Journal of Medical Education Development
e-ISSN: 2980-7670
https://edujournal.zums.ac.ir

Volume 19, Issue 4
October 2026
Pages: 4–20

Review Article

Resilience among medical educators during crises: a conceptual framework developed through narrative synthesis

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Article info

Article history:
Received 8 Dec. 2025
Revised 24 Feb. 2026
Accepted 2 Aug. 2026
Published 1 Oct. 2026

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How to cite this article:
Yazdani Sh, Afshari P, Bayazidi S. Resilience among medical educators during crises: a conceptual framework developed through narrative synthesis. *J Med Edu Dev*. 2026;19(4):4–20.

Abstract

Background & Objective: Crises place large demands on medical educators, threatening educational continuity, teaching effectiveness, and professional well-being. Strengthening educator resilience is necessary for maintaining the quality of medical education under adverse conditions. This study aimed to develop an evidence-informed conceptual framework of resilience attributes for medical educators during crises to provide a foundation for practice-oriented guidance and faculty development.

Materials & Methods: A narrative synthesis was conducted to identify and conceptually organize resilience-related concepts among medical science educators in crisis contexts. The synthesis was guided by the four-stage framework proposed by Popay et al. Relevant Persian- and English-language studies published between 1998 and 2026 were identified through a structured search, followed by title and abstract screening, full-text assessment, and methodological quality appraisal using the Joanna Briggs Institute (JBI) Critical Appraisal Checklists. Of 865 records identified, 60 studies met the eligibility and quality criteria and were included in the final synthesis. Resilience-related concepts were extracted, compared, grouped, and iteratively abstracted to identify common patterns and develop the conceptual framework.

Results: During the first stage of the synthesis resilience-related concepts and descriptions were extracted from the included studies. In the second stage iterative comparison and conceptual refinement produced twelve resilience attributes: fostering tolerance and patience, promoting personal thriving, strengthening hardiness, developing meta-competencies, acquiring meta-skills, acquiring meta-knowledge, fostering self-authorisation, strengthening self-governance, enhancing autonomy, cultivating critical thinking, cultivating a caring mindset, and developing creative thinking. In the third stage these attributes were synthesized into four overarching concepts: Meta-attitude, Metacapability, Self-determination, and Higher-order thinking. During the final stage, repeated review and collaborative discussions improved conceptual coherence and strengthened the consistency of the framework.

Conclusion: This study presents an evidence-informed conceptual framework that identifies key resilience attributes supporting medical educators during crises. The framework offers practical directions for strengthening educator resilience, promoting well-being, sustaining teaching quality, and improving educational outcomes. It may guide faculty development programs, institutional crisis preparedness initiatives, educational policy, and the design of practice-oriented interventions while providing a foundation for future empirical validation and implementation across diverse medical education settings.
Despite favorable attitudes toward palliative care, the lack of knowledge, particularly in conceptual and psychological domains, should be addressed. The findings highlight the necessity of palliative care training in internal medicine residency programs.

Keywords: resilience, psychological; faculty, medical; education, medical; crisis; faculty development; attitude; internal medicine; knowledge; palliative care

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Introduction

Individual resilience can be understood as the capacity to maintain or rapidly regain psychological well-being when exposed to stressors or adverse circumstances [1]. Bandura conceptualizes human agency as the capacity to exercise control over the nature and quality of one's life through intentionality, forethought, self-regulation, and self-reflectiveness, which can support individuals in managing challenging circumstances [2]. Resilience has been conceptualized both as a process encompassing adaptation and recovery and as an ability that helps individuals cope with adversity from health, relational or financial stressors [3]. Among medical educators' resilience is considered a protective factor that reduces burnout and emotional exhaustion, supports academic productivity and improves professional satisfaction [4].

More broadly resilience refers to the capacity to employ adaptive strategies during periods of adversity or change, enabling individuals to sustain both professional and personal functioning [5]. It emerges through active interactions between personal and contextual factors and is often domain-specific, varying across different life and professional settings [6]. According to Vercio et al. the determinants of individual resilience can be categorized into three domains: internal factors, social capital and societal influences. Internal factors include personality characteristics such as tolerance of ambiguity, optimism, personal competencies and reflective capacity [7]. Organisational resilience ultimately begins with individuals; without resilient people, attempts to strengthen institutions may resemble constructing a boat full of holes. Although institutional leaders often focus on strategic and organisational planning, overlooking key members of educational systems may leave institutions vulnerable during crises and unexpected disruptions [8]. Although resilience has been extensively studied in psychology and organisational sciences, it remains relatively underexplored in medical education.

