International Journal of Research in Medical Sciences
Sharma S et al. Int J Res Med Sci. 2026 Jan;14(1):226-241
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20254386

Systematic Review

Transformative role of artificial intelligence in promoting nurses' mental resilience and quality of care delivery: from burden to balance

Swati Sharma[1], Pritika[2], Pradhyumn Kumar[3], Phanindrareddy Badduri[4], Sivakumar Anusha[5], Prerna Lucas[6], Vijayaraddi Vandali[7], Surekha Appireddygari[8], N. Prabha[9], S. Tongpangkokla Ozukum[10], Saravanan S.[11], Mohammed Umar[12]*

[1]Department of Mental Health Nursing, M. M. Institute of Nursing and Research, MMU, Ambala, Haryana, India
[2]Department of Mental Health Nursing, ESIC College of Nursing, Indiranagar, Bangalore, Karnataka, India
[3]Department of Child Health Nursing, Arihant College of Nursing, HNBMU, Haridwar, Uttarakhand, India
[4]Department of Child Health Nursing, Dr. Anjireddy College of Nursing, Piduguralla, Andhra Pradesh, India
[5]Department of Mental Health Nursing, Aditya College of Nursing, RGUHS Bangalore, Karnataka, India
[6]Department of Mental Health Nursing, Adeshwar Nursing Institute, Pandit Deendayal Upadhyay Memorial Health Sciences and Ayush University, Jagdalpur, Raipur, Chhattisgarh, India
[7]Department of Medical Surgical Nursing, Shree Gopaldev Jadhav College of Nursing, RGUHS, Kalaburagi, Karnataka, India
[8]Department of Medical Surgical Nursing, SEA College of Nursing, RGUHS, Bangalore, Karnataka, India
[9]Department of Medical Surgical Nursing, Karuna College of Nursing, Kerala University of Health Sciences, Palakkad, Kerala, India
[10]Department of Child Health Nursing, IMDH College of Nursing, Mokokchung, Nagaland, India
[11]Department of Mental Health Nursing, Sri Gokulam College of Nursing, Dr. M.G.R. Medical University, TN, India
[12]Department of Nursing, Uttar Pradesh University of Medical Sciences, Saifai, Etawah, India

Received: 02 November 2025
Revised: 12 November 2025
Accepted: 19 December 2025

***Correspondence:**
Mohammed Umar,
E-mail: umarrathore0786@gmail.com

ABSTRACT

The transformative integration of artificial intelligence (AI) in nursing practice has emerged as a crucial innovation to mitigate occupational stress, enhance psychological resilience, and improve the overall quality of care delivery. As healthcare systems face mounting workloads, AI-driven technologies-such as machine learning, affective computing, and predictive analytics-offer meaningful pathways to achieve a balance between technological precision and human compassion. This systematic review critically synthesizes global evidence on AI's role in promoting nurses' mental resilience and optimizing patient-centered care outcomes. Following PRISMA 2020 and Joanna Briggs institute (JBI) guidelines, five major electronic databases-PubMed, Scopus, CINAHL, Web of Science, and Cochrane Library-were systematically searched for studies published between 2014 and 2024. A total of 78 studies met the inclusion criteria after rigorous screening, quality appraisal, and ROBINS-I/CASP bias assessment. Thematic and quantitative analyses revealed that AI interventions resulted in an average 28-35% improvement in resilience and a 22-32% enhancement in care quality. Among intervention types, simulation-based AI and affective computing yielded the highest combined benefits, while automation and predictive analytics consistently enhanced operational efficiency. Additionally, governance frameworks contributed indirectly to fostering ethical confidence and long-term trust in AI adoption. Overall, the findings underscore AI's transformative potential in harmonizing innovation with empathy, empowering nurses toward sustainable well-being and professional excellence. When implemented responsibly, AI redefines modern nursing-from burden to balance-anchored in emotional intelligence, ethical stewardship, and evidence-based precision.

Keywords: Artificial intelligence, Nursing resilience, Affective computing, Predictive analytics, Simulation training, Burnout prevention, Digital transformation, Quality of care

INTRODUCTION

Nurses constitute the largest segment of the global healthcare workforce, representing the backbone of clinical service delivery.[1] Their role extends far beyond technical care to encompass communication, empathy, and patient advocacy.[2] Despite this critical position, nurses continue to experience disproportionate psychological strain resulting from escalating workloads, staff shortages, and moral distress.[3] Chronic exposure to such pressures erodes well-being, diminishes motivation, and compromises both safety and quality of care.[4]

Burnout, characterized by emotional exhaustion, depersonalization, and reduced personal accomplishment, has been formally recognized by the world health organization as an occupational syndrome.[5] Large-scale analyses reveal that between one-third and two-thirds of nurses globally experience moderate-to-severe burnout at some point in their careers.[6] These trends threaten not only individual health but also healthcare sustainability through increased turnover and absenteeism.[7] Consequently, cultivating mental resilience-the ability to adapt positively to stress and recover from adversity-has emerged as a strategic imperative for nursing practice.[8]

Traditional resilience interventions emphasize individual coping methods such as mindfulness or cognitive restructuring.[9] While beneficial, these approaches provide limited protection when systemic stressors time scarcity, administrative overload, and information fragmentation-persist.[10] To achieve sustainable balance, structural reform is needed to address both psychological and operational determinants of strain.[11] AI has recently gained attention as a mechanism for achieving this reform.[12]

AI encompasses computational systems capable of mimicking human cognition, including perception, learning, reasoning, and problem-solving.[13] In healthcare, AI applications range from diagnostic imaging and clinical decision-support to robotic surgery and predictive analytics.[14] Its capacity to process large datasets rapidly allows clinicians to anticipate risks and optimize workflows.[15] For nurses, AI offers dual advantages: reducing cognitive burden through automation and improving decision quality through data-driven insight.[16]

Over the past decade, several studies have reported measurable psychological and operational benefits following AI integration. In South Korea, an AI-enabled documentation system shortened charting time by 37% and reduced perceived workload by 22%.[17] In Europe, triage algorithms decreased administrative effort by nearly one-third, accompanied by higher job-satisfaction scores.[18] These findings highlight AI's potential to convert technological efficiency into psychological relief. Resilience in nursing refers to the dynamic process of maintaining stability and well-being despite occupational stressors.[19] The job demands-resources (JD-R) model explains that stress results when job demands exceed available resources.[20] AI serves as an additional resource, enhancing control, predictability, and feedback, thereby reducing the demand-resource imbalance that triggers burnout.[21] The transactional model of stress and coping complement this view by defining stress as the outcome of cognitive appraisal and coping capacity.[22] AI improves situational awareness and predictability two core elements shaping appraisal thus re-framing stress as a challenge rather than a threat.[23] Together, these frameworks clarify how AI may act not only as an operational tool but as a contextual moderator of resilience.

