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Frontline employees in an AI-integrated workplace: current perspectives and future research landscapes

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Abstract

Purpose – This study aims to systematically review frontline employees' (FLE) psychological responses to the artificial intelligence (AI) integration literature, conduct an extensive analysis and develop a conceptual framework that consolidates diverse approaches to this research domain.

Design/methodology/approach – This study uses a comprehensive systematic literature review (SLR) approach. Using keywords, 21 structured search combinations were established and 76 articles were selected using the PRISMA process. Additionally, the study uses the theory-context-characteristics-methodology (TCCM) framework and proposes a conceptual framework leveraging cognitive appraisal (CA) and conservation of resource (COR) theories.

Findings – The resulting framework reveals how CA and emotion relate to AI and FLE capabilities, leading to AI adoption, turnover intention and FLE performance.

Originality/value – To the best of the authors' knowledge, this study is the first to comprehensively analyze FLE psychological responses to AI integration using an SLR approach, proposing a conceptual framework by consolidating existing knowledge and classifying FLE psychological responses to AI integration across industries and leveraging CA and COR theories, providing future research directions, thus filling a gap in previous research.

Keywords Systematic literature review, Artificial intelligence, AI integration, Frontline employees' psychological responses, Cognitive appraisal, Emotion

Paper type Literature review

1. Introduction

Artificial intelligence (AI) integration in industries is pivotal for technological advancement (Euromonitor, 2021), promising significant efficiency gains, innovation, and personalized services that frontline employees (FLE) can offer to customers (Dwivedi *et al.*, 2021). Following the forecasted potential doubling of companies' cash flows by 2030 and widespread

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recognition of AI's ability to enhance operational efficiency (Haan, 2023), businesses are increasingly embracing AI (Bughin *et al.*, 2018). AI is expected to create innovative service offerings, opening new opportunities for employees (Lu *et al.*, 2020). However, for successful integration, both technical issues and service employee receptivity should be addressed, emphasizing the importance of adopting collaboration to maximize AI's transformative potential (Chowdhury *et al.*, 2022).

While empirical studies positively describe collaboration with AI, understanding the influencing factors of service workers' cognitive and emotional responses is vital (Loureiro *et al.*, 2023), considering the subjective nature of perceptions and attitudes influenced by diverse external factors and organizational cultures (Chandra and Rahman, 2024) and the lack of theory-based empirical evidence in the domain (Chowdhury *et al.*, 2022). This warrants a comprehensive examination of the research findings regarding AI impact on FLE psychological responses, which are key drivers of intention and behavioral outcomes. (Kong *et al.*, 2021).

FLE constitute 80% of the global workforce, with 75% utilizing technology, including AI, in their service roles; however, 60% express dissatisfaction with the technology provided by their employers (Brenzel, 2022). To harness AI's full potential, organizations need to effectively assess its benefits and barriers and develop clear plans and training programs for AI-human collaboration (Howard, 2019).

AI integration is the continuous collaboration between AI and existing systems (He *et al.*, 2024). Unlike AI implementation, which implies a one-time setup, AI integration involves including AI as a continuous and integral part of an organization's existing technological ecosystem (Presbitero and Teng-Calleja, 2023), highlighting the importance of collaboration with FLE during service delivery. Approximately 34% of all business-related operations are automated and 66% are conducted by people; therefore, AI integration can have several positive effects, including increased organizational effectiveness and operational efficiency (Bughin *et al.*, 2018). New skill sets can be generated by integrating AI, with AI expected to provoke job losses and create job opportunities in 25 and 50% of companies, respectively (World Economic Forum, 2023). From 2030, 800 million jobs may need to be reorganized, redesigned, or eliminated because of ongoing AI integration (Manyika *et al.*, 2017). For instance, computational creativity is demonstrated when AI engages in creative activities (e.g. composing catchphrases or creating graphics), a capability that Gap has harnessed to predict fashion trends and design apparel (Huang *et al.*, 2019).

Psychological responses are defined as individual's cognitive and emotional responses to a situation perceived as challenging or exceeding their capacity or resources (Ding, 2021). While many studies have examined psychological responses (Clayton, 2020; Mazza *et al.*, 2020), research specifically addressing FLE psychological responses to AI integration in service theory and practice literature remains limited (Liang *et al.*, 2022).

The literature on AI integration in service delivery and its significant effects on FLE psychological responses remains fragmented (Pereira *et al.*, 2023), as evidenced by inconsistencies in theories and findings. By applying the theories, context, characteristics and methods (TCCM) framework, this study seeks to identify patterns in the literature and provide a comprehensive understanding of the factors influencing FLE psychological responses to AI integration through a conceptual framework, thereby contributing to more coherent knowledge in this domain.

Examining FLE psychological responses to AI use is essential for organizations seeking to integrate AI to assist in service roles, as this can enhance service employee performance, improve employee-customer interactions, and facilitate effective change management, ultimately influencing organizational performance (Wijayati *et al.*, 2022). Simultaneously, establishing a consistent approach to mapping-out FLE psychological responses to AI use can set a roadmap for future studies on AI, FLE, and behavioral outcomes (Suseno *et al.*, 2022; Wang

et al., 2023a, b). By considering FLE psychological responses, organizations can overcome barriers and enhance the benefits of AI use among FLE (Hornung and Smolnik, 2022).

To evaluate the current situation and propose directions for future studies on FLE psychological responses to AI integration in service environments, retrospective analysis is critical. Accordingly, this study aimed to answer the following research questions.

RQ1. What are the variables involved in FLE psychological responses to AI integration in service delivery?

RQ2. What are the primary theoretical frameworks used to study FLE psychological responses?

RQ3. How can these variables be consolidated into a comprehensive conceptual framework?

RQ4. What are the directions for future research related to FLE psychological responses to AI integration?

Practically, this study emphasizes the key considerations for practitioners to enhance FLE psychological responses to AI integration strategies. The methodology used for the SLR is described in the following section, along with the findings and discussion. Subsequently, future research directions and academic and practical implications are presented, followed by limitations and conclusions.

2. Methodology

2.1 Review structure

We employed a structured SLR methodology to provide an overview of the research on FLE psychological responses to AI integration, identify gaps in the literature, and propose future research directions (Tranfield *et al.*, 2003; Rousseau *et al.*, 2008; Swain *et al.*, 2023). This method, known for its comprehensive insights and systematic approach, is effective for literature synthesis (Cronin *et al.*, 2008; Kunisch *et al.*, 2018; Pasca *et al.*, 2021; Adil *et al.*, 2022; Chandra and Rahman, 2024; Kim *et al.*, 2023). The SLR process involved a four-stage approach–identification, screening, eligibility, and inclusion–resulting in 76 relevant articles.

2.2 Topic selection

A recent scholarly discourse emphasized the need to explore the contrasting dynamics of fear and empowerment related to AI inspiring the topic of FLE psychological responses to AI integration (Puntoni *et al.*, 2021). While the current AI research often focuses on consumers' psychological responses (Cui *et al.*, 2023; Khan and Mishra, 2024), this study focuses on the service environment, which is a less-explored area, to understand the impact of AI on FLE (Oosthuizen *et al.*, 2021). Articles from academic journals listed in the Australian Business Dean Council (ABDC) Journal Quality List were utilized to ensure credibility and reliability (Paul and Criado, 2020; Chopra *et al.*, 2023). The ABDC list is a widely recognized benchmark for high-quality scholarly journals, ensuring the integrity of selected articles (Budhwar *et al.*, 2022). Although this approach may seem limited, it maintains a high standard of evidence and avoids the quality variability found in book chapters and conference proceedings. Journal articles provide more thorough details than conference papers (González-Albo and Bordons, 2011) and are more impactful than chapter books because of their rigorous peer review processes.

2.3 Search strategy

A robust search procedure was developed based on previous SLR approaches (Sahu *et al.*, 2020; Seth *et al.*, 2020; Talwar *et al.*, 2020; Chopra *et al.*, 2023). The search involved three sets

of keywords: artificial intelligence, employees, and psychological responses. Expert guidance was used to refine the initial keyword strategy (Appendix A). Various electronic databases, including Web of Science, Science Direct, Emerald, ProQuest, Sage, Taylor and Francis, Springer, and Google Scholar, were used for verification (Adil *et al.*, 2022). The authors located more articles on Google Scholar than on the Web of Science and designed search combinations based on the database's 256-character limit (Harari *et al.*, 2020).

2.4 Journal selection and criteria for inclusion/exclusion

The review applied rigorous selection criteria, focusing on peer-reviewed scholarly works published in English between 2018 and 2024 that appeared in journals rated A*, A, B, or C on the ABDC Journal Quality List. Before 2000, AI was often regarded as a routine tool in computer science, and scholars frequently avoided the term (McCorduck and Cfe, 2004). The AI Winter, marked by unmet expectations, caused continuous reluctance to use the term AI (Kurzweil, 2014). Consequently, the SLR was initiated from 2000 onward. The initial screening revealed that the first relevant paper was published in 2018. Thus, research papers from 2018 have made significant advancements in service theory and practice, making the timeframe more relevant.