Howe et al., citing Martin and Marsh, describe individual resilience through five dimensions: confidence (self-efficacy), coordination (planning), control, composure (low anxiety), and commitment (persistence) [9]. Educational systems that are resilient to shocks and stressors can help prevent prolonged disruption of education, weakened learning outcomes, and long-term psychosocial consequences for learners [10]. Embedding resilience-building approaches into educational programs equips learners with the skills needed to navigate challenges and flourish. Medical learners in particular must understand the inherent uncertainties, ethical complexities and systemic pressures associated with professional practice. Educational strategies such as simulation-based learning and authentic case-based ethical discussions may help learners reinterpret uncertainty as an opportunity for growth rather than a threat [9]. According to Bandura, mastery experiences are the strongest source of self-efficacy, as success strengthens efficacy expectations, whereas repeated failure weakens them. Verbal persuasion is generally less influential because it lacks a direct experiential basis [11]. Evidence from this review suggests that strengthening resilience may help health professions educators cope with occupational stress, reduce burnout risk, and preserve the quality of their teaching – though the authors emphasize that individual efforts should be paired with systemic reforms [12]. Medical educators therefore need deliberate and sustained efforts to strengthen resilience so they can more effectively help prepare future physicians who are professionally responsible and adaptable [5]. The importance of promoting resilience in health professions education is reflected in initiatives such as the Association for Medical Education in Europe (AMEE) Essential Skills in Medical Education (ESME) program, which provides practical strategies for building resilience and supporting sustainable change [13]. According to Chan medical educators in Hong Kong frequently balance clinical responsibilities alongside teaching, research and administrative commitments within systems characterized by high expectations and long working hours, making resilience particularly important [4]. Chan et al. highlight the importance of culturally sensitive understandings of resilience for designing faculty development programs that support medical educators. [14].

Educator resilience also serves an important pedagogical function by enabling instructors to model and cultivate adaptive capacities in their learners. Through integrated educational approaches medical educators are uniquely positioned to encourage resilience both personally and among students.

Faculty development initiatives should therefore promote multidimensional and context-sensitive conceptualizations of resilience, encourage critical reflection on how personal beliefs about resilience shape educational practice, and strategically use the hidden curriculum to strengthen learner resilience [15]. Despite increasing attention to resilience in medical education, limited evidence exists regarding resilience attributes

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specific to medical educators during crises and how these can inform faculty development. Therefore, this study aimed to identify and synthesize resilience attributes among medical educators during crises through a narrative synthesis approach and to develop a conceptual framework to inform a practice-oriented guide for strengthening resilience in medical education.

Materials & Methods

Design and setting(s)

This study used a narrative synthesis approach to identify, integrate and conceptually organise resilience-related attributes among medical science educators in crisis contexts. The synthesis process was guided by the four-stage framework for narrative synthesis proposed by Popay et al. [16]. Given the interpretive and conceptual aim of this study, these stages were adapted to support conceptual abstraction and framework development.

Search strategy and study selection

Studies were eligible if they examined resilience, resilience-related attributes, adaptive capacities, or related constructs among medical or health professions educators, faculty members, clinical educators, or academic teaching staff, particularly in the context of crisis, adversity, disruption, or substantial occupational stress. Studies focusing exclusively on students, patients, residents, or non-educator healthcare professionals were excluded unless their findings directly addressed educator resilience or were explicitly used as contextual evidence rather than as evidence for the core framework. Relevant Persian- and English-language studies were identified through searches of Google Scholar, PubMed, EMBASE, ERIC, the Scientific Information Database (SID), and Magiran, using predefined combinations of terms related to resilience, medical/health professions educators, faculty, teaching, and crisis or adversity. The search was conducted from 1986 to 2026.The search yielded 865 records. After removal of 107 duplicate records, 758 records were screened by title, of which 292 were excluded. The abstracts of the remaining 466 records were assessed, and 302 records were excluded. Full texts of the remaining 164 articles were assessed for eligibility.

Quality appraisal

The methodological quality of the eligible studies was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist appropriate to the design of each study. Two members of the research team independently conducted the quality appraisal and reached consensus through discussion. Any disagreement was planned to be resolved through consultation with the first author; however, no disagreements arose during the appraisal process.

Data collection methods

Following quality appraisal, 104 studies were excluded for not meeting the predefined quality criteria, and 60 studies were retained for the final narrative synthesis (**Figure 1**). Concepts, characteristics and descriptions related to resilience among medical science educators were extracted from the included studies. This stage resulted in a broad range of initial concepts reflecting different dimensions of resilience described across the literature. The aim was to develop an initial understanding of the phenomenon while avoiding the use of predetermined categories.