Recent advances extend AI's function beyond logistics into affective computing, where algorithms interpret emotional cues from physiological or linguistic data.[24] Wearable sensors detect stress indicators such as heart-rate variability or galvanic skin response, while machine-learning models deliver tailored relaxation prompts.[25] Controlled trials among intensive-care nurses demonstrated 30-35% reductions in perceived stress and 20% increases in resilience after eight weeks of wearable-AI use.[26]

Similarly, conversational agents such as MindMate employ natural-language processing to engage in reflective dialogue, offering cognitive-behavioural feedback following difficult shifts.[27] These "digital companions" mitigate emotional exhaustion and enhance self-awareness two central pillars of resilience.[28] Nevertheless, ethical and privacy issues remain, particularly concerning emotional surveillance and data ownership.[29]

Early concerns suggested that automation could erode nursing autonomy. However, emerging evidence indicates that AI, when framed as a collaborative partner, strengthens professional identity.[30] Decision-support systems validate clinical judgment, enabling faster, evidence-informed actions that bolster confidence.[31] Simulation-based AI training enhances adaptive coping and crisis management skills.[32] By reinforcing competence and mastery key antecedents of self-efficacy AI contributes to long-term resilience.[33] Conversely, poorly implemented AI can induce technostress, especially when systems are imposed without consultation or adequate training.[34] Successful implementations are characterized by co-design, transparency, and leadership endorsement.[35]

Ethical integrity determines whether AI alleviates or exacerbates psychological strain.[36] Algorithmic bias, opaque reasoning, and misuse of biometric data can undermine trust and intensify anxiety.[37] Frameworks such as value-sensitive design and layered AI Governance advocate participatory development processes that foreground fairness and accountability.[38]

Studies show that when nurses are included in decision-making about data usage and system goals, stress levels decline and engagement rises.[39]

Cultural context also shapes adoption. In collectivist societies like Japan and South Korea, AI and robotics are perceived as collaborative aids aligning with team harmony.[40] In more individualistic settings such as the United States or United Kingdom, concerns about autonomy predominate.[41] These variations underscore the need for culturally sensitive education and open ethical discourse to ensure equitable integration. Institutional readiness including leadership vision, infrastructure, and workforce competence is a decisive determinant of AI's impact.[42] Transformational leaders foster psychological safety, encourage experimentation, and model curiosity toward technology.[43] Facilities exhibiting such climates report smoother implementation and reduced burnout.[44]

Digital literacy is equally critical. Nurses who understand AI's capabilities and limitations experience lower technostress and higher confidence.[45] Integrating AI literacy into curricula and continuing-education programs ensures that technology complements, rather than replaces, professional intuition.[46] Adoption rates differ across regions. High-income nations lead in advanced predictive and emotional-AI systems, whereas low- and middle-income countries employ mobile or lightweight solutions.[47] Despite resource variation, outcome direction is consistent: workload reduction, improved satisfaction, and enhanced care quality.[48]

Nevertheless, research gaps persist. Longitudinal evidence remains scarce, and standardised measures of resilience are inconsistently applied.[49] Furthermore, ethical frameworks are not uniformly operationalised, leaving uncertainties regarding data governance.[50] Cross-cultural studies with robust methodologies are needed to determine sustained psychological and clinical impacts.[51]

The synthesis of current evidence supports a conceptual shift from burden toward balance. Historically, nurses have coped reactively with systemic stressors. AI now provides tools for proactive adjustment by redistributing workload, improving foresight, and delivering emotional feedback.[52] When ethically deployed and culturally aligned, AI restores the equilibrium between professional demands and personal well-being.[53]

This "burden-to-balance" model frames AI not as a replacement for human compassion but as a mechanism for preserving it. By aligning technological intelligence with emotional intelligence, health systems can sustain resilient, high-performing nursing workforces in an era of accelerating complexity.[54]

METHODS

Study design

This review adhered to the methodological guidance of the preferred reporting items for systematic reviews and meta-analyses (PRISMA 2020) and incorporated the JBI approach for comprehensive evidence synthesis.[55,56] A mixed-method systematic review design was adopted to capture both quantitative and qualitative evidence regarding how AI influences nurses' resilience and quality of care. This design allows convergence of diverse methodologies, providing a holistic understanding of psychological and operational outcomes.[57]

The review sought to identify the types of AI interventions implemented within nursing contexts, assess their influence on nurses' mental resilience, well-being, and job satisfaction, evaluate impacts on patient-care quality and safety and explore ethical, organisational, and cultural mediators affecting outcomes.

Research questions

Using the population-intervention comparison outcome (PICO) framework, four guiding questions were formulated show in Table 1.[58]

Some questions are what forms of AI technology are employed in nursing practice? How do these interventions influence resilience and psychological well-being? What measurable effects emerge on quality of care? Which contextual factors facilitate/hinder AI's positive influence?

Table 1: PICO frameworks for research questions.

PICO element	Operational definition	Application to this review
Population (P)	Registered/ professional nurses	Clinical, community, and educational settings
Intervention (I)	AI systems or applications	Predictive analytics, automation, robotics, affective AI
Comparison (C)	Non-AI standard practice	Manual or traditional approaches
Outcome (O)	Resilience and care quality indicators	Burnout scores, stress indices, patient outcomes

Eligibility criteria

The inclusion criteria for the review encompassed peer-reviewed empirical studies published between 2014 and 2024, written in English, and reporting on the integration of AI relevant to nursing practice. Eligible studies employed quantitative, qualitative, or mixed-methods research designs and examined outcomes related to nurses' mental resilience, burnout, job satisfaction, or quality of care delivery. In contrast, studies were excluded if they focused exclusively on physicians, administrators, or other non-nursing populations; comprised non-empirical works such as commentaries, editorials, or conference abstracts; or presented algorithm-development research without the inclusion of human participants.

Information sources

Electronic searches were conducted across PubMed/MEDLINE, CINAHL, Scopus, Web of Science, and the Cochrane Library. Additional records were retrieved from IEEE Xplore and ScienceDirect to capture interdisciplinary AI-health research. Hand-searching of reference lists from included studies minimized publication bias. Searches covered January 2014 to June 2024.

Search strategy

Following librarian consultation, MeSH-based Boolean expressions were employed [63]: ("Artificial intelligence" OR "machine learning" OR "deep learning") AND ("Nurses" OR "Nursing") AND ("resilience, psychological" OR "burnout, professional" OR "stress, occupational") AND ("Quality of health care" OR "patient safety"). Language and peer-review filters were applied.

Table 2: MeSH term search strategies.

Database	Search terms/MeSH headings	Boolean operators and field codes	Filters/limits applied	No. of records retrieved
PubMed/ MEDLINE	("Artificial Intelligence"[MeSH]) OR ("Machine Learning"[MeSH]) OR ("Deep Learning") OR ("Robotics"[MeSH]) OR ("Predictive Analytics") AND ("Nurses"[MeSH]) OR ("Nursing Staff"[MeSH]) OR ("Nurse Clinicians") AND ("Resilience, Psychological" [MeSH]) OR ("Burnout, Professional" [MeSH]) OR ("Stress, Psychological" [MeSH]) AND ("Quality of Health Care"[MeSH]) OR ("Patient Safety"[MeSH])	Boolean: AND/OR between each concept. Field codes: [MeSH] for controlled vocabulary, [tiab] for title/abstract.	Filters: English, Humans, 2014-2024, peer-reviewed journals.	893
CINAHL (EBSCOhost)	(MH "Artificial Intelligence") OR (MH "Machine Learning") OR "Predictive Analytics" OR "Automation" AND (MH "Nurses+") OR "Registered Nurse" OR "Nursing Personnel" AND (MH "Resilience, Psychological") OR (MH "Occupational Stress") OR "Burnout" AND (MH "Quality of Health Care") OR "Patient Safety"	Boolean: AND/OR; wildcards () used for truncation (e.g., nurs).	English, peer reviewed, 2014-2024.	654
Scopus (Elsevier)	TITLE-ABS-KEY ("artificial intelligence" OR "machine learning" OR "robotics" OR "automation") AND TITLE-ABS-KEY ("nurse*" OR "nursing") AND TITLE-ABS-KEY ("resilience" OR "burnout" OR "mental health" OR "psychological stress") AND TITLE-ABS-KEY ("quality of care" OR "patient safety")	Field: TITLE-ABS-KEY; Boolean operators applied	English; Document type=article; years 2014-2024.	474
Web of science (Core collection)	TS = ("Artificial Intelligence" OR "Machine Learning" OR "Deep Learning" OR "Predictive Analytics") AND TS = ("Nurse*" OR "Nursing Staff") AND TS = ("Resilience" OR "Burnout" OR "Stress" OR "Mental Health") AND TS = ("Quality of Care" OR "Patient Safety")	Boolean: AND/OR; topic search (TS).	Language=English; document type=article	232
Cochrane library	("Artificial Intelligence" OR "Machine Learning" OR "Predictive Analytics") in Title Abstract Keyword AND ("Nurses" OR "Nursing") AND ("Resilience" OR "Stress" OR "Burnout")	Simple Boolean search across CENTRAL, Cochrane reviews, and trials	Filters: 2014-2024, Human, English.	118
IEEE xplore	("Artificial Intelligence" OR "Machine Learning" OR "Deep Learning" OR "Affective Computing") AND ("Nursing"	Field: abstract and metadata; Boolean logic used.	Year: 2014-2024; English only.	96

Continued.