The PRISMA approach to SLR (Voola *et al.*, 2022) was followed, comprising identification, screening, eligibility, and inclusion.

2.4.1 Identification. To gather all potentially relevant studies, 1,027 records were initially identified using 21 search strings divided into three batches (Appendix A). After removing 481 duplicates, 546 records remained.

2.4.2 Screening. To ensure that only credible studies were considered, 546 records were screened based on the inclusion criteria, focusing on papers published in peer-reviewed and ranked journals. This process excluded dissertations (e.g. Wongras and Tanantong, 2023), book sections (e.g. Dewasiri *et al.*, 2023), conference papers (e.g. Cao and Yao, 2020), and journals that were not qualified on the ABDC Journal Quality List (Ryan *et al.*, 2024), among others.

2.4.3 Eligibility. To further refine the selection, quality and relevance criteria were applied, resulting in the exclusion of 197 non-scholarly works and 164 articles that did not meet the ABDC Journal Quality List, leaving 185 articles.

2.4.4 Inclusion. To finalize the selection of articles for in-depth review, a detailed review of 185 articles resulted in the exclusion of 109 articles that mentioned relevant keywords less than twice or lacked focus on FLE psychological responses to AI integration. Notable exclusions were studies in which AI is employed to measure and analyze FLE psychological responses (e.g. Malik *et al.*, 2023), on psychological responses or empathic skills integration into AI (e.g. Huang *et al.*, 2019), and on evaluation of customer feedback on AI replacing human FLE (e.g. Pelau *et al.*, 2021; Ruan and Mezei, 2022). The final selection for this SLR comprised 76 articles (Figure 1).

3. Findings and discussion

This study comprises 76 research papers related to FLE psychological responses to AI integration. Appendix B presents information about the research articles (i.e. name of authors, publication year, title, journal, service industry type, research methods used, number of respondents, and key findings). These articles were reviewed to answer the first research question of the study (i.e. *RQ1*). The subsequent sections provide a concise literature synthesis.

3.1 Evolution, publication, and authorship

Academic research evolution in this domain can be gauged by analyzing high-quality publications (Chopra *et al.*, 2023). Appendix C presents the annual distribution of the selected articles from 2018 to mid-2024 (a period of six years). Despite the relatively short timeframe

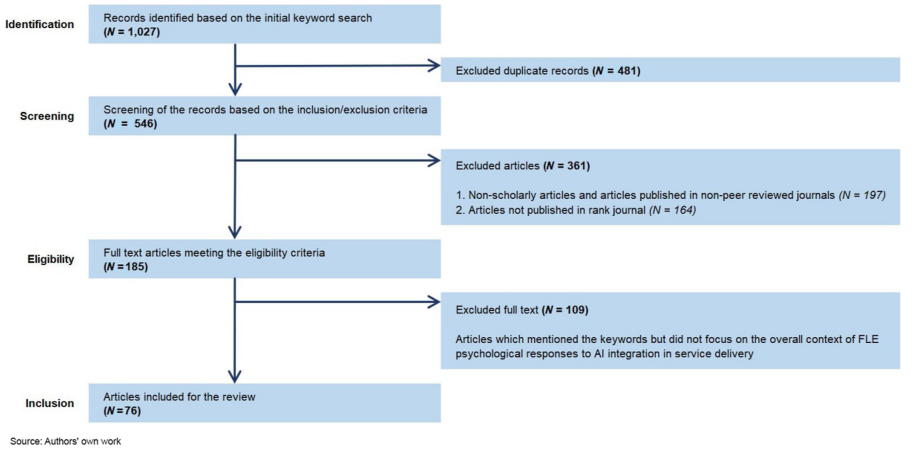

Figure 1. PRISMA process

and early exploration stage, the first article on FLE psychological responses to AI integration, published in 2018, underscores emerging trends and attracts significant attention from researchers, setting the foundation for more extensive and in-depth future studies.

Thus, this SLR considered that FLE psychological responses to AI integration publications began in 2018. Research interest was initially low from 2018 to 2020, with only 9 papers (11.84%) published. The number of publications increased to 12 (15.79%) in 2021, 23 (30.26%) in 2022, and 25 (32.89%) in 2023. The recent surge can be attributed to the increased prevalence of remote work and opportunities stemming from social distancing measures during the COVID-19 pandemic (Sipior, 2020), which has spurred substantial scholarly interest in this domain. Publications decreased in mid-2024, with only seven papers (9.21%) published. While definitive conclusions may be premature, this decline may be attributed to a growing research emphasis on the potential applications of AI in organizations and consumer experiences (Ranieri *et al.*, 2024).

FLE psychological responses to AI in service delivery have appeared in 40 academic journals, highlighting their focus on service-related categories (Appendix D). Following prior SLR frameworks (Paul and Feliciano-Cestero, 2021), Appendix E identifies the top ten cited publications on FLE psychological responses to AI integration in service delivery, with Brougham and Haar (2018) lead with 665 citations (110.83 annually), Li *et al*. (2019) at 532 (106.4 annually) and Prentice *et al*.'s (2020) at 289 (72.25 annually).

3.2 Methodological perspectives

3.2.1 Research settings. The researchers analyzed studies on how AI influences FLE psychological responses in service delivery, categorizing them by geographic location to understand the global research distribution (Chintalapati and Pandey, 2022). This breakdown reveals significant research discrepancies among countries. The analysis categorized studies by geographic location, highlighting China, the USA, and India as the top contributors, which collectively account for a substantial portion of the research. China leads with 16.51% (18 studies), followed closely by the USA (12.84% or 14 studies), India (9.17% or 10 studies), and the UK (7.34% or 8 studies), while Germany, Taiwan, and South Korea each contributed 4.59% (5 studies), followed by Australia (3.67% or 4 studies), Japan, and Portugal (2.75% or 3 studies); many other regions remain underrepresented, indicating limited awareness of AI's impact in diverse socioeconomic and cultural contexts (Appendix F). This concentration of research in a few nations may skew global perspectives on FLE psychological responses to AI integration, potentially overlooking insights from less-studied regions.

3.2.2 Research design and sample types. This study synthesizes methods and observes that among the 87 research designs across 76 studies, 75.86% utilized quantitative methods, primarily surveys (70.11%), with smaller proportions employing content analysis (3.45%) and experimental designs (2.3%) (Appendix G). Of the studies, 24.14% used qualitative approaches, with interviews being the most common (17.24%). Literature reviews and case studies accounted for 4.6 and 2.3% of the studies, respectively, exploring themes such as FLE-AI awareness and perceptions.

Regarding sample types, 68.97% of the studies involved AI-experienced FLE, 20.69% focused on perception s of AI's impact, and 10.34% adopted a mixed-methods approach which can be attributed to AI-experienced respondents offering firsthand insights into practical implications and challenges to AI integration, making them a valuable source for research data.

3.3 Theoretical perspectives

Table 1 outlines 53 theories adopted for the FLE psychological responses and AI integration. CA and COR theories were used in seven and six studies, respectively. In general, 16% of the SLR studies were grounded in either of these theories. Table 1 indicates inconsistent reliance on exact theories on FLE psychological responses to AI integration, attributed to the absence of a unified theoretical framework. To address the second research question (i.e. *RQ2*), this study recommends refined theoretical contributions by utilizing two prominent theories from the existing literature. Owing to discrepancies in the number of journal articles for each theory, only two recently used theories on FLE psychological responses to AI integration domain are explained below, along with a detailed examination of their application in this context.

Table 1. Theories used

#	Studies	Theories	Articles
1	Zhu *et al*. (2021), Chiu *et al*. (2021), Paluch *et al*. (2022), Song *et al*. (2022), Zhao *et al*. (2023), Song *et al*. (2024), Cheng *et al*. (2023)	Cognitive appraisal theory	7
2	Khaliq *et al*. (2022), Qiu *et al*. (2022), Liang *et al*. (2022), He *et al*. (2024), Zhu and Kanjanamekanant (2023), Willems *et al*. (2023)	Conservation of resources theory; JD-R model	6
3	Abdelhakim *et al*. (2023), Saxena and Mishra (2025), Park *et al*. (2024), Sattu *et al*. (2024)	Theory of Acceptance and Use of Technology	4
4	Malik *et al*. (2022), Kong *et al*. (2021), Kang *et al*. (2024), Sattu *et al*. (2024)	Fit theory	4
5	Boustani (2022), Arias-Pérez and Vélez-Jaramillo (2022b)	Transaction cost theory	2
6	Arias-Pérez and Vélez-Jaramillo (2022a), Chowdhury *et al*. (2022)	Knowledge-Based View	2
7	Dang and Liu (2022), Do *et al*. (2023)	Implicit theory of intelligence	2
8	Prentice *et al*. (2020), He *et al*. (2025)	Self-regulation theory	2
9	Vorobeva *et al*. (2022), Wang *et al*. (2023a, b)	Social comparison theory	2
10	Abubakar *et al*. (2019), Kang *et al*. (2024)	Social exchange theory	2
11	Lin *et al*. (2022), Leung *et al*. (2023)	Technology affordance theory	2
12	Vasiljeva *et al*. (2021), Sattu *et al*. (2024)	Technology–organization–environment	2
13	Li *et al*. (2019), Li *et al*. (2024)	social learning theory	2
14	Dutta *et al*. (2023), Nguyen *et al*. (2023)	Social response theory	2
15	Presbitero and Teng-Calleja (2023), Bhattacharyya (2023)	Social Cognitive Theory	2

Source(s): Authors' own work

3.3.1 Cognitive appraisal theory. CA theory (Lazarus and Folkman, 1984) explains that individuals may experience stress when appraising a situation as a threat or harmful to their personal and social resources. This initial cognitive evaluation was followed by an assessment of their confidence in possessing the necessary resources to manage their situation. For example, if the FLE appraise their relationships to the service environment (e.g. threat of replacement by AI; empowered by the newly acquired support tool), then a specific psychological response that is tied to the appraisal pattern follows, and the FLE with the same appraisals experiences the same psychological responses regardless of circumstances (Lazarus, 1991).

