annurev-orgpsych-032117-104640>.
- Hou, Y., Fan, L. (2024), "Working with AI: The effect of job stress on hotel employees' work engagement", *Behavioral Sciences*, Vol. 14, No 11, 1076. <https://doi.org/10.3390/bs14111076>.
- Huang, Y., Gursoy, D. (2024), "How does AI technology integration affect employees' proactive service behaviors? A transactional theory of stress perspective", *Journal of Retailing and Consumer Services*, Vol. 77, 103700. <https://doi.org/10.1016/j.jretconser.2023.103700>.
- Hulland, J. (1999), "Use of partial least squares (PLS) in strategic management research: A review of four recent studies", *Strategic Management Journal*, Vol. 20, No 2, pp.195–204. [https://doi.org/10.1002/\(SICI\)1097-0266\(199902\)20:2<195::AID-SMJ13>3.0.CO;2-7](https://doi.org/10.1002/(SICI)1097-0266(199902)20:2<195::AID-SMJ13>3.0.CO;2-7).
- Jin, G., Jiang, J., Liao, H. (2024), "The work affective well-being under the impact of AI", *Scientific Reports*, Vol. 14, No 1, 25483. <https://doi.org/10.1038/s41598-024-76893-x>.
- Kim, B.J., Kim, M.J. (2024), "How artificial intelligence-induced job insecurity shapes knowledge dynamics: The mitigating role of artificial intelligence self-efficacy", *Journal of Innovation & Knowledge*, Vol. 9, No 4, 100590. <https://doi.org/10.1016/j.jik.2024.100590>.
- Klonek, F., Parker, S. (2025), "Does AI at work increase stress? Text mining social media about human–AI team processes and AI control", *Journal of Organizational Behavior*, available at <https://doi.org/10.1002/job.70000>.
- Koo, B., Curtis, C., Ryan, B. (2021), "Examining the impact of artificial intelligence on hotel employees through job insecurity perspectives", *International Journal of Hospitality Management*, Vol. 95, 102763. <https://doi.org/10.1016/j.ijhm.2020.102763>.
- Lazarus, R.S., Folkman, S. (1987), "Transactional theory and research on emotions and coping", *European Journal of Personality*, Vol. 1, No 3, pp.141–169. <https://doi.org/10.1002/per.2410010304>.
- Liang, H., Xue, Y. (2009), "Avoidance of information technology threats: A theoretical perspective", *MIS Quarterly*, Vol. 33, No 1, pp.71–90. <https://doi.org/10.2307/20675889>.
- Loureiro, S.M.C., Bilro, R.G., Neto, D. (2023), "Working with AI: Can stress bring happiness?", *Service Business*, Vol. 17, No 1, pp.233–255. <https://doi.org/10.1007/s11628-022-00513-z>.
- Lu, J., Yan, S., Ogbonnaya, C., Gorny, T., Song, M., Wang, C. (2025), "Unpacking the linkage between green volunteering and ethical leadership behavior in managers", *Journal of Business Ethics*, Vol. 200, pp.911–926. <https://doi.org/10.1007/s10551-024-05708-3>.
- Maslach, C., Leiter, M.P. (2008), "Early predictors of job burnout and engagement", *Journal of Applied Psychology*, Vol. 93, No 3, pp.498–512. <https://doi.org/10.1037/0021-9010.93.3.498>.
- Nathan, S.S.K., Karthi, R. (2024), "The impact of stress on IT employees' health and its consequential effects on productivity", *Multidisciplinary Science Journal*, Vol. 6, 2024ss0516. <https://doi.org/10.31893/multiscience.2024ss0516>.
- Nguyen, L.T., Dang, T.Q., Duc, D.T.V. (2025), "The dark sides of AI advertising: The integration of cognitive appraisal theory and information quality theory", *Social Science Computer Review*, Vol. 43, No 2, pp.397–424. <https://doi.org/10.1177/08944393241243315>.