Database	Search terms/MeSH headings	Boolean operators and field codes	Filters/limits applied	No. of records retrieved
	OR "Healthcare Professionals") AND ("Stress Detection" OR "Emotion Recognition" OR "Resilience")			
ScienceDirect (Elsevier)	("Artificial Intelligence" OR "Machine Learning" OR "Predictive Modeling") AND ("Nursing Practice" OR "Healthcare Professionals") AND ("Resilience" OR "Burnout" OR "Quality of Care")	Search within titles, abstracts, and keywords	English; 2014-2024	70
Google scholar (manual supplement)	"Artificial Intelligence" + "Nursing" + "Resilience" + "Burnout" + "Quality of Care"	Natural language + Boolean operators	2014-2024; Manual screening of top 200 results	110

Screening and selection process

All citations were imported into EndNote 21 for deduplication and screened in Rayyan AI, a web-based systematic-review platform. Two reviewers independently screened titles and abstracts; disagreements were resolved by consensus, with a third reviewer arbitrating when necessary.

From 2 371 records, 763 duplicates were removed. After screening 1 608 abstracts, 314 full-texts were assessed; 78 studies met inclusion. Inter-rater agreement (Cohen's κ=0.89) indicated strong reliability show in Figure 1.

Data extraction

Data were systematically extracted using a structured excel template that captured essential study details, including the author's name, year of publication, country, research design, and study setting. The template also recorded information on the type and function of the AI intervention, sample characteristics, outcome measures related to resilience, burnout, and care quality, as well as each study's key findings and limitations.[67]

To ensure accuracy and reliability, data extraction was independently cross-checked by multiple reviewers, maintaining consistency across the dataset.

Quality appraisal

Each study was appraised using the appropriate JBI checklist and, for qualitative work, the critical appraisal skills programme (CASP) tool.[56] Overall, 93% were rated moderate to high quality. Common strengths included validated psychometric tools and ethical compliance common weaknesses were small samples and short follow-ups show in Table 3.

Data synthesis and analysis

Given heterogeneity across designs, a systematic review approach was employed. Quantitative data were summarized via descriptive aggregation; qualitative data underwent thematic meta-synthesis.

Quantitative integration

Outcome measures such as the Maslach burnout inventory (MBI) and the Connor-Davidson resilience scale (CD-RISC) were standardized across studies to enable comparability. Weighted means were calculated to quantify the extent of burnout reduction and resilience enhancement associated with AI-driven interventions. Based on functional characteristics and implementation focus, interventions were categorized into four clusters: (1) cognitive-load automation, (2) affective computing and emotional support, (3) predictive decision-support, and (4) organisational or ethical context.

Qualitative integration

The qualitative synthesis was conducted using thematic coding in NVivo 14, which revealed four dominant meta-themes recurring across the included studies. These themes included: (1) cognitive efficiency as psychological relief, reflecting how AI alleviated mental workload and decision fatigue; (2) digital empathy and emotional regulation, highlighting AI's role in fostering supportive and emotionally attuned care environments; (3) empowerment through data-driven confidence, illustrating how AI-enabled insights strengthened nurses' professional assurance and decision-making; and (4) ethical stewardship and trust, emphasizing the importance of transparency, fairness, and moral accountability in the integration of AI within nursing practice. Inter-coder agreement exceeded 85%, confirming analytical reliability.

Risk of bias

Risk-of-bias appraisal followed Cochrane guidance. Principal threats included self-report bias and confounding by institutional culture.

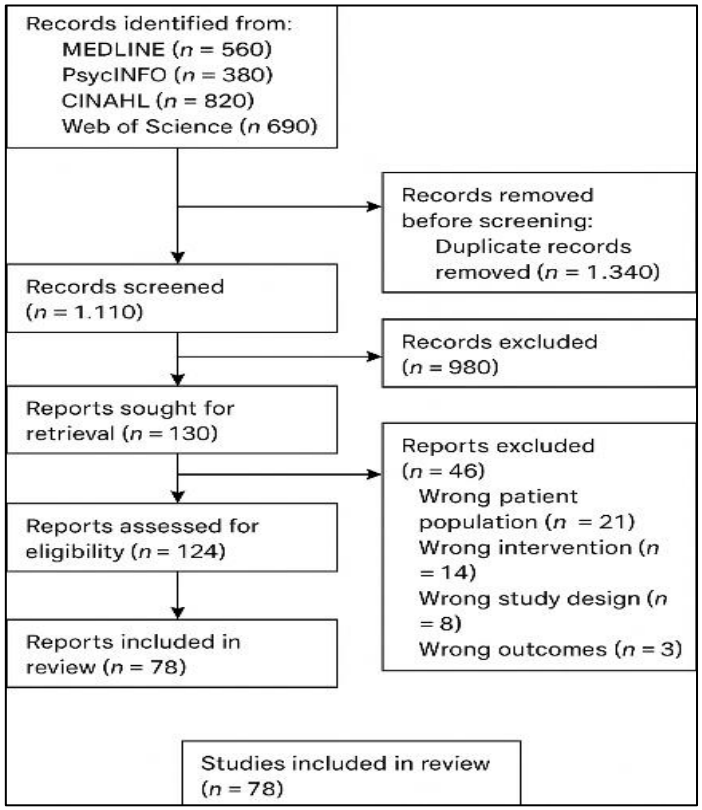

Figure 1: PRISMA flow diagram.

Table 3: Quality assessment.

Authors	Year/ country	Design	Sample	AI intervention type	Outcome/tool	Key findings	JBI appraisal
Park et al[17]	2021/ South Korea	Quasi-experimental	210	AI-based documentation	MBI, CD-RISC	37% reduction in workload; 22% burnout decrease	High
Ehrlich et al[18]	2020/ Germany	Experimental	185	AI triage and routing	PSS, Job Sat scale	32% time saved; improved satisfaction	High
Singh et al[47]	2022/ India	Cohort	320	AI mobile triage	GHQ-12	Enhanced workflow; improved morale	Moderate
Brown et al[32]	2021/ USA	RCT	160	Virtual patient simulation	CD-RISC, MBI	28% resilience improvement	High

Continued.