In the context of AI integration in service delivery, the CA of relationships (e.g. trust in organization) and personal resources (i.e. AI benefits and risks, and job security) of FLE could lead to emotions that would affect AI adoption, turnover intention, and FLE performance. For instance, ensuring trust in organizational information can lead to positive behavioral outcomes (Zhu and Kanjanamekanant, 2023; Mulcahy *et al.*, 2024). When FLE encounter AI-related situations, their work environments, tasks, knowledge about AI, and job roles influence their cognitive evaluations (Chiu *et al.*, 2021; Ding, 2021).

3.3.2 Conservation of resources theory. COR theory posits that individuals strive to acquire, maintain, and protect both tangible (e.g. job security and time) and intangible resources (e.g. self-esteem and organizational support) to enhance their well-being and resilience (Hobfoll, 1989). Applied in organizational contexts, COR theory explains how organizational resources influence FLE psychological responses to AI integration. FLE with ample resources tend to be more resilient to change, with organization-related attributes being the most significant and consistent moderator of FLE psychological responses, whereas those who receive higher organizational support (e.g. training programs and AI perception-shifting simulations) are more likely to be resilient to change (Im and Kim, 2022). The existing literature indicates that adequate resources promote positive cognitive evaluation, which mitigates loss and deterrence emotions among FLE (Khaliq *et al.*, 2022). Conversely, negative psychological responses to AI integration can stem from unfamiliarity with AI, causing uncertainty or fear (Li and Huang, 2020) and the perceived benefits of AI outweigh the stakes if leadership and transparency in organization are sustained (Chandra and Rahman, 2024).

3.4 Synthesis of frequently discussed variables

To answer the third research question (i.e. *RQ3*), the authors created a comprehensive conceptual framework consolidating the antecedents, moderators, mediators, and outcomes of the FLE psychological responses to AI integration domain. Tables 2 and 3 present the syntheses of the variables involved in the research on FLE psychological responses to AI integration. The literature in this domain suggests that two factors influence FLE psychological responses to AI integration: AI task and knowledge (Verma and Singh, 2022) and FLE characteristics and role (Presbitero and Teng-Calleja, 2023).

3.4.1 AI task and knowledge as antecedent. FLE psychological responses to AI integration demonstrate significant variability across countries and sectors, contingent on two key dimensions: AI knowledge characteristics and AI task characteristics (Verma and Singh, 2022).

3.4.1.1 AI knowledge characteristics. AI knowledge characteristics capture AI's analytical capabilities, including data analysis, predictive modeling, and natural language processing, which drive efficiency in service delivery (Chowdhury *et al.*, 2022). These capabilities encourage FLE to embrace AI-driven innovations by reducing uncertainty and promoting trust (Cao *et al.*, 2021). For instance, AI's robust knowledge fosters organizational trust and psychological security, influencing FLE perceptions of job security and willingness to collaborate with AI (Zhu *et al.*, 2021; Prentice *et al.*, 2023). This highlights the interplay between technical understanding and psychological confidence, with a lack of such understanding potentially exacerbating job insecurity.

Table 2. Frequently discussed variables

	Variable name	Sources	Frequency
Antecedents	*AI Task and Knowledge*		
	Task characteristics	Im and Kim (2022), Wang *et al*. (2023a, b), Chowdhury *et al*. (2022), Khaliq *et al*. (2022), Prentice *et al*. (2023), Boustani (2022), Saxena and Mishra (2025), Prentice *et al*. (2020), Koo *et al*. (2021), Li *et al*. (2019), Arias-Pérez and Vélez-Jaramillo (2022a), Malik *et al*. (2022), Verma and Singh (2022), Presbitero and Teng-Calleja (2023), Shamim *et al*. (2023), Kang *et al*. (2023), Brougham and Haar (2018), Nam (2019), Zhao *et al*. (2023), Lingmont and Alexiou (2020), Verma and Singh (2022), Abdelhakim *et al*. (2023), Qiu *et al*. (2022), Tong *et al*. (2021), Vorobeva *et al*. (2022), Zhu *et al*. (2021), Arias-Pérez and Vélez-Jaramillo (2022b), Vatan and Dogan (2021), Loureiro *et al*. (2023), Song *et al*. (2024), Wang *et al*. (2023a, b), Do *et al*. (2023), Zhu and Kanjanamekanant (2023), Willems *et al*. (2023), Tojib *et al*. (2023), Zirar *et al*. (2023), Bhattacharyya (2023), Li *et al*. (2019), Li *et al*. (2024), Dutta *et al*. (2023), Park *et al*. (2024), Leung *et al*. (2023), Garrelfs *et al*. (2023)	43
	Knowledge characteristics	Wijayati *et al*. (2022), Im and Kim (2022), Wang *et al*. (2023a, b), Chowdhury *et al*. (2022), Khaliq *et al*. (2022), Prentice *et al*. (2023), Vasiljeva *et al*. (2021), Saxena and Mishra (2025), Motamarri *et al*. (2020), Li *et al*. (2019), Arias-Pérez and Vélez-Jaramillo (2022a), Malik *et al*. (2022), Verma and Singh (2022), Presbitero and Teng-Calleja (2023), He *et al*. (2024), Shamim *et al*. (2023), Kang *et al*. (2023), Brougham and Haar (2018), Nam (2019), Zhao *et al*. (2023), Lingmont and Alexiou (2020), Verma and Singh (2022), Abdelhakim *et al*. (2023), Qiu *et al*. (2022), Tong *et al*. (2021), Vorobeva *et al*. (2022), Zhu *et al*. (2021), Arias-Pérez and Vélez-Jaramillo (2022b), Vatan and Dogan (2021), Loureiro *et al*. (2023), Pillai *et al*. (2024), Song *et al*. (2024), Do *et al*. (2023), Tojib *et al*. (2023), He *et al*. (2025), Zirar *et al*. (2023), Li *et al*. (2024), Nguyen *et al*. (2023), Leung *et al*. (2023), Garrelfs *et al*. (2023), Cheng *et al*. (2023)	41
	FLE Characteristics and Role		
	Job role	Wijayati *et al*. (2022), Wang *et al*. (2023a, b), Chowdhury *et al*. (2022), Khaliq *et al*. (2022), Prentice *et al*. (2023), Saxena and Mishra (2025), Parvez *et al*. (2022), Li *et al*. (2019), Zhang and Jin (2023), Arias-Pérez and Vélez-Jaramillo (2022a), Malik *et al*. (2022), Liang *et al*. (2022), Presbitero and Teng-Calleja (2023), Shamim *et al*. (2023), Kang *et al*. (2023), Brougham and Haar (2018), Nam (2019), Zhao *et al*. (2023), Lingmont and Alexiou (2020), Verma and Singh (2022), Qiu *et al*. (2022), Tong *et al*. (2021), Vorobeva *et al*. (2022), Zhu *et al*. (2021), Arias-Pérez and Vélez-Jaramillo (2022b), Vatan and Dogan (2021), Loureiro *et al*. (2023), Willems *et al*. (2023), Li *et al*. (2019)	29
	Age/generational differences	Wijayati *et al*. (2022), Wang *et al*. (2023a, b), Chowdhury *et al*. (2022), Khaliq *et al*. (2022), Prentice *et al*. (2023), Saxena and Mishra (2025), Parvez *et al*. (2022), Makridis and Han (2021), Li *et al*. (2019), Arias-Pérez and Vélez-Jaramillo (2022a), Malik *et al*. (2022), Presbitero and Teng-Calleja (2023), Shamim *et al*. (2023), Kang *et al*. (2023), Brougham and Haar (2018), Nam (2019), Zhao *et al*. (2023), Lingmont and Alexiou (2020), Verma and Singh (2022), Qiu *et al*. (2022), Tong *et al*. (2021), Vorobeva *et al*. (2022), Zhu *et al*. (2021), Arias-Pérez and Vélez-Jaramillo (2022b), Vatan and Dogan (2021), Loureiro *et al*. (2023), Dutta *et al*. (2023)	27
	Technical Proficiency	Wijayati *et al*. (2022), Im and Kim (2022), Wang *et al*. (2023a, b), Chowdhury *et al*. (2022), Khaliq *et al*. (2022), Prentice *et al*. (2023), Saxena and Mishra (2025), Lin *et al*. (2022), Parvez *et al*. (2022), Motamarri *et al*. (2020), Li *et al*. (2019), Arias-Pérez and Vélez-Jaramillo (2022a), Malik *et al*. (2022), Presbitero and Teng-Calleja (2023), Shamim *et al*. (2023), Kang *et al*. (2023), Brougham and Haar (2018), Nam (2019), Zhao *et al*. (2023), Lingmont and Alexiou (2020), Verma and Singh (2022), Qiu *et al*. (2022), Tong *et al*. (2021), Vorobeva *et al*. (2022), Zhu *et al*. (2021), Arias-Pérez and Vélez-Jaramillo (2022b), Vatan and Dogan (2021), Loureiro *et al*. (2023), Zirar *et al*. (2023), Sattu *et al*. (2024)	30