Data analysis

The extracted concepts were reviewed, compared and organised iteratively. Similar and related concepts were gradually grouped together, allowing common patterns across studies to emerge. To improve the transparency of the analytical process, a representative example of this coding and synthesis procedure is presented in **Table 1**. For example, statements describing reduced perceived stress, adaptive coping, coping skills training and adaptive functioning under stress were initially coded, grouped under the concept of adaptive coping through hardiness, and subsequently synthesized into the resilience attribute "Hardiness". Relationships among conceptual groups were examined through comparison, interpretation and abstraction. Through this process the initial concepts were progressively organized into twelve resilience attributes. These attributes were then grouped into four overarching concepts according to their conceptual relationships and levels of abstraction. This structure was developed gradually through repeated interpretation and comparison across studies rather than being derived directly from any single study or existing framework. The robustness of the synthesis was assessed by examining the coherence of the developing framework and its consistency with the included evidence through repeated review of the studies, revisiting earlier concepts and discussions within the research team. This process resulted in the development of a conceptual framework describing resilience among medical science educators in crisis contexts, consisting

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of twelve resilience attributes organized into four overarching concepts (**Table 2**).

Table 1. Representative example of the analytical process used to derive final resilience attribute

Representative text	Initial codes	Grouped concept	Final resilience attribute
Hardiness helps reduce perceived stress and strengthens adaptive coping in challenging educational environments. Hardiness training grounded in theory and evidence improves coping strategies and supports adaptive functioning under stress	- Reduced perceived stress - Adaptive coping - Improved coping strategies - Adaptive functioning under stress - Hardiness training	Hardiness-based adaptive coping	Hardiness

Note: This example illustrates the coding and synthesis process from initial text to final attribute. No abbreviations used.

Table 2. Representative evidence for the twelve resilience attributes

Author(s)	Article Title	Key finding
Langmann [17].	Tolerance and education	Resilient educators show tolerance by enduring differences and uncertainty, responding respectfully to diverse perspectives, maintaining professional relationships during challenging situations and recognising appropriate limits of acceptance.
Scheel [24].	The art of medical education. Facts views Vis Obgyn.	Medical curricula should be designed to address the future needs of society, and professionals thrive when they are granted professional autonomy, as their initiative plays a key role in the success of educational programs.
Kobasa [26].	Stressful life events, personality, and health: an inquiry into hardiness	Hardiness has been characterized by a strong commitment to the self, an attitude of vigor toward the environment, a sense of meaningfulness, and an internal locus of contro
Bennet and Bennet [32].	Meta-knowledge: understanding the knowledge that drives our actions	Meta-knowledge helps individuals understand the nature, types and context of their knowledge, supporting conscious decision-making, effective knowledge creation, sharing and application in complex and uncertain situations.
Brown and McCartney [35].	Competence is not enough: metacompetence and accounting education.	Meta-competence is the higher-order capacity that helps individuals learn, adapt, anticipate and create, providing the foundation for developing and effectively applying professional competencies.
Skills Development Scotland [41].	A guide to metaskills across the curriculum	Meta-skills are higher-order transferable abilities that encourage adaptability, lifelong learning and effective performance in complex and unpredictable environments by helping individuals recognise, develop and apply their skills.
Schmid [43].	Plural Self-Authorization. In: We, Together: The Social Ontology of Us.	Self-authorisation is the capacity to act with confidence and legitimacy based on one's own judgment, values and professional responsibility.
de Kervenoael et al. [51].	Business-to-business and self-governance practice in the digital knowledge economy: learning from pharmaceutical e-detailing in Thailand.	Self-governance helps professionals regulate their own actions, assume responsibility and align individual decisions with shared professional goals and ethical standards.
Allen et al. [53].	The educational role of autonomy in medical training: a scoping review.	Autonomy is linked to increased confidence, readiness for independent practice, the development of clinical decision-making skills and the formation of professional identity.
Phillips et al. [60].	Critical thinking in medical education missions	Critical thinking is the purposeful self-regulatory use of judgment to interpret, analyse, evaluate and draw inferences, enabling the effective application of medical knowledge in practice.
Morehouse [62].	Caring thinking, education of the emotions, and the community of inquiry	Caring thinking complements critical and creative thinking and emphasises balanced judgment grounded in values and emotions.
Yelavarthi [67].	The need of creative thinking in Indian medical education	Creative thinking promotes innovative problem-solving, lifelong learning and collaborative teamwork, providing a foundation for professional development in medical education.

Note: Table entries are synthesised from the included studies. Reference numbers correspond to the Vancouver-style reference list.