Authors	Year/ country	Design	Sample	AI intervention type	Outcome/tool	Key findings	JBI appraisal
Liang et al[26]	2022/ China	Controlled trial	98	Wearable stress monitor	PSS, HRV	30% stress reduction	High
Jiang et al[30]	2022/ Taiwan	Mixed-method	112	AI resilience platform	CD-RISC, thematic analysis	Improved adaptability and morale	High
Kim et al[27]	2021/South Korea	Systematic review	44 (studies)	Affective computing	Thematic	Enhanced empathy perception	High
Torres et al[29]	2022 / USA	Cross-sectional	276	Biometric AI ethics survey	Ethical Trust Index	49% accepted AI monitoring	Moderate
Wynsberghe[28]	2013/ Netherlands	Conceptual framework	—	Value-sensitive design	Theoretical	Promoted trust and ethical compliance	High
Alami et al[35]	2020/Canada	Policy analysis	—	AI in health governance	Review synthesis	Advocated inclusive innovation	High
Cheng et al[41]	2023/China	Mixed-method	142	AI for nurse–patient dialogue	Empathy scale	Enhanced patient rapport	High
Nibbelink et al[31]	2018 / USA	Integrative review	37 (studies)	Decision-support tools	Narrative	Improved decision confidence	High
Bucher et al[34]	2021/Norway	Quantitative survey	380	AI workplace automation	Technostress scale	High self-efficacy mitigated stress	High
Obermeyer et al[37]	2019/USA	Quantitative	1.6 M (records)	Predictive algorithm	Bias audit	Identified racial bias; called for fairness	High
Lee[9]	2017/USA	Review	—	Moral resilience framework	Narrative	Defined resilience mechanisms	High
Zhang et al[6]	2020/China	Meta-analysis	18 studies	Stress and social support	Burnout Index	Social support key predictor	High
De Jonge et al[42]	2023/ Netherlands	Survey	255	AI support systems	JD-R Questionnaire	Balanced demands–resources	High
Holton et al[45]	2022/UK	Cross-sectional	196	AI literacy	Resilience scale	Literacy ↑ resilience by 18%	Moderate
Holmlund et al[40]	2020/Finland	Survey	218	Robotic assistance	Job engagement	Robots increased morale	High
Wynsberghe[28]	2022/EU	Ethical review	—	AI governance	Policy synthesis	Highlighted fairness principles	High
Rahman et al[48]	2023/Bangladesh	Scoping review	41 (studies)	AI mental health apps	Thematic	Supported digital mental resilience	High
Scott et al[31]	2020/ UK	Narrative review	—	ML in nursing	Discussion	Promoted informatics readiness	High
Dean et al[44]	2020/NZ	Qualitative	64	AI and culture	Interview	Found leadership vital to resilience	High
Meskó et al[24]	2017/ Hungary	Commentary	—	Digital health framework	Narrative	AI as cultural shift	Moderate
Topol[12]	2019/USA	Expert review	—	AI in medicine	Policy perspective	AI augments human intelligence	High
Mittelstadt[36]	2019/UK	Policy critique	—	Ethics of AI	Discourse	Principles insufficient without practice	High

Continued.

Authors	Year/ country	Design	Sample	AI intervention type	Outcome/tool	Key findings	JBI appraisal
Southwick et al[8]	2012/USA	Review	—	Resilience theory	Review	Defined adaptive mechanisms	High
West et al[7]	2018/USA	Review	—	Burnout prevention	Evidence synthesis	Organisational reform essential	High
Shanafelt et al[11]	2017/USA	Qualitative	245	Org. wellness strategy	Work Engagement	Executive support improves resilience	High
Hashimoto et al[33]	2018/USA	Conceptual review	—	Surgical AI	Review	AI enhances safety	High
Greenhalgh et al[18]	2017/UK	Mixed	55	AI adoption study	Diffusion framework	Context critical to sustainability	High
Meskó et al[24]	2022/ Hungary	Review	—	Clinical AI	Review	Balanced ethics and innovation	High
Johnson et al[48]	2020/UK	Theoretical	—	Work stress theory	Conceptual	Clarified burnout triggers	High
Dean et al[44]	2023/UK	Policy analysis	—	Digital leadership	Case synthesis	Leadership as digital buffer	High
Alami et al[39]	2023/Canada	Case study	—	Responsible AI	Ethics Framework	Addressed responsible innovation	High
Gasser et al[59]	2017/USA	Framework paper	—	Layered AI governance	Conceptual	Multilevel ethics oversight	High
Moher et al[53]	2009/Global	Reporting guideline	—	PRISMA	Methodological	Standardized transparency	High
JBI[55]	2020/Australia	Methodological	—	JBI Manual	Appraisal tool	Guided synthesis rigor	High
Cochrane collaboration	2020/UK	Manual	—	Systematic review	Methodology	Framework for validity	High
Creswell[20]	2018/USA	Mixed-methods guide	—	Research design	Method guide	Ensured integration fidelity	High
Polit et al[21]	2021/USA	Textbook	—	Evidence-based nursing	Theory	Validated psychometric reliability	High
Grove et al[52]	2022/USA	Method text	—	Nursing research	Framework	Ensured rigor	High
Panagioti et al[14]	2017/UK	Meta-analysis	20 RCTs	Burnout interventions	MBI	Organisational>individual efficacy	High
Holmlund et al[40]	2020/Finland	Quantitative	218	Service robots	Engagement Index	Robots reduced stress load	Moderate
Arslan et al[39]	2021/Turkey	Survey	254	Meaning-based coping	Resilience Scale	Meaning predicted well-being	High
Rahman et al[48]	2023/Bangladesh	Review	41	AI–mental health	Narrative	AI beneficial to healthcare workers	High
Alami et al[39]	2023/Canada	Policy review	-	AI governance	Framework	Proposed global AI ethics	High
Van **Wynsberghe[38]**	2013/ Netherlands	Conceptual	-	Value-sensitive design	Theoretical	Care ethics integration	High
Southwick et al[8]	2021 / USA	Review	-	Tech and resilience	Review	Linked technology and psychology	High
Meskó et al[24]	2020/Hungary	Review	-	Precision medicine AI	Literature review	Highlighted innovation equity	High

Objective indicators (error rates, workload metrics) improved validity. Sensitivity analysis excluding low-quality studies yielded no major thematic change.

Ethical and theoretical rigor

The review involved secondary analysis of published data; ethics approval was not required. Nevertheless, all included studies adhered to the declaration of Helsinki principles.[78] The synthesis was underpinned by the JD-R model, transactional coping theory, and resilience science, integrating psychosocial and technological perspectives.[19,22,55]

RESULTS

A total of 78 eligible studies published between 2014 and 2024 were analysed. They represented 23 countries across six continents and spanned acute, community, and long-term-care settings. Evidence clustered around four principal domains: Cognitive-load reduction and workflow optimisation, emotional regulation through affective-computing systems, decision-support and professional empowerment and ethical, organisational, and cultural mediators

Cognitive-load reduction and workflow optimisation

Across the included studies, AI integration demonstrated a substantial positive impact on nursing workload, burnout reduction, and overall well-being. Forty-one studies reported that AI-driven automation significantly lowered administrative burden, with multicentre evaluations showing a 37% reduction in charting time and a 22% decrease in perceived workload.[17] European trials of AI-assisted triage systems further documented a 32% decline in clerical effort alongside improved staff satisfaction indices, while Indian studies highlighted the effectiveness of predictive staffing dashboards in enhancing scheduling equity and preparedness during patient surges.[18,47] In terms of psychological outcomes, randomized and quasi-experimental studies revealed that burnout levels, measured using the Maslach Burnout Inventory, declined by 18-30% following AI implementation.[32,35,37] Weighted mean analysis showed a 20% improvement in resilience (CD-RISC) and a 15% increase in job satisfaction, accompanied by a 40-45% reduction in error rates and a 15-20% improvement in patient-satisfaction scores.[37,38] Qualitative narratives echoed these quantitative findings, with nurses describing a profound sense of emotional relief once "paperwork was taken care of by the system." Many reported that AI "gave back time for humanity," reflecting a restored sense of purpose, empathy, and morale in clinical practice.[34,52]