(*continued*)

Table 2. Continued

	Variable name	Sources	Frequency
Moderators	*Organization-related attributes*		
	Leadership	Wijayati *et al.* (2022), Abubakar *et al.* (2019), Suseno *et al.* (2022), Malik *et al.* (2022), Verma and Singh (2022), Qiu *et al.* (2022), Cao *et al.* (2021), Li *et al.* (2019)	8
	Transparency	Chowdhury *et al.* (2022), Shamim *et al.* (2023), Nguyen *et al.* (2023), Sattu *et al.* (2024)	4
	Organizational culture	Boustani (2022), Song *et al.* (2022), Makridis and Han (2021), Arias-Pérez and Vélez-Jaramillo (2022a), Kong *et al.* (2021), Lingmont and Alexiou (2020), Abdelhakim *et al.* (2023), Arias-Pérez and Vélez-Jaramillo (2022b), Do *et al.* (2023), Li *et al.* (2019), Garrelfs *et al.* (2023)	11
	Industrial relations climate	Zhao *et al.* (2023), Khoa *et al.* (2023)	2
	Competitive psychological climate	Khaliq *et al.* (2022), Li *et al.* (2019), Song *et al.* (2024), Do *et al.* (2023), Madan and Ashok (2024), Garrelfs *et al.* (2023)	6
	Perceived organizational support	Li *et al.* (2019), Song *et al.* (2024), Khoa *et al.* (2023), Willems *et al.* (2023), Bhattacharyya (2023), Garrelfs *et al.* (2023)	6
	Employee engagement	Wang *et al.* (2023a, b), Prentice *et al.* (2023), Vasiljeva *et al.* (2021), Saxena and Mishra (2025), Koo *et al.* (2021), Makridis and Han (2021), Gkinko and Elbanna (2022), Loureiro *et al.* (2023), Wang *et al.* (2023a, b), Willems *et al.* (2023), Bhattacharyya (2023), Li *et al.* (2024), Dutta *et al.* (2023), Nguyen *et al.* (2023)	14
Mediators *(FLE psychological responses to AI integration)*	*Cognitive appraisal*		
	Relationship	Chowdhury *et al.* (2022), Gkinko and Elbanna (2023), You *et al.* (2018), Makridis and Han (2021), Shamim *et al.* (2023), Loureiro *et al.* (2023), Do *et al.* (2023), Madan and Ashok (2024), Khoa *et al.* (2023), Dutta *et al.* (2023), Park *et al.* (2024), Sattu *et al.* (2024), Leung *et al.* (2023), Garrelfs *et al.* (2023)	14
	AI Benefits and Risks	Song *et al.* (2022), Lin *et al.* (2022), Motamarri *et al.* (2020), Malik *et al.* (2022), Verma and Singh (2022), Tong *et al.* (2021), Madan and Ashok (2024), Willems *et al.* (2023), Behn *et al.* (2024), Bhattacharyya (2023), Li *et al.* (2019), Nguyen *et al.* (2023), Park *et al.* (2024), Sattu *et al.* (2024), Leung *et al.* (2023), Garrelfs *et al.* (2023)	16
	Job Security	Im and Kim (2022), Hornung and Smolnik (2022), Prentice *et al.* (2023), DingL.2021, Arias-Pérez and Vélez-Jaramillo (2022a), Kong *et al.* (2021), Nam (2019), Mirbabaie *et al.* (2022), Zhu *et al.* (2021), Arias-Pérez and Vélez-Jaramillo (2022b), Loureiro *et al.* (2023), Song *et al.* (2024), Wang *et al.* (2023a, b), Zhu and Kanjanamekanant (2023), Willems *et al.* (2023), Tojib *et al.* (2023), Kang *et al.* (2024), Bhattacharyya (2023), Park *et al.* (2024), Sattu *et al.* (2024)	20
	Emotion		
	Achievement	Hornung and Smolnik (2022), Gkinko and Elbanna (2023), Dang and Liu (2022), Chiu *et al.* (2021), Qiu *et al.* (2022), Do *et al.* (2023), Park *et al.* (2024)	7
	Challenge	Hornung and Smolnik (2022), Suseno *et al.* (2022), Gkinko and Elbanna (2023), Gkinko and Elbanna (2022), Liang *et al.* (2022), Qiu *et al.* (2022), Zhu *et al.* (2021), Cao *et al.* (2021), Pillai *et al.* (2024), Do *et al.* (2023), Park *et al.* (2024), Cheng *et al.* (2023)	12
	Loss	Wang *et al.* (2023a, b), Hornung and Smolnik (2022), Parvez *et al.* (2022), Gkinko and Elbanna (2022), Chiu *et al.* (2021), Pillai *et al.* (2024), Song *et al.* (2024), Do *et al.* (2023), Willems *et al.* (2023), Behn *et al.* (2024), He *et al.* (2024), Bhattacharyya (2023), Park *et al.* (2024)	13
	Deterrence	Hornung and Smolnik (2022), Gkinko and Elbanna (2022), Song *et al.* (2024), Do *et al.* (2023), Zhu and Kanjanamekanant (2023), Willems *et al.* (2023), Tojib *et al.* (2023), Behn *et al.* (2024), He *et al.* (2025), Nguyen *et al.* (2023), Park *et al.* (2024), Sattu *et al.* (2024), Cheng *et al.* (2023)	13

(*continued*)

Table 2. Continued

	Variable name	Sources	Frequency
Outcome variables	*Intention and Behavioral outcome*		
	AI adoption	Wijayati *et al*. (2022), Wang *et al*. (2023a, b), Chowdhury *et al*. (2022), Khaliq *et al*. (2022), Prentice *et al*. (2023), Saxena and Mishra (2025), Parvez *et al*. (2022), Li *et al*. (2019), Zhang and Jin (2023), Arias-Pérez and Vélez-Jaramillo (2022a), Malik *et al*. (2022), Liang *et al*. (2022), Presbitero and Teng-Calleja (2023), Shamim *et al*. (2023), Kang *et al*. (2023), Brougham and Haar (2018), Nam (2019), Zhao *et al*. (2023), Lingmont and Alexiou (2020), Verma and Singh (2022), Qiu *et al*. (2022), Tong *et al*. (2021), Vorobeva *et al*. (2022), Zhu *et al*. (2021), Arias-Pérez and Vélez-Jaramillo (2022b), Vatan and Dogan (2021), Loureiro *et al*. (2023), Pillai *et al*. (2024), Do *et al*. (2023), Willems *et al*. (2023), Behn *et al*. (2024), Zirar *et al*. (2023), Bhattacharyya (2023), Li *et al*. (2019), Li *et al*. (2024), Park *et al*. (2024), Sattu *et al*. (2024), Leung *et al*. (2023), Cheng *et al*. (2023)	39
	Turn-over intention	Wijayati *et al*. (2022), Wang *et al*. (2023a, b), Chowdhury *et al*. (2022), Khaliq *et al*. (2022), Prentice *et al*. (2023), Saxena and Mishra (2025), Parvez *et al*. (2022), Makridis and Han (2021), Li *et al*. (2019), Arias-Pérez and Vélez-Jaramillo (2022a), Malik *et al*. (2022), Presbitero and Teng-Calleja (2023), Shamim *et al*. (2023), Kang *et al*. (2023), Brougham and Haar (2018), Nam (2019), Zhao *et al*. (2023), Lingmont and Alexiou (2020), Verma and Singh (2022), Qiu *et al*. (2022), Tong *et al*. (2021), Vorobeva *et al*. (2022), Zhu *et al*. (2021), Arias-Pérez and Vélez-Jaramillo (2022b), Vatan and Dogan (2021), Loureiro *et al*. (2023), Zhu and Kanjanamekanant (2023), Kang *et al*. (2024)	28
	FLE performance	Wijayati *et al*. (2022), Im and Kim (2022), Wang *et al*. (2023a, b), Chowdhury *et al*. (2022), Khaliq *et al*. (2022), Prentice *et al*. (2023), Saxena and Mishra (2025), Lin *et al*. (2022), Parvez *et al*. (2022), Motamarri *et al*. (2020), Li *et al*. (2019), Arias-Pérez and Vélez-Jaramillo (2022a), Malik *et al*. (2022), Presbitero and Teng-Calleja (2023), Shamim *et al*. (2023), Kang *et al*. (2023), Brougham and Haar (2018), Nam (2019), Zhao *et al*. (2023), Lingmont and Alexiou (2020), Verma and Singh (2022), Qiu *et al*. (2022), Tong *et al*. (2021), Vorobeva *et al*. (2022), Zhu *et al*. (2021), Arias-Pérez and Vélez-Jaramillo (2022b), Vatan and Dogan (2021), Loureiro *et al*. (2023), Song *et al*. (2024), Do *et al*. (2023), Willems *et al*. (2023), He *et al*. (2024), Li *et al*. (2019), Dutta *et al*. (2023)	34