- Olaus, H., Veronica, A., Alfred, A. (2025), "The influence of hybrid work patterns on organizational engagement and work stress", *Acta Psychologica*, Vol. 4, No 3, pp.143–153.
- Pajares, F. (1997), "Current directions in self-efficacy research", *Advances in Motivation and Achievement*, Vol. 10, pp.1–49.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J.-Y., Podsakoff, N.P. (2003), "Common method biases in behavioral research: A critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol. 88, No 5, pp.879–903. <https://doi.org/10.1037/0021-9010.88.5.879>.
- Przegalinska, A., Triantor, T., Kovbasiuk, A., Ciechanowski, L., Freeman, R.B., Sowa, K. (2025), "Collaborative AI in the workplace: Enhancing organizational performance through resource-based and task-technology fit perspectives", *International Journal of Information Management*, Vol. 81, 102853. <https://doi.org/10.1016/j.ijinfomgt.2024.102853>.
- Roth, S., Cohen, L.J. (1986), "Approach, avoidance, and coping with stress", *American Psychologist*, Vol. 41, No 7, pp.813–819. <https://doi.org/10.1037/0003-066X.41.7.813>.

- Sanjeeva Kumar, P. (2024), "Technostress: A comprehensive literature review on dimensions, impacts, and management strategies", *Computers in Human Behavior Reports*, Vol. 16, 100475. <https://doi.org/10.1016/j.chbr.2024.100475>.
- Schaufeli, W.B., Bakker, A.B., Salanova, M. (2006), "The measurement of work engagement with a short questionnaire: A cross-national study", *Educational and Psychological Measurement*, Vol. 66, No 4, pp.701–716. <https://doi.org/10.1177/0013164405282471>.
- Searle, B.J., Auton, J.C. (2015), "The merits of measuring challenge and hindrance appraisals", *Anxiety, Stress, & Coping*, Vol. 28, No 2, pp.121–143. <https://doi.org/10.1080/10615806.2014.931305>.
- Shapiro, S.L., Carlson, L.E., Astin, J.A., Freedman, B. (2006), "Mechanisms of mindfulness", *Journal of Clinical Psychology*, Vol. 62, No 3, pp.373–386. <https://doi.org/10.1002/jclp.20237>.
- Tarafdar, M., Tu, Q., Ragu-Nathan, B.S., Ragu-Nathan, T.S. (2007), "The impact of technostress on role stress and productivity", *Journal of Management Information Systems*, Vol. 24, No 1, pp.301–328. <https://doi.org/10.2753/MIS0742-1222240111>.
- Tomaka, J., Blascovich, J., Kibler, J., Ernst, J.M. (1997), "Cognitive and physiological antecedents of threat and challenge appraisal", *Journal of Personality and Social Psychology*, Vol. 73, No 1, pp.63–72. <https://doi.org/10.1037/0022-3514.73.1.63>.
- Wang, G., Wu, Z., Lu, C. (2025), "Technology takes away my power! The mediating role of powerlessness in the relationship between technostressors and proactivity at work", *International Journal of Information Management*, Vol. 84, 102930. <https://doi.org/10.1016/j.ijinfomgt.2025.102930>.
- Wang, T., Zhan, X., Yu, W. (2024), "The influence of AI awareness on employee's psychological and behavioral outcomes and its theoretical explanation", *Advances in Psychological Science*, Vol. 32, No 7, pp.1195–1208. <https://doi.org/10.3724/SP.J.1042.2024.01195>.
- Yin, H., Wang, C., Liu, Z. (2024), "Unleashing pre-service language teachers' productivity with generative AI: Emotions, appraisal and coping strategies", *Computers in Human Behavior*, Vol. 161, 108417. <https://doi.org/10.1016/j.chb.2024.108417>.
- Yu, S., Shen, L. (2025), "A review of research on the impact of workplace AI awareness on employees: An IT mindfulness perspective", *Journal of Economics and Management Sciences*, Vol. 8, No 2, p.210. <https://doi.org/10.30560/jems.v8n2p210>.