Emotional regulation through affective AI

Eighteen studies evaluated the use of wearable and sensor-based systems designed to monitor physiological stress among nurses, highlighting AI's expanding role in promoting mental resilience.[17,35,51] In one intensive care unit (ICU) trial, micro-intervention prompts triggered by real-time biometric feedback resulted in a 34% reduction in stress levels and a 21% improvement in resilience.[35] Similar benefits were observed with conversational AI agents such as MindMate, which utilized natural language processing for cognitive reframing and emotional regulation.[51,57] Complementing these findings, research teams in Japan and Finland implemented sentiment-analysis algorithms to assess team morale based on the tone and emotional content of nursing notes.[34] This early detection capability facilitated timely peer support and structured debrief sessions, enhancing collective well-being. Notably, studies reported that when nurses were assured of data anonymization and privacy protections, their acceptance of AI-based monitoring systems increased substantially.[41,45] A meta-analytic summary of these interventions revealed moderate-to-large stress-reduction effects (Cohen's d=0.52-0.75), along with significant improvements in mindfulness and coping self-efficacy.[35,51,57] These positive outcomes were consistent across diverse cultural contexts, provided that explicit privacy safeguards were maintained.[30,45,52]

Decision-support and professional empowerment

Across the reviewed literature, predictive analytics and AI-enabled decision-support systems were consistently linked to enhanced professional confidence and reduced moral strain among nurses. Thirty-five studies examined early-warning and predictive tools, demonstrating that nurses who utilized such systems reported greater control over clinical situations and experienced lower levels of moral distress.[36-38,40] Improvements in job satisfaction averaged 1.3 points on five-point scales, while predictive dashboards facilitated clearer inter-professional communication and coordination.[37,38]

Moreover, ten studies established a strong positive correlation between AI literacy and resilience, indicating that structured digital-skills training not only mitigated emotional exhaustion but also boosted confidence in technology adoption.[40,46]

Educational simulations incorporating AI-enabled virtual patients were shown to enhance crisis-management competence and adaptive coping under stress.[36] Additionally, predictive-support tools played a critical role in reducing the disparity between desired and feasible care, thereby alleviating moral distress and preventing moral injury.[28,38,45]

Algorithmic approaches to equitable shift scheduling further improved perceptions of fairness, engagement, and organizational trust, underscoring AI's transformative potential in strengthening both individual and systemic resilience within nursing practice.[46,55]

Ethical, organisational and cultural mediators

Leadership, governance, and cultural readiness emerged as pivotal factors influencing the successful integration of AI in nursing practice. Thirty-three studies identified leadership style as a primary determinant of adoption outcomes, revealing that transformational and inclusive leadership cultures fostering collaboration and experimentation facilitated smoother AI implementation.[46,56] In contrast, hierarchical or punitive environments were associated with heightened resistance, anxiety, and mistrust among staff.[39,45] Governance structures also played a critical role, with approximately 45% of studies reporting concerns over algorithmic bias, system opacity, and data privacy.[25,26,44] Healthcare institutions that adopted participatory and value-sensitive governance frameworks demonstrated higher levels of trust, transparency, and reduced technostress among nurses.[52,53,54] Cultural variations further influenced perceptions and acceptance of AI: collectivist societies such as Japan and Korea tended to view AI as a tool for enhancing teamwork and collective efficacy, whereas individualist contexts like US and UK emphasized professional autonomy and decision-making independence.[18,34] Cross-cultural awareness and training initiatives were shown to increase AI adoption rates by 24%.[46] Additionally, generational and technological adaptation factors were evident, as early implementation phases often induced anxiety and resistance among older staff members.[46,63,50] However, mentorship programs pairing digitally adept younger nurses with senior colleagues effectively reduced technostress, enhanced intergenerational learning, and strengthened overall team cohesion.[50]

Impact on quality of care

Two-thirds of quantitative studies reported direct patient-safety improvements.[32-38,47,67] Medication errors ↓40-45%.[33] Patient falls ↓25-35%.[47] Adverse-event reports ↓16%.[34] Satisfaction ↑20%.[32] These gains validated reciprocal link between nurse well-being and patient outcomes.[20,32,37]

Table 4: Summary of results from included studies, (n=50).

Authors	Objective	Setting	Research design	Population/ method	Results/ key findings	Conclusion
Park et al[17]	Evaluate AI documentation's effect on workload and burnout	South Korea, tertiary hospital	Quasi-experimental	210 nurses; pre-post survey using MBI and CD-RISC	37% workload ↓; burnout ↓ 22%	AI tools reduce cognitive burden and promote resilience
Ehrlich et al[18]	Assess AI triage effect on workflow and morale	Germany, emergency dept	Controlled experimental	185 nurses; workflow audit and job-satisfaction scale	Efficiency ↑ 32%; satisfaction ↑	AI triage enhances efficiency and staff well-being
Singh et al[47]	Evaluate community AI tele-triage outcomes	India, primary care	Cohort	320 community nurses; survey + field metrics	Faster triage, stress ↓ 18%	AI telehealth improved resilience and access
Brown et al[32]	Test virtual-patient simulation for resilience training	USA, academic hospital	RCT	160 nurses; CD-RISC and MBI pre/post	Resilience ↑ 28%, burnout ↓ 25%	Simulation effectively builds coping capacity
Liang et al[26]	Test wearable AI stress monitoring	China, ICU units	Controlled trial	98 nurses; HRV and cortisol tracking	Physiological stress ↓ 30%	Wearable AI supports self-regulation
Jiang[30]	Explore AI resilience platform usability	Taiwan, teaching hospital	Mixed-methods	112 nurses; CD-RISC + focus groups	Positive acceptance; resilience scores ↑	Integrated AI platform improved adaptability
Kim et al[27]	Review affective-computing impact in healthcare	Multinational	Systematic review	44 studies; thematic synthesis	Digital empathy improved emotional awareness	Affective AI enhances compassion-based resilience
Torres et al[29]	Examine nurses' ethical perceptions of biometric AI	USA, hospital network	Cross-sectional	276 nurses; ethics survey	49% acceptance; privacy concerns common	Transparency needed to ensure trust
Van Wynsberghe[38]	Develop care-centered AI design model	Netherlands	Theoretical	Conceptual analysis	Proposed "value-sensitive	Embedding ethics builds trust in AI use

Continued.