Source(s): Authors' own work

Table 3. Variables for proposed conceptual framework in FLE psychological responses to AI integration in service delivery

Studies	Independent variables: AI task and knowledge		Independent variables: FLE characteristics and role			Moderator: Organization related attributes							Mediating variables: Cognitive appraisal			Mediating variables: Emotion				Outcome variables: Intention and behavioral outcome		
	TC	KC	JR	AGD	TP	L	T	OC	IRC	CPC	POS	FEI	R	BR	JS	A	C	Lo	D	AIA	TOI	FP
Abdelhakim *et al*. (2023)	*	*						*														
Abubakar *et al*. (2019)						*																
Arias-Pérez and Vélez-Jaramillo (2022a)								*							*							
Arias-Pérez and Vélez-Jaramillo (2022b)								*							*							
Behn *et al*. (2024)														*				*	*	*		
Bhattacharyya (2023)	*										*	*		*	*			*		*		
Boustani (2022)	*							*														
Brougham and Haar (2018)				*																	*	
Cao *et al*. (2021)						*											*					
Cheng *et al*. (2023)		*															*		*	*		
Chiu *et al*. (2021)																*		*				
Chowdhury *et al*. (2022)							*						*									
Dang and Liu (2022)																*						
Ding, L. (2021)															*							
Do *et al*. (2023)	*	*						*		*			*			*	*	*	*	*		*
Dutta *et al*. (2023)	*			*								*	*									*
Garrelfs *et al*. (2023)	*	*						*		*	*		*	*								
Gkinko and Elbanna (2022)												*					*	*	*			
Gkinko and Elbanna (2023)													*			*	*					
He *et al*. (2024)		*																*	*			*
He *et al*. (2025)		*																				
Hornung and Smolnik (2022)															*	*	*	*	*			
Im and Kim (2022)	*	*			*										*							*
Kang *et al*. (2024)															*						*	
Kang *et al*. (2023)					*																	*
Kar and Kushwaha (2023)																						
Khaliq *et al*. (2022)										*												
Khoa *et al*. (2023)									*		*		*									

(*continued*)

Table 3. Continued

Studies	Independent variables: AI task and knowledge		Independent variables: FLE characteristics and role			Moderator: Organization related attributes							Mediating variables: Cognitive appraisal			Mediating variables: Emotion				Outcome variables: Intention and behavioral outcome		
	TC	KC	JR	AGD	TP	L	T	OC	IRC	CPC	POS	FEI	R	BR	JS	A	C	Lo	D	AIA	TOI	FP
Kong *et al*. (2021)								*							*							
Koo *et al*. (2021)	*											*										
Leung *et al*. (2023)	*	*											*	*						*		
Li *et al*. (2024)	*	*										*								*		
Li *et al*. (2019)										*	*											
Li *et al*. (2019)	*		*			*		*						*						*		*
Liang *et al*. (2022)			*														*			*		
Lin *et al*. (2022)					*									*								*
Lingmont and Alexiou (2020)								*														
Loureiro *et al*. (2023)												*	*		*							
Madan and Ashok (2024)										*			*	*								
Makridis and Han (2021)				*				*				*	*								*	
Malik *et al*. (2022)					*	*								*								*
Mirbabaie *et al*. (2022)															*							
Motamarri *et al*. (2020)		*			*									*								*
Nam (2019)				*											*						*	
Nguyen *et al*. (2023)		*					*					*		*					*			
Paluch *et al*. (2022)																						
Park *et al*. (2024)	*												*	*	*	*	*	*	*	*		
Parvez *et al*. (2022)			*	*	*													*		*	*	*
Pillai *et al*. (2024)		*															*	*		*		
Prentice *et al*. (2020)	*																					
Prentice *et al*. (2023)				*								*			*						*	
Presbitero and Teng-Calleja (2023)				*																	*	
Qiu *et al*. (2022)						*										*	*					
Sattu *et al*. (2024)					*		*						*	*	*				*	*		
Saxena and Mishra (2025)												*										
Shamim *et al*. (2023)							*						*									

(*continued*)

Table 3. Continued

Studies	Independent variables: AI task and knowledge		Independent variables: FLE characteristics and role			Moderator: Organization related attributes							Mediating variables: Cognitive appraisal			Mediating variables: Emotion				Outcome variables: Intention and behavioral outcome		
	TC	KC	JR	AGD	TP	L	T	OC	IRC	CPC	POS	FEI	R	BR	JS	A	C	Lo	D	AIA	TOI	FP
Song *et al*. (2024)	*	*								*	*				*			*	*			*
Song *et al*. (2022)								*						*								
Suseno *et al*. (2022)						*											*					
Tojib *et al*. (2023)	*	*													*				*			
Tong *et al*. (2021)					*									*								*
Vasiljeva *et al*. (2021)		*										*										
Vatan and Dogan (2021)				*																	*	
Verma and Singh (2022)	*	*												*								
Verma and Singh (2022)						*																
Vorobeva *et al.* (2022)					*																	*
Wang *et al.* (2023a, b)												*						*				
Wang *et al.* (2023a, b)	*											*			*							
Wijayati *et al*. (2022)						*																
Willems *et al*. (2023)	*		*								*	*		*	*			*	*	*		*
You *et al*. (2018)													*									
Zhang and Jin (2023)			*																	*		
Zhao *et al*. (2023)									*													
Zhu and Kanjanamekanant (2023)	*														*				*		*	
Zhu *et al*. (2021)				*											*		*				*	
Zirar *et al*. (2023)	*	*			*															*		

Note(s): *Independent variables:* AI Task and Knowledge (TC; Task characteristics, KC; Knowledge characteristics), FLE Characteristics and Role (JR; Job role, AGD; Age and Generational Differences, TP; Technical proficiency)
Moderator: Organization-related attributes (L; leadership, T; transparency, OC; organizational culture, IRC; industrial relations climate, CPC; competitive psychological climate, POS; perceived organizational support, FEI; FLE engagement inititiatives)
Mediating variable: Cognitive Appraisal (R; relationships, BR; AI benefits and risks, JS; job security), Emotion (A; achievement, C; challenge, Lo; loss, D; deterrence)
Outcome variables: Intention and behavioral outcome (AIA; AI adoption, TOI; turn-over intention, FP; FLE performance)
Source(s): Authors' own work

3.4.1.2 AI task characteristics. AI task characteristics refer to the AI's ability to execute predefined functions effectively, encompassing automation, robotics, and service-oriented functions (Song *et al.*, 2024). The delegation of repetitive tasks to AI enhances productivity and allows FLE to concentrate on tasks requiring emotional intelligence and human-centric skills. Such strategic deployment promotes trust and facilitates a shift toward higher-value roles, reinforcing FLE engagement in challenging service scenarios (Paluch *et al.*, 2022). This underscores the critical alignment between task allocation and FLE capabilities in optimizing organizational outcomes and individual satisfaction.

3.4.2 FLE characteristics and role as antecedent. FLE characteristics and roles significantly shape their responses to AI integration, with notable variability driven by job roles, age and generational differences, and technical proficiency (Im and Kim, 2022; Parvez *et al.*, 2022).

3.4.2.1 Job role. A job role is a person's place within a group or organization, encompassing specific required qualifications, duties, and responsibilities (Zhang and Jin, 2023). A clear understanding of FLE roles provides structure for targeted strategies in AI integration. Role-specific impacts, such as technological displacement or shifts in task complexity, cause diverse psychological outcomes (Lingmont and Alexiou, 2020). Tailoring communication, training, and engagement initiatives to these dynamics can mitigate resistance and enhance performance (Vatan and Dogan, 2021; Song *et al.*, 2022). This finding highlights the importance of role-based interventions in addressing AI-related concerns.

3.4.2.2 Age and generational differences. FLE attitudes toward AI are shaped by generational contexts, affecting adaptability, satisfaction, and productivity (Nam, 2019). Understanding these differences can inform customized engagement strategies to enhance AI receptivity across diverse workforce demographics (Presbitero and Teng-Calleja, 2023).

3.4.2.3 Technical proficiency. Technical Proficiency is the ability to use and assess service delivery providers' workflow quality in a work environment (Kang *et al.*, 2023). It is pivotal in moderating FLE responses, with higher proficiency often correlating with greater acceptance and optimism toward AI integration (Sattu *et al.*, 2024). However, even highly skilled tasks are susceptible to displacement (Vorobeva *et al.*, 2022), underscoring the need for continuous skill development. (Parvez *et al.*, 2022).