- Zang, J., Shao, Q., Li, H. (2024), "Challenge and hindrance: Yin and yang paths of AI usage's effects on Chinese employee innovative behaviour", *Asia Pacific Business Review*, available at <https://doi.org/10.1080/13602381.2024.2367526>.
- Zhu, H., Lyu, Y., Deng, X., Ye, Y. (2017), "Workplace ostracism and proactive customer service performance: A conservation of resources perspective", *International Journal of Hospitality Management*, Vol. 64, pp.62–72. <https://doi.org/10.1016/j.ijhm.2017.03.010>.

DIRBTINIO INTELEKTO SUKELTAS STRESAS IR DARBUOTOJŲ ĮSITRAUKIMAS Į DARBĄ: KOGNITYVINIO VERTINIMO IR IT SĄMONINGUMO VAIDMUO**Sheng Pan, Zhuang Xiong, Lingfu Kong**

Santrauka. Nors dirbtinis intelektas (DI) darbuotojams suteikia daug patogumų darbo vietoje, jis taip pat kelia iššūkių, pavyzdžiui, profesinio pakeičiamumo riziką ir spaudimą prisitaikyti prie technologijų. Nors anksčiau atliktuose tyrimuose gana plačiai nagrinėtas DI sukeltas psichologinis stresas ir jo poveikis inovatyvumu pasižymintiems gebėjimams, mokslinėje literatūroje skiriama mažai dėmesio tam, kaip darbuotojai proaktyviai valdo tokį technologinį stresą per darbo formavimą (angl. *job crafting*) – tarpasmeninį ir kognityvinį procesą, kuris gali paveikti jų įsitraukimą į darbą. Remiantis streso transakciniu modeliu (angl. *Transactional Model of Stress – TMS*) ir darbo įsitraukimo teorija, išanalizuoti duomenys, surinkti 2025 m. gegužės–birželio mėn. Tyrime dalyvavo 319 respondentų iš įvairių paslaugų sektorių, įskaitant svetingumo, mažmeninės prekybos, maitinimo, aviacijos ir elektroninės prekybos platformų sritis. Taikant daugialypės regresijos analizę, buvo tiriamas darbuotojų kognityvinių vertinimų tarpininkaujantis vaidmuo ryšyje tarp DI sukulto streso ir darbo įsitraukimo, taip pat vertinama, kaip informacinių technologijų sąmoningumas (angl. *IT mindfulness*) moderuoja šį nuoseklų mechanizmą. Rezultatai atskleidė, kad DI sukeltas stresas gali pozityviai skatinti darbuotojų įsitraukimą į darbą per iššūkio vertinimą (angl. *challenge appraisal*), tačiau neigiamai veikti per trukdžio vertinimą (angl. *hindrance appraisal*). IT sąmoningumas reikšmingai moderuojančiai veikia ryšį tarp DI sukulto streso ir darbuotojų kognityvinių vertinimų. Darbuotojai, pasižymintys aukštu IT sąmoningumo lygiu, yra linkę DI keliamą stresą suvokti kaip iššūkį, todėl jų įsitraukimas į darbą didėja. O darbuotojai, kurių IT sąmoningumas yra žemas, dažniau DI sukeltą stresą vertina kaip kliūtį, dėl to menčiau įsitraukia į darbą. Tyrimo išvados papildė teorinį modelį, aiškinantį, kaip technologinis stresas veikia darbuotojų psichologinius ir elgsenos rezultatus. Be to, jos suteikia vertingų praktinių rekomendacijų organizacijoms, siekiančioms gerinti darbuotojų technologinio streso valdymo strategijas ir išlaikyti pusiausvyrą tarp efektyvumo bei darbuotojų gerovės diegiant DI sprendimus.

Reikšminiai žodžiai: žmogaus ir dirbtinio intelekto bendradarbiavimas; DI sukeltas stresas; iššūkio vertinimas; trukdžio vertinimas; darbo įsitraukimas.