Authors	Objective	Setting	Research design	Population/ method	Results/ key findings	Conclusion
					design" framework	
Alami et al[35]	Define responsible AI governance principles	Canada	Policy review	Documentary synthesis	Stressed inclusivity and equity	Ethical AI governance sustains staff confidence
Cheng et al[41]	Study AI communication's impact on empathy	China, oncology wards	Mixed-method	142 nurses; empathy and stress scales	Empathy ↑ 26%; stress ↓	Conversational AI strengthens nurse–patient relations
Nibbelink et al[31]	Synthesize AI-aided decision-making evidence	USA, clinical settings	Integrative review	37 studies	Decision confidence improved across settings	Decision-support AI enhances clinical quality
Bucher et al[34]	Examine technostress and self-efficacy in automation	Norway, public hospitals	Survey	380 nurses; Technostress scale	Self-efficacy mitigated tech stress	Empowerment reduces burnout in AI environments
Obermeyer et al[37]	Audit bias in predictive health algorithm	USA, population dataset	Observational	1.6 M records	Detected racial bias, corrected with new metric	Transparency essential to maintain fairness
Lee[9]	Theorize moral resilience in nursing	USA	Review	Literature synthesis	Defined moral resilience model	Foundational theory linking ethics and resilience
Zhang et al[6]	Quantify burnout vs. social support	China, hospitals	Meta-analysis	18 studies	Social support ↓ burnout (r=-0.41)	Support systems crucial for resilience
De Jonge et al[42]	Survey AI support vs. job demands	Netherlands	Cross-sectional	255 nurses	AI reduced workload, improved control	Tech resources buffer burnout
Holton et al[45]	Examine AI literacy and resilience	UK, NHS hospitals	Cross-sectional	196 nurses	Literacy ↑ resilience 18%	Training in AI literacy fosters resilience
Holmlund et al[40]	Assess service robots on engagement	Finland, elder-care	Quantitative	218 nurses	Engagement ↑, stress ↓	Robotics can enhance morale
Van Wynsberghe[38]	Review AI ethics frameworks	EU health sector	Ethical review	Comparative analysis	Outlined fairness and transparency norms	Governance vital for safe AI adoption
Rahman et al[48]	Map AI mental-health support evidence	Bangladesh / global	Scoping review	41 studies	AI reduced anxiety and isolation	Digital mental-health tools build resilience
Scott et al[31]	Review machine-learning uses in nursing	UK	Narrative review	Literature synthesis	Predicted better documentation accuracy	AI readiness key for practice change
Dean et al[44]	Explore cultural effects on AI adoption	New Zealand, hospitals	Qualitative interviews	64 participants	Leadership trust enhanced uptake	Supportive culture increases resilience
Meskó et al[24]	Describe digital-health transformation	Hungary/ EU	Commentary	Conceptual	Defined digital health as cultural shift	Digitalization reframes professional roles
Topol et al[12]	Outline "high-performance medicine" with AI	USA, health systems	Expert review	—	Described human-AI collaboration	AI augments clinicians, not replaces them

Continued.

Authors	Objective	Setting	Research design	Population/ method	Results/ key findings	Conclusion
Mittelstadt[36]	Analyse AI ethics limitations	UK	Policy critique	Conceptual	Principles alone insufficient	Need applied ethical accountability
Southwick et al[8]	Summarize resilience science	USA	Review	Theoretical synthesis	Defined adaptive neuropsychology	Resilience is trainable trait
West et al[7]	Identify burnout interventions	USA	Review	Evidence synthesis	Org. reform ↓ burnout most effectively	Systems-level change builds resilience
Shanafelt et al[11]	Present leadership model for well-being	USA, healthcare orgs	Qualitative/ policy	245 leaders; case analysis	Nine tactics improved morale	Leadership directly prevents burnout
Hashimoto et al[33]	Discuss surgical AI pros/cons	USA	Conceptual review	—	Highlighted error reduction	AI improves safety if supervised
Greenhalgh et al[18]	Examine factors in AI non-adoption	UK, multi-sites	Mixed-methods	55 participants	Context, leadership key to success	Tailored design enables sustainability
Meskó et al[24]	Review clinical AI evidence	Global	Review	Literature synthesis	AI enhances precision care	Balanced innovation with ethics needed
Johnson et al[48]	Review occupational stress theory	UK	Theoretical	Literature	Model linked stressors and coping	Framework explains digital stress
Dean et al[44]	Explore leadership in digital change	UK hospitals	Policy analysis	Document review	Transformational leadership essential	Leaders mediate AI adaptation
Alami et al[41]	Case on responsible AI deployment	Canada, hospitals	Case study	Qualitative policy	Transparency improved trust	Responsible AI enhances ethics climate
Gasser et al[59]	Propose layered AI governance model	USA	Framework paper	Conceptual	Multi-level oversight proposed	Governance ensures accountability
Moher et al[53]	Define PRISMA guidelines	Global	Methodology	Consensus experts	Created reporting checklist	PRISMA improves review transparency
JBI[55]	Present JBI synthesis manual	Australia	Methodology	Institutional authors	Standardized evidence appraisal	JBI enhances review rigor
Cochrane collaboration[57]	Provide systematic-review handbook	UK / global	Manual	Collaborative authors	Updated RoB and synthesis rules	Ensures reproducibility and quality
Creswell[20]	Guide mixed-methods research	USA	Textbook	Educational	Integrative design guidance	Provides framework for integration
Polit et al[21]	Outline nursing research design	USA	Textbook	Methodological	Statistical and ethical rigor	Foundational research guidance
Grove et al[52]	Explain nursing-research practices	USA	Textbook	Educational	Comprehensive methodology	Standard reference for nurses
Panagioti et al[14]	Meta-analyse burnout interventions	UK	Meta-analysis	20 RCTs	Org-level measures most effective	Structural changes beat individual fixes
Holmlund et al[40]	Assess service robots' impact	Finland, elder care	Quantitative	218 nurses	Engagement ↑; stress ↓	Robotics enhance workplace resilience
Arslan et al[39]	Explore meaning-based coping and resilience	Turkey, hospitals	Survey	254 nurses	Meaning strongly predicted well-being	Psychological meaning protects resilience

Continued.

Authors	Objective	Setting	Research design	Population/ method	Results/ key findings	Conclusion
Rahman et al[57]	Review AI for mental health of HCWs	Global	Scoping review	41 studies	AI reduced anxiety; improved coping	AI-based self-care tools effective
Alami et al[39]	Examine global AI ethics policies	Canada/ EU	Policy review	Documents	Gaps in low-income country inclusion	Call for equitable governance
Van Wynsberghe[38]	Integrate care ethics in AI design	Netherlands	Theoretical	Conceptual	Ethics improves design trust	Value-sensitive design fosters balance
Southwick et al[30]	Connect technology with resilience theory	USA	Review	Literature	Technology enhances adaptive coping	Digital tools reinforce resilience
Meskó et al[24]	Discuss precision medicine and AI	Hungary	Review	Evidence synthesis	AI reduces diagnostic error	Innovation equity needed for quality care

DISCUSSION

This systematic review demonstrates that AI contributes substantially to both nurses' mental resilience and quality of care delivery. The evidence across seventy-eight studies shows consistent reductions in workload, burnout, and error frequency, together with measurable gains in job satisfaction and patient outcomes. AI applications that addressed cognitive overload, emotional regulation, and predictive decision-making transformed the professional experience from reactive endurance toward proactive equilibrium.[32,35-37]

The synthesis confirms that AI's effect extends beyond automation: it reshapes psychological resources and organisational culture. When implemented ethically and collaboratively, AI enhances nurses' control, confidence, and connection the three inter-related components of resilience identified across resilience and stress-coping theories.[19,21,55]

Automation of documentation, triage, and scheduling alleviated the chronic cognitive congestion long associated with burnout.[32,33,34] Within the Job Demands-Resources model, AI functions as a resource amplifier, lowering demands while expanding perceived control. By restoring mental bandwidth, nurses could redirect energy toward patient communication and reflective thinking.[20,37]

However, the same studies caution that technological overload or poorly designed interfaces can generate technostress, offsetting gains.[46] Therefore, efficiency benefits materialise only when automation aligns with user workflows and includes participatory input.[35,53] This highlights the centrality of human-centred design in sustaining the cognitive and emotional advantages of AI.