3.4.3 Organization-related attributes as moderator. Organization-related attributes mediate the relationship between AI knowledge, FLE characteristics, and psychological responses (Madan and Ashok, 2024). For instance, FLE engagement initiatives and appropriate leadership are evidently efficient strategies for improving AI adoption, turnover intention, and FLE performance, which require abundant organizational resources (Prentice *et al.*, 2023; Xie *et al.*, 2023). Organizational changes affect key organizational aspects, including leadership, transparency, organizational culture, industrial relations climate, competitive psychological climate, perceived organizational support, and FLE engagement initiatives, as detailed on Appendix H. Hence, organizations with ample resources are more likely to perform effective strategies in service delivery that assist FLE in AI integration preparation (Vasiljeva *et al.*, 2021).

3.4.4 Cognitive appraisal as mediator. The literature advocates that the relationship between a previously identified set of antecedents and outcomes is mediated by emotions and the CA of FLE psychological responses to AI integration. Various AI Knowledge and Task characteristics lead to positive organizational changes, such as AI information processing and AI job autonomy, by establishing technical expertise and analytical proficiency that inspires creative behavior experiments with more analytical and fact-based solutions (Verma and Singh, 2024); these further improve intention and behavioral outcomes.

3.4.4.1 Relationships. FLE psychological responses are influenced by their degree of connection and trust in their organization (Chowdhury *et al.*, 2022). In organizations with a strong trust culture, FLE feel empowered and are more likely to embrace AI as a tool to enhance their roles and well-being (Park *et al.*, 2024) Conversely, weak relational dynamics

amplify fears of displacement and reduce the effectiveness of AI-driven initiatives (Makridis and Han, 2021).

3.4.4.2 AI benefits and risks. These refer to FLE anticipated advantages and potential drawbacks associated with AI in organizations (Willems *et al.*, 2023). AI acceptance involves a multistage appraisal process: in the primary stage, FLE assess its benefits and risks, while in the secondary stage, they adapt to the workplace dynamics that influence their willingness to collaborate with AI (Lin *et al.*, 2022; Paluch *et al.*, 2022). Effective assessment of the benefits and risks, and development of clear plans and training programs for AI-human collaboration is essential for organizations to harness its full potential (Nguyen *et al.*, 2023). Organizations must address these perceptions through clear communication and well-structured training programs to promote collaboration and trust.

3.4.4.3 Job security. Job security refers to FLE perception of their future positions within an organization, which often serves as a psychological contract wherein they believe the organization will acknowledge their efforts and dedication to service delivery in exchange for employment continuity (Prentice *et al.*, 2023). This perception significantly represents FLE cognitive appraisal, which in turn influences their emotional states. When FLE who feel secure in their jobs are generally more motivated and less resistant to AI integration (Tojib *et al.*, 2023). Clear communication about AI's role and its potential impact on employment helps mitigate fear and foster confidence (Mirbabaie *et al.*, 2022). By contrast, insecure environments exacerbate resistance, reduce morale, and hinder successful adoption.

3.4.5 Emotions as mediator. Managing emotions is an essential component of FLE roles (Kalra *et al.*, 2023). Service organizations and researchers must consider multiple emotional experiences during AI integration (Gkinko and Elbanna, 2022). FLE characteristics and roles influence cognitive evaluations (Chiu *et al.*, 2021; Ding, 2021) which can lead to emotions that affect AI adoption (Kar and Kushwaha, 2023), turnover intention (Khaliq *et al.*, 2022), and FLE performance (Wijayati *et al.*, 2022). Hence, emotions have four categories: achievement, challenge, loss, and deterrence (Hornung and Smolnik, 2022).

3.4.6 Intention and behavioral outcome as an outcome variable. The outcomes of FLE psychological responses to AI integration in the service delivery context can be largely categorized into intention and behavioral outcomes. In the proposed conceptual framework, the outcome variables include three aspects: AI adoption, turnover intention, and FLE performance.

3.4.6.1 AI adoption. AI adoption reflects the extent to which FLE integrates AI technologies into workflows. This outcome hinges on their willingness and CA, as FLE who recognize AI's benefits are more likely to embrace it as a job performance enhancement and career progression tool (Im and Kim, 2022). Research indicates that AI adoption significantly affects FLE cognitive appraisals during AI integration, which, in turn, influences FLE characteristics and roles, AI tasks, and knowledge (Cheng *et al.*, 2023). However, the literature also reveals gaps in the understanding of the long-term behavioral impacts of AI adoption, highlighting the need for further exploration (Malik *et al.*, 2022).

3.4.6.2 Turnover intention. Turnover intention is closely tied to psychological responses to AI, and AI-induced job insecurity is a key driver of turnover intention, particularly in sectors heavily reliant on automation (Saxena and Mishra, 2025). This presents a contradiction for service industries that prioritize customer satisfaction but face high turnover rates (Koo *et al.*, 2021). Addressing turnover intention requires targeted strategies to bolster FLE confidence and security, such as upskilling initiatives and transparent communication regarding AI role in organizational transformation (Kang *et al.*, 2024).

3.4.6.3 FLE performance. Studies have focused on FLE performance as a key determinant of intention and behavioral outcomes, with AI integration and FLE engagement directly influencing productivity and service quality (Wijayati *et al.*, 2022). For instance, fostering positive emotions and providing robust support systems can significantly enhance FLE performance, underscoring the interplay between individual responses and broader organizational objectives (Pasamehmetoglu *et al.*, 2017).

3.5 Development of an integrated conceptual framework

Using CA Theory, the variables from the extant literature are synthesized to develop a conceptual framework that highlights the influence of AI tasks and knowledge, along with FLE characteristics and roles, on the outcome variable, as illustrated in Figure 2. This outcome variable depicts the FLE psychological responses to AI integration, encompassing both the positive and negative impacts of AI. The CA Theory asserts that FLE psychological responses are shaped by their evaluations and interpretations of their circumstances. Hence, the FLE assessment of relationships and personal resources represent cognitive mediators in the relationship between the antecedents and outcome variables. Meanwhile, the COR theory posits that the availability or lack of organization-related attributes moderates the impact of these antecedents. Following Jaakkola (2020), the authors employed a theory synthesis approach to developing the conceptual framework. Using this method, theoretical perspectives from the existing literature can be integrated systematically, ensuring both the framework's cohesiveness and conceptual rigor (Jaakkola, 2020). The conceptual framework systematically coordinates variables, establishes clear connections between theoretical constructs, and synthesizes fragmented research into a coherent structure (Becker and Jaakkola, 2020), achieving three key objectives: (1) combining CA and COR theories to provide a robust explanation of FLE psychological responses; (2) highlighting the roles of mediators and moderators in the relationship between antecedents and outcomes; and (3) providing practical insights for managing AI impact on FLE. This framework not only summarizes existing research but also offers a synthesized model that enhances understanding and facilitates the practical integration of AI into frontline roles.

4. Future research directions

This SLR outlines future research directions for FLE psychological responses to AI in service delivery using the TCCM framework (Paul and Rosado-Serrano, 2019) to identify gaps and propose agendas through theory, context, characteristics, and methodology. Recent studies in top journals have similarly used the TCCM to guide future research (Pasca *et al.*, 2021; Adil *et al.*, 2022; Kim *et al.*, 2023). The following section discusses the TCCM-based research agenda and addresses our final research question (i.e. *RQ4*).

4.1 Theory development

While interest in FLE psychological responses to AI integration persists, empirical evidence on the domain factors is lacking (Chowdhury *et al.*, 2022). The absence of a consistent

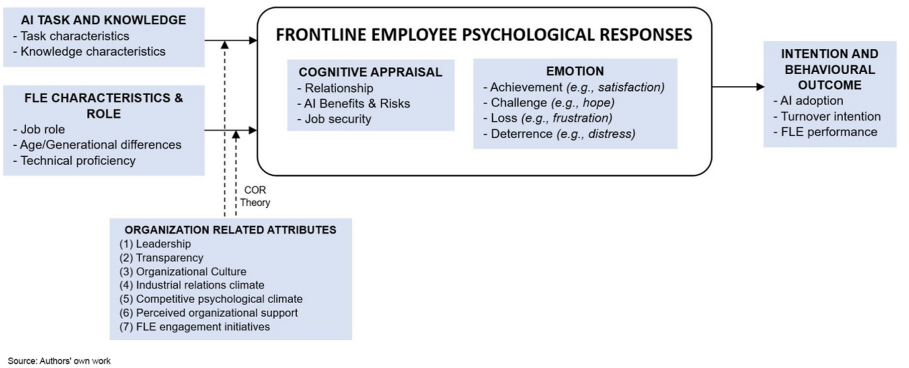

Figure 2. Proposed conceptual framework for FLE psychological responses to AI integration in service delivery

theoretical framework underscores the need for broader perspectives in future research. This study advocates for refined theoretical contributions, utilizing the two prominent theories used in the extant literature.