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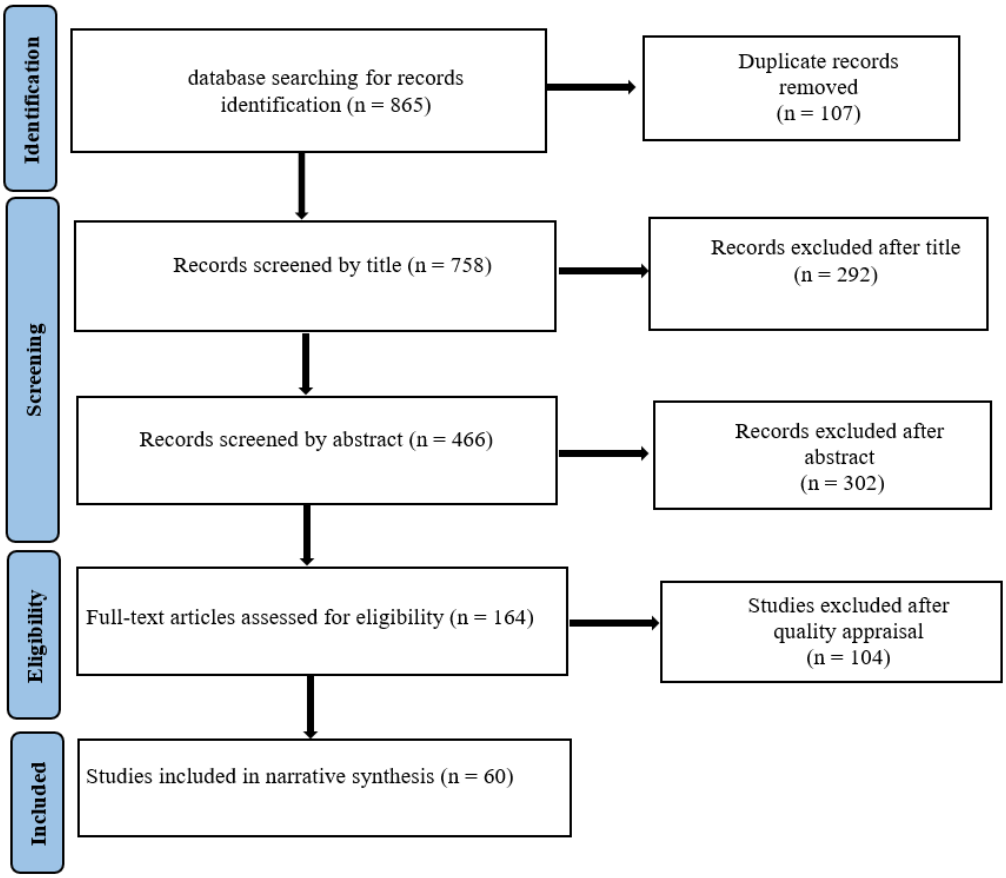

Figure 1. Flow diagram of study selection and narrative synthesis process

Table 1. Representative example of the analytical process used to derive final resilience attributes

Representative text	Initial codes	Grouped concept	Final resilience attribute
Hardiness helps reduce perceived stress and strengthens adaptive coping in challenging educational environments. Hardiness training grounded in theory and evidence improves coping strategies and supports adaptive functioning under stress	- Reduced perceived stress - Adaptive coping - Improved coping strategies - Adaptive functioning under stress - Hardiness training	Hardiness-based adaptive coping	Hardiness

Note: This example illustrates the coding and synthesis process from initial text to final attribute. No abbreviations used.

Results

The findings were developed through a narrative synthesis process guided by the four-stage framework proposed by Popay et al. [16], moving progressively from concept extraction toward conceptual integration and framework development.

In the first stage, developing a theory, concepts, attributes and descriptions related to resilience among medical science educators during crises were extracted from the included studies. This stage generated a broad and diverse set of initial concepts reflecting different perspectives on how resilience is understood, developed and sustained in educational and crisis contexts. Rather than applying predefined categories, emphasis was placed on maintaining openness to the diversity of meanings represented across the literature and developing an initial understanding of the phenomenon.

In the second stage, developing a preliminary synthesis, the extracted concepts were iteratively reviewed, compared and organised to identify recurring conceptual patterns across studies. Concepts with conceptual affinity or overlapping meanings were gradually grouped and refined into twelve resilience attributes. These attributes included fostering tolerance and patience, providing conditions for personal thriving, strengthening hardiness, striving for meta-competencies, acquiring meta-skills, acquiring meta-knowledge, fostering self-authorisation, strengthening self-governance, enhancing autonomy, cultivating