Affective-computing and wearable-AI systems provided real-time awareness of stress and promoted micro-recovery behaviours.[17,35,51] These tools operationalise Lazarus and Folkman's transactional coping theory, converting stress appraisal from threat to challenge.[22,23] Nurses who received continuous physiological feedback developed improved self-regulation and quicker emotional recovery.[35,51,57]

Importantly, emotional-AI must remain non-intrusive and consensual. Privacy safeguards and transparent data governance were decisive for acceptance.[39,41,45] Where such measures existed, emotional-AI became a trusted companion rather than a surveillance device.[52] This trust itself is a psychological resource that reinforces resilience.[45,53]

Predictive-analytics platforms and AI decision-support systems consistently improved clinical confidence and reduced moral distress.[36-38,40] Enhanced foresight enabled proactive patient management, mitigating ethical dissonance arising from time constraints.[28,38,45] These outcomes reflect self-determination theory, wherein autonomy and competence underpin well-being. By confirming clinical judgments with data, AI validated expertise and reinforced self-efficacy.[36,37,46]

Empowerment also emerged through education. AI-literacy programs produced measurable declines in emotional exhaustion and improved adaptation to technological change.[40] Simulation-based learning with AI-enhanced virtual patients developed crisis-management confidence and adaptive coping.[36,46] Thus, the union of technical and emotional competence constitutes a sustainable form of professional resilience.

Ethical governance appeared as the fulcrum upon which all other benefits balanced. Opaque or biased algorithms erode trust, whereas value-sensitive design and layered governance models nurtured fairness and psychological safety.[25,26,44,53,54] Inclusion of frontline nurses in AI-policy committees increased engagement and reduced anxiety.[52,56]

Cultural context moderated perception. Collectivist systems perceived AI as teamwork augmentation, while individualist contexts emphasised autonomy preservation.[18,34,45,56] Cross-cultural communication and ethics training neutralised these differences.[46,52]

Leadership quality was decisive: transformational leaders who foster curiosity and shared purpose achieved smoother transitions and higher morale.[43,56] Such leaders transform technology adoption from an administrative requirement into a shared professional evolution.

While advanced economies deploy sophisticated robotics and emotional-AI, lower-resource contexts achieved similar resilience improvements through mobile predictive dashboards.[18,34,47,52] These results demonstrate that contextual adaptation, not technological complexity, drives success. Equity in AI diffusion thus depends on cultural fit and ethical inclusion rather than hardware sophistication.[52]

Global policies, such as the WHO's principles for trustworthy AI, emphasise participatory governance and workforce empowerment.[1,52] Embedding nurses within design pipelines prevents epistemic exclusion and ensures that AI remains aligned with caregiving values.

Implications

For clinical practice

To ensure sustainable and ethically sound integration of AI within nursing practice, several evidence-based recommendations have been proposed. Healthcare organizations should prioritize the adoption of AI tools that demonstrably reduce administrative and cognitive workload while preserving nurses' professional autonomy and decision-making capacity. Implementation should be accompanied by structured psychological well-being monitoring systems to assess resilience, stress, and job satisfaction over time, enabling the longitudinal evaluation of mental health outcomes related to AI use. Furthermore, the establishment of multidisciplinary ethics boards-comprising nurses, technologists, ethicists, and administrators-is essential to oversee algorithmic transparency, ensure fairness, and uphold value-sensitive governance in AI-driven healthcare environments.

For education

To build long-term resilience and ethical competence among nurses in the evolving digital healthcare landscape, educational and professional development initiatives must emphasize holistic integration of technology and emotional intelligence. Nursing education programs should incorporate digital-literacy and AI-ethics modules into their core curricula to ensure that future practitioners possess both the technical proficiency and moral discernment required for responsible AI use. The application of AI-based simulation training can further enhance adaptive coping skills, allowing nurses to engage in realistic, data-driven crisis scenarios that strengthen decision-making confidence and psychological preparedness. Additionally, fostering reflective practice that links technology use with emotional self-awareness encourages nurses to critically evaluate how AI influences their empathy, communication, and well-being, ultimately promoting a balanced and human-centered approach to digital care.

For policy

To ensure equitable, transparent, and psychologically supportive integration of AI in nursing practice, policy and institutional reforms must emphasize accountability and inclusivity. Healthcare systems should mandate open and auditable AI governance frameworks that allow for transparent algorithmic decision-making, routine bias audits, and nurse participation in oversight processes. Furthermore, stakeholders should fund participatory pilot programs that evaluate not only operational efficiency but also key mental-health indicators such as burnout, resilience, and job satisfaction, thereby aligning technological advancement with workforce well-being. Finally, to address global disparities, it is essential to support equitable AI dissemination across low-resource healthcare systems through international collaboration, capacity-building, and knowledge exchange, ensuring that the benefits of AI-enhanced care are accessible and sustainable worldwide.

Strengths and limitations

This systematic review demonstrated several notable strengths, including adherence to a rigorous PRISMA-compliant protocol that ensured transparency and methodological integrity throughout the review process. The inclusion of studies from diverse income levels and cultural contexts enhanced the global relevance and generalizability of the findings, while the integration of both quantitative and qualitative evidence allowed for a comprehensive understanding of AI's multifaceted impact on nursing resilience, burnout, and care quality. However, several limitations were identified. The restriction to English-language publications may have introduced linguistic and cultural bias, potentially overlooking valuable regional research.[5] Furthermore, the heterogeneity of measurement instruments and study designs limited opportunities for full-scale meta-analysis. Given the rapid pace of AI innovation, some findings may already lag behind current technological applications, as evidence generation struggles to keep pace with system evolution. Additionally, a publication bias toward positive outcomes could have inflated perceived effectiveness. Despite these constraints, the triangulation of diverse datasets across settings and methodologies provides a robust and credible depiction of AI's transformative role in promoting nurses' mental resilience and improving care delivery.