4.1.1 The use of cognitive appraisal theory. Future research should focus on several CA areas, as proposed in the AI integration framework for service delivery. First, investigating the antecedents that shape FLE cognitive appraisals of AI will allow organizations to pinpoint specific factors that influence how FLE perceive and evaluate AI, thereby enabling targeted interventions to manage FLE psychological responses effectively. Given employee characteristics, researchers may examine the effectiveness of career roadmaps in reassuring FLE about job stability during AI integration (Kong *et al.*, 2021; Presbitero and Teng-Calleja, 2023), highlighting AI as a supportive tool rather than a replacement. Additionally, exploring approaches that position FLE training programs as rewarding rather than obligatory can encourage AI adoption. As such, investigating the effectiveness of gamified job designs and training programs (Malik *et al.*, 2022) for FLE upskilling can also mitigate fears, leading to better acceptance. Second, longitudinal studies on CA are necessary to understand how FLE appraisals evolve over time as AI becomes more embedded in service delivery roles. Future researchers could explore how initial concerns about job security may shift to increased job satisfaction as FLEs experience the benefits of AI in reducing workload and improving service delivery (Vatan and Dogan, 2021). Third, exploring cross-cultural variations in FLE psychological responses toward AI can offer insights into how different cultural contexts influence FLE psychological responses to AI integration. A comparative study between developed and developing countries or regions within continents can explore how cultural norms influence distinct CAs (Shamim *et al.*, 2023). Finally, we explore organization-related attribute strategies and interventions to enhance positive FLE psychological responses. Although previous studies have highlighted the significant effects of various organization-related attributes on CA, examining the combinations and developing measurement scales (Arias-Perez and Velez-Jaramillo, 2022a) for FLE psychological responses could offer valuable insights. Considering the CA theory empowers FLE to accept and establish expectations and thus better understand AI, including its limitations and scope (Chiu *et al.*, 2021). Considering the antecedents' nature carefully helps to more easily align FLE psychological responses to promote positive perceptions of AI value and its contribution to service delivery (Verma and Singh, 2024).

4.1.2 The use of conservation of resources theory. The current literature indicates that FLEs have more positive psychological responses to AI integration when organizational resources for service delivery are adequately provided, especially if these resources are abundant. However, loss events during the transition period of AI integration are often the cause of negative psychological responses that increase vulnerability (Hobfoll, 1989). For instance, FLE who expect gains in training and have mastered their service delivery may experience negative psychological responses to the idea of leaving behind old service delivery routines or unlearning and relearning new skills or work processes. Hence, future research could investigate the significant relationships among various organization-related attributes, examining how they complement each other and affect FLE psychological responses to AI integration. (Li *et al.*, 2019). Further, investigating the impact of organizational support programs such as immersive virtual environments that influence FLE resilience to AI integration in service delivery (You *et al.*, 2018) could explore the extent to which these programs help FLEs acquire, maintain, and secure their career competencies, and how this affects their intention and behavioral outcomes. Additionally, studies could investigate the role of organization-related attributes in shaping FLE psychological responses as well as the long-term impacts of AI integration on organization-related attributes. Understanding these dynamics can offer insights into optimizing resource allocation and promoting positive psychological responses to AI integration initiatives for collaborative service delivery.

4.2 Context

Studies on FLE psychological responses to AI integration in service delivery were conducted across 37 countries. Notably, 16.51% of the studies gathered data from China, 12.84% from the USA, 9.7% from India, and 7.34% from the UK Hence, almost half (45.86%) of the extant literature concentrated on data gathered from respondents in these four countries, raising concerns about the findings' generalizability. Researchers should prioritize conducting studies in diverse and underrepresented countries for a comprehensive understanding from a global perspective. Previous studies have primarily focused on fragmented contexts. To advance the field, future research should examine the significant effects of FLE psychological responses to AI integration on AI adoption, turnover intention, and FLE performance. Addressing these gaps will provide comprehensive insight into AI's impact on FLEs, thereby enabling more effective and culturally sensitive AI integration strategies.

4.3 Characteristics

Given the nascent stage of AI integration in service delivery roles, FLE psychological responses warrant more attention. (Liang *et al.*, 2022). The SLR shows that researchers primarily examined AI tasks and knowledge, perceived benefits of AI, and AI awareness as antecedents of the domain. Hence, future researchers can examine four characteristics: (1) the industry scope, (2) the long-term effects, (3) the influencing factors, and (4) the customers' perspectives.

4.3.1 Broaden industry scope. The extant literature has targeted specific regions or industries, limiting the generalizability of the findings (Liang *et al.*, 2022). Future studies should cover a wider range of service-related sectors, such as hospitality, retail, healthcare, and customer support, across various cultural contexts to determine whether the psychological effects of AI are consistent across different service industries. For instance, integrating AI into healthcare may reveal unique stressors related to high-stakes decision-making and patient care; however, if healthcare practitioners perceive that AI helps avoid human bias and increase accuracy of information provided to patients, they are more likely to be satisfied (Wang *et al.*, 2023a, b). Conversely, AI in the hospitality sector could highlight challenges in customer interaction, requiring consideration of the technology's anthropomorphic, entertainment, functional, and informational attributes (Qiu *et al.*, 2022). By including a variety of industries and regions, research can provide more robust insights into how AI affects FLE psychological well-being and job performance (Verma and Singh, 2022).

4.3.2 Investigate long-term effects. The pandemic highlighted the increasing reliance on AI, which remains a permanent fixture in service delivery (Leung *et al.*, 2023). Long-term effects should be studied to track changes in FLE attitudes, stress levels, and job satisfaction over time. Such studies should focus on developing strategies or training programmes that address the psychological impact of AI on FLE. For example, continuous training and support can mitigate initial fears of job displacement by helping FLE perceive AI as a tool that enhances their roles, rather than replacing them. This approach provides a comprehensive view of how AI-enabled job characteristics influence long-term FLE wellbeing and performance, leading to more effective AI integration strategies in the service industry (Verma and Singh, 2022).

4.3.3 Explore factors to develop effective management strategies. Beyond job characteristics, we investigate organizational and personal factors such as leadership styles, innovation climate, and organizational support (Liang *et al.*, 2022). Additionally, individual differences, such as age, cultural background, and previous experience with technology, are crucial in shaping FLE psychological responses to AI. For instance, supportive leadership and a positive innovation climate can significantly enhance FLE acceptance and engagement with AI. Research should examine not only the triggers of FLE psychological responses to AI integration but also the means to promote positive engagement with AI adoption, prevent turnover intentions, and support performance. Identifying stressors and resistance sources as

well as understanding how supportive leadership, continuous training, and a positive organizational culture can enhance AI acceptance among FLE, is vital. Implementing robust training programs can demystify AI and alleviate fears of job displacement. Creating a supportive environment in which FLE is valued and understood can reduce turnover intentions and improve job satisfaction. Understanding these factors can help develop comprehensive strategies to support FLE, ensuring that they perceive AI as a beneficial addition to their roles rather than a threat (Khaliq *et al.*, 2022).

4.3.4 Customers' perspectives as an outcome variable. When integrating AI, service organizations should approach the human-AI relationship as a collaboration that benefits customers (Do *et al.*, 2023). Reducing FLE negative psychological responses and enhancing positive ones leads to higher service hospitality. Specifically, fatigue or burnout often result in service indifference or negative attitudes, whereas positive emotions motivate FLE to serve customers enthusiastically (Kong *et al.*, 2021; Qiu *et al.*, 2022). Empowering FLE enhances market understanding and fosters adaptive customer engagement (Motamarri *et al.*, 2020). As this SLR focused on the influence of FLE psychological responses on their intentions and behavioral outcomes, future researchers may explore different outcomes that bridge the gap related to customers' perspectives and how sustained positive psychological responses in FLE affect long-term customer satisfaction and loyalty, as well as how AI integration can be optimized to support service excellence. Such studies can provide a more comprehensive understanding of the impact on overall service quality.

4.4 Methodologies

The synthesis of FLE psychological responses to AI integration literature shows diverse methodologies. Among the 67 reviewed studies (11 using mixed methods), a predominant trend for quantitative methods was evident, with 61 studies using surveys. A smaller subset used interviews in 15 studies and less than five each from other methods, indicating opportunities for further qualitative studies that can provide in-depth knowledge of the domain (Van't Riet *et al.*, 2001). As FLE psychological responses to AI integration have been studied for less than a decade, this area has significant potential for further development. For instance, conducting interviews with FLE across different service industries can yield deeper insights into quantitative trends and reveal potential disparities in results when compared with different datasets (Vatan and Dogan, 2021; Koo *et al.*, 2021). Future research should integrate mixed-methods studies that combine surveys and in-depth interviews. This will provide a more balanced understanding and reveal the underlying reasons for the observed trends. Diversifying methodological approaches will enhance the robustness of research outcomes and improve AI integration strategies.

5. Academic and practical implications

This study has several implications. First, this SLR synthesizes research on FLE psychological responses to AI integration in service delivery, examining and analyzing the evolution of FLE psychological responses to AI research over time. Research on FLE psychological responses to AI integration has been conducted for less than a decade. The literature remains fragmented, showcasing various emerging strategies to address negative FLE psychological responses and presenting numerous avenues for future research. While a few reviews have summarized the literature on this domain, they have a limited scope. For instance, extant literature were limited to AI identity threat (Mirbabaie *et al.*, 2022), FLE empowerment (Motamarri *et al.*, 2020), empathetic creativity, (Do *et al.*, 2023) or co-existence (Zirar *et al.*, 2023). This SLR analyzes the development of FLE psychological responses to AI integration through publication outlets, years, countries, theories, contexts, and methods.