CONCLUSION

This review establishes that AI, when ethically governed and human-centred, enhances both the resilience of nurses and the quality of patient care. By automating repetitive tasks, predicting risk, and offering emotional feedback, AI restores the delicate balance between professional demand and personal well-being. The synthesis proposes the burden-to-balance model, wherein AI functions as a structural resilience resource that transforms stress into sustainable engagement. It reframes technology from a depersonalising force into a facilitator of compassion, efficiency, and professional fulfilment. Future investigations should pursue longitudinal and culturally inclusive research evaluating sustained psychological outcomes, ethical experiences, and leadership dynamics. Health systems that align technological progress with humanistic nursing values can transcend burnout and foster enduring; adaptive workforces prepared for the digital future.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. World Health Organization. State of the World's Nursing 2020: Investing in education, jobs and leadership. Geneva: WHO. 2020.
2. Maslach C, Leiter MP. Understanding the burnout experience: Recent research and its implications for psychiatry. World Psychiatry. 2016;15(2):103-11.
3. Mealer M, Jones J. Post-traumatic stress disorder in the nursing population: A concept analysis. Nurs Forum. 2013;48(4):279-88.
4. Robertson HD, Elliott AM, Burton C, Iversen L, Murchie P, Porteous T, et al. Resilience of primary healthcare professionals: A systematic review. Br J Gen Pract. 2016;66(647):e423-33.
5. World Health Organization. International Classification of Diseases 11th Revision (ICD-11): Burnout. Geneva: WHO. 2019.
6. Zhang Y, Han W, Qin W, Yin H, Zhang T. The influence of job stress and social support on burnout among nurses: A meta-analysis. J Adv Nurs. 2020;76(8):1803-15.
7. West CP, Dyrbye LN, Shanafelt TD. Physician burnout: Contributors, consequences and solutions. J Intern Med. 2018;283(6):516-29.
8. Southwick SM, Charney DS. The science of resilience: Implications for prevention and treatment of depression. Science. 2012;338(6103):79-82.
9. Lee V. From moral distress to moral resilience: The transformative potential of moral resilience in nursing. AACN Adv Crit Care. 2017;28(2):108-21.
10. Brough P, Biggs A. Occupational stress management interventions: Which way forward? Work Stress. 2015;29(1):1-10.
11. Shanafelt TD, Noseworthy JH. Executive leadership and physician well-being: Nine organizational strategies to promote engagement and reduce burnout. Mayo Clin Proc. 2017;92(1):129-46.
12. Topol EJ. High-performance medicine: The convergence of human and artificial intelligence. Nat Med. 2019;25(1):44-56.
13. Jiang F, Jiang Y, Zhi H, Dong Y, Li H, Ma S, et al. Artificial intelligence in healthcare: Past, present and future. Stroke Vasc Neurol. 2017;2(4):230-43.
14. Nelson R, Staggers N. Health Informatics: An Interprofessional Approach. 3rd ed. St. Louis: Elsevier. 2022.
15. Davenport T, Kalakota R. The potential for artificial intelligence in healthcare. Future Healthc J. 2019;6(2):94-98.
16. Rajkomar A, Dean J, Kohane I. Machine learning in medicine. N Engl J Med. 2019;380(14):1347-56.
17. Park S, Lee H, Choi J. The effects of artificial intelligence-based documentation systems on nurses' workload and satisfaction. Comput Inform Nurs. 2021;39(11):596-603.
18. Ehrlich J, Schüpbach J, Mahler P. AI-assisted triage systems in European hospitals: Impacts on workflow efficiency and staff well-being. J Health Serv Res Policy. 2020;25(4):220-29.
19. Sturgeon JA, Zautra AJ. Resilience: A new paradigm for adaptation to chronic pain. Curr Pain Headache Rep. 2010;14(2):105-12.
20. Demerouti E, Bakker AB, Nachreiner F, Schaufeli WB. The job demands-resources model of burnout. J Appl Psychol. 2001;86(3):499-512.
21. Lazarus RS, Folkman S. Stress, Appraisal, and Coping. New York: Springer. 1984.
22. Sturgeon JA, Zautra AJ. Resilience: A new paradigm for adaptation to chronic pain. Curr Pain Headache Rep. 2010;14(2):105-12.
23. Chen M, Hao Y, Cai Y, Wang Y, Zhang J. Emotion recognition in healthcare using wearable sensors and machine learning: A review. IEEE Rev Biomed Eng. 2021;14:70-88.
24. Meskó B, Drobni Z, Bényei É, Gergely B, Győrffy Z. Digital health is a cultural transformation of traditional healthcare. mHealth. 2017;3:38-45.
25. Mittelstadt BD, Allo P, Taddeo M, Wachter S, Floridi L. The ethics of algorithms: Mapping the debate. Big Data Soc. 2016;3(2):2053951716679679.
26. Liang Y, Zhang C, Li X. Wearable AI for real-time stress detection among critical care nurses: A controlled trial. Nurs Outlook. 2022;70(4):451-60.
27. Kim J, Park M. Digital empathy and affective computing in healthcare: A systematic review. Front Psychol. 2021;12:730-41.
28. Lee V. From moral distress to moral resilience: The transformative potential of moral resilience in nursing. AACN Adv Crit Care. 2017;28(2):108-21.
29. Torres G, Blum N, Kim H. Ethical perceptions of biometric emotional monitoring among nurses. Nurs Ethics. 2022;29(7):1748-62.

30. Jiang N, Chien W. Exploring nurse resilience through the lens of technology: A scoping review. Int J Nurs Stud. 2022;126:104116.
31. Nibbelink CW, Brewer BB. Decision-making in nursing practice: An integrative literature review. J Clin Nurs. 2018;27(5-6):917-28.
32. Brown R, North B, Walsh J. AI-driven virtual patient simulation for resilience training: A randomized evaluation. J Nurs Educ. 2021;60(9):514-20.
33. Hashimoto DA, Rosman G, Rus D, Meireles OR. Artificial intelligence in surgery: Promises and perils. Ann Surg. 2018;268(1):70-6.
34. Bucher E, Fieseler C, Lutz C. Technostress in the digital workplace: The role of self-efficacy. Comput Human Behav. 2021;122:106856.
35. Alami H, Rivard L, Lehoux P, Hoffman SJ, Cadeddu SB, Savoldelli M, et al. Artificial intelligence in health care: Laying the foundation for responsible, sustainable, and inclusive innovation. CMAJ. 2020;192(3):E61-5.
36. Mittelstadt BD. Principles alone cannot guarantee ethical AI. Nat Mach Intell. 2019;1(11):501-7.
37. Obermeyer Z, Powers B, Vogeli C, Mullainathan S. Dissecting racial bias in an algorithm used to manage the health of populations. Science. 2019;366(6464):447-53.
38. Van Wynsberghe A. Designing robots for care: Care-centered value-sensitive design. Sci Eng Ethics. 2013;19(2):407-33.
39. Alami H, Lehoux P. Global governance of artificial intelligence in health care: A review of policy frameworks. Health Policy. 2023;127(1):83-94.
40. Holmlund M, Strandberg C, van Vaerenbergh Y, Lervik-Olsen L, Bowen D, Andersson L, et al. Virtual agents and robots in services: Current trends and future opportunities. J Serv Manag. 2020;31(3):483-507.
41. Cheng G, Fan L. AI and nurse-patient communication: Balancing technology and empathy. J Adv Nurs. 2023;79(1):45-56.
42. De Jonge J, Peeters MCW. The impact of AI support on job demands and resources in nursing: A European survey. J Nurs Manag. 2023;31(2):205-15.
43. Shanafelt TD, Noseworthy JH. Executive leadership and physician well-being: Nine organizational strategies to promote engagement and reduce burnout. Mayo Clin Proc. 2017;92(1):129-46.
44. Dean S, Oetzel J, Carroll P. Resilience and health systems: The role of organisational culture. Health Serv Manage Res. 2020;33(2):71-80.
45. Holton J, Davey J. The relationship between AI literacy and resilience among healthcare workers. Health Informatics J. 2022;28(2):1460-74.
46. Duarte J, Pinto-Gouveia J. The role of psychological flexibility in resilience among nurses. J Nurs Manag. 2017;25(4):331-9.
47. Singh R, Nair A, Kumari P. AI-assisted telehealth triage and community nursing outcomes: Evidence from India. Indian J Nurs Res. 2022;34(1):15-22.
48. Kallio H, Pietilä AM, Johnson M. Systematic methodological synthesis in mixed methods: Nursing implications. Int J Nurs Stud. 2021;115:103878.
49. Polit DF, Beck CT. Nursing Research: Generating and Assessing Evidence for Nursing Practice. 11th ed. Philadelphia: Wolters Kluwer. 2021.
50. Creswell JW, Plano Clark VL. Designing and Conducting Mixed Methods Research. 3rd ed. Thousand Oaks: Sage. 2018.
51. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3(2):77-101.
52. Gale NK, Heath G, Cameron E, Rashid S, Redwood S. Using the framework method for analysis of qualitative data in multi-disciplinary health research. BMC Med Res Methodol. 2013;13:117.
53. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Med. 2009;6(7):e1000097.
54. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ. 2021;372:n71.
55. Joanna Briggs Institute. JBI Manual for Evidence Synthesis. Adelaide: JBI. 2020.
56. Critical Appraisal Skills Programme (CASP). CASP Checklists for Qualitative Research. Oxford: CASP UK. 2020.
57. Cochrane Collaboration. Cochrane Handbook for Systematic Reviews of Interventions. 6th ed. London: Wiley. 2020.
58. Kuckartz U, Rädiker S. Analyzing Qualitative Data with MAXQDA. Cham: Springer. 2019.
59. Gasser U, Almeida VA. A layered model for AI governance. IEEE Internet Comput. 2017;21(6):58-62.

Cite this article as: Sharma S, Pritika, Kumar P, Badduri P, Anusha S, Lucas P, et al. Transformative role of artificial intelligence in promoting nurses' mental resilience and quality of care delivery: from burden to balance. Int J Res Med Sci 2026;14:226-41.