Second, this SLR reinforces the theoretical frameworks underpinning research on FLE psychological responses to AI integration in service delivery. The analysis revealed that

despite the heightened research interest, only 53 theories were identified across 67 papers, with 51 of these theories appearing in fewer than five studies. Notably, 15 studies lacked theoretical foundations, indicating the lack of theoretical focus. This SLR suggests that future studies should leverage two prominent theories, CA and COR, to strengthen the theoretical basis of this domain.

Third, this study proposes a conceptual framework for FLE psychological responses to AI integration in service delivery, drawing on variables that have been widely studied. This review categorizes the antecedents of FLE psychological responses to AI integration into AI tasks and knowledge and FLE characteristics and roles. All FLE psychological responses were synthesized by breaking them down into CA and emotion, with these components illustrated as mediators between sources and outcomes within the framework. The effects of FLE psychological responses are categorized as FLE intentions and behavioral outcomes. Depending on the effectiveness of organization-related attributes, these outcomes are generally divided into AI adoption, turnover intention, and FLE performance. Overall, our research offers a framework that synthesizes FLE psychological responses to AI integration in the service delivery literature, which provides a comprehensive understanding of the domain. Building on the valuable contributions of previous reviews, this SLR presents a comprehensive keyword search strategy and a thoroughly developed conceptual framework, as detailed in Appendix A and Figure 2, respectively. Hence, this conceptual framework represents the first attempt to integrate the variables (antecedents, mediators, moderators, and outcomes) demonstrated in the FLE psychological responses to AI integration literature into a concise model.

Fourth, the SLR highlights unexplored areas in FLE psychological responses to AI integration; offers insightful recommendations for future research, as proposed by the existing literature and the TCCM framework; and provides emergent insights into FLE intention and behavioral outcomes. The proposed framework indicates that CA and emotions drive intention and behavioral outcomes in service delivery.

For practical implications, this SLR provides insights into service-driven organizations. First, based on a synthesis of FLE psychological responses to AI integration, a framework was proposed to illustrate antecedents, mediators, moderators, and outcomes. Specifically, the antecedents were classified into AI tasks and knowledge as well as FLE characteristics and roles, enabling service organizations to understand the full range of factors driving FLE psychological responses. This framework also synthesizes the CAs and emotions that affect FLE intentions and behavioral outcomes. Thus, the framework provides valuable insights into service-oriented businesses regarding the factors driving FLE psychological responses and classifies constructs to address FLE intentions and behavioral outcomes. Consequently, organizations should develop strategies and training programs aligned with AI tasks, knowledge, and FLE characteristics and roles to improve FLE psychological responses, leading to positive intentions and behavioral outcomes.

6. Limitations and conclusion

This SLR has several limitations. First, as the study adhered to the predetermined PRISMA process for selecting academic research and reviewed only articles that satisfied these requirements (Table 4), the SLR analysis and findings cannot be generalized to all FLE psychological responses to AI integration in the service delivery domain. Second, this study considered research published in English. This approach may have overlooked relevant studies published in other languages, potentially biasing the findings toward English-speaking academic discourse. Third, while efforts were made to include a broad range of reputable studies, the rapid evolution of AI and FLE adoption in service delivery means that newer studies beyond the authors' review period, from April 2023 to June 2024, could offer additional insights not captured in this SLR. Future updates or supplementary reviews are necessary to address this emerging research topic. Fourth, this SLR focused on synthesizing

Table 4. Future research directions proposed by extant literature

Category	Research focus	Representative studies	Research Priority
Theories	Investigate antecedents, evolution, and cross-cultural variations in cognitive appraisals of AI by FLE	Kong *et al.* (2021), Presbitero and Teng-Calleja (2023), Shamim *et al.* (2023), Chiu *et al.* (2021), Liang *et al.* (2022)	*High Priority:* Understanding cognitive and emotional responses is critical for effective AI integration in global contexts. Cross-cultural comparisons could illuminate cultural moderators influencing AI acceptance and appraisals
	Examine the role of Conservation of Resources Theory in mitigating FLE negative psychological responses to AI.	Li *et al*. (2019), You *et al*. (2018), Liang *et al.* (2022), Verma and Singh (2022), Khaliq *et al*. (2022)	*Moderate Priority:* Enhancing resilience during transitions can improve retention and performance. Exploring how organizational resources buffer stressors adds valuable insights into effective integration strategies
	Investigate the intersection of ORA and gamified designs for upskilling FLE to support AI adoption	Li *et al*. (2019), Verma and Singh (2022)	*Moderate Priority:* Training frameworks that incorporate gamification and ORA strategies can significantly improve engagement and reduce adoption resistance
Context	Explore FLE psychological responses to AI integration in underrepresented and diverse global contexts	Wang *et al.* (2023a, b), Shamim *et al.* (2023), Verma and Singh (2022), Presbitero and Teng-Calleja (2023)	*High Priority:* Regional disparities in AI adoption and FLE psychological outcomes necessitate broader geographical research, especially in underrepresented countries
Characteristics	Broaden the scope of AI research to include underexplored industries and regions	Liang *et al*. (2022), Qiu *et al*. (2022), Wang *et al.* (2023a, b), Verma and Singh (2022), Leung *et al*. (2023)	*High Priority:* Expanding research to diverse sectors like healthcare, hospitality, and retail could provide industry-specific insights into FLE stressors and satisfaction
	Investigate long-term psychological impacts of AI on FLE, including job satisfaction, stress, and training effectiveness	Wang *et al.* (2023a, b), Leung *et al*. (2023), Verma and Singh (2022), Presbitero and Teng-Calleja (2023)	*High Priority:* Longitudinal research on psychological outcomes is essential for developing robust, sustainable AI integration strategies
	Identify organizational and individual factors influencing FLE acceptance of and engagement with AI.	Khaliq *et al*. (2022), Kong *et al*. (2021), Liang *et al*. (2022), Motamarri *et al*. (2020)	*Moderate Priority:* Leadership styles, innovation climates, and personalized support systems require further exploration to understand their impact on engagement
	Examine customers' perceptions as an outcome variable to determine long-term effects on service quality	Do *et al*. (2023), Qiu *et al*. (2022), Motamarri *et al*. (2020), Kong *et al*. (2021)	*Moderate Priority:* Linking FLE responses to customer satisfaction and service quality will bridge gaps in understanding human-AI collaboration impacts

(*continued*)

Table 4. Continued

Category	Research focus	Representative studies	Research Priority
Methods	Employ longitudinal and cross-national studies to assess dynamic FLE psychological responses to AI integration	Willems *et al.* (2023), Verma and Singh (2022), Shamim *et al.* (2023), Wang *et al.* (2023a, b)	*High Priority:* Longitudinal methods are key to understanding evolving psychological impacts, while cross-national approaches can address global variability
	Focus on qualitative methods to explore nuanced FLE responses to AI across various service industries	Liang *et al.* (2022), Shamim *et al.* (2023), Verma and Singh (2022), Do *et al.* (2023)	*Moderate Priority:* Qualitative methods can complement quantitative research, providing deeper insights into individual and contextual variables affecting FLE attitudes and behaviours

Source(s): Authors' own work

existing literature from ranked journals, which may introduce publication bias toward studies with statistically significant findings (e.g. conference papers, chapter books) or those aligned with mainstream theoretical frameworks. This bias may have affected the comprehensiveness and diversity of perspectives included in this review. Fifth, our study focuses on AI, which is generally divided into AI knowledge and AI task characteristics (Verma and Singh, 2022). Beyond AI, future researchers should investigate other vast innovations in the fourth industrial revolution, such as smart technology, robotics, and algorithms. Additionally, the growing research on chatbots and generative AI can challenge established norms, policies, and standards of good research practices, potentially reshaping the future of research and service delivery. (Leslie, 2023).

In conclusion, this SLR systematically synthesized the evolving landscape of FLE psychological responses to AI integration in service delivery. By categorizing the research according to theoretical frameworks, contextual factors, methodological approaches, and key constructs, this study provides a comprehensive framework for understanding the complex dynamics of the domain.

This study also identifies several avenues for future research, including the need for longitudinal studies to track evolving FLE perceptions, more inclusive studies across diverse global contexts beyond heavily represented countries, and deeper explorations of the practical implications of FLE psychological response interventions in service delivery settings. Additionally, this study fills gaps in the existing literature using empirical research spanning diverse theoretical foundations, characteristics, contexts, and methodologies (Table 4), structures a conceptual framework that merges existing theories, enhances the comprehension of the current literature, and pinpoints potential research directions for further exploration within the domain. The proposed directions offer constructive avenues for advancing the literature, strategic opportunities for further exploration of FLE psychological responses to AI integration, and virtuous potential for refining the diverse constructs toward FLE psychological responses to AI integration affecting FLE intention and behavior.

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Supplementary material
The supplementary material for this article can be found online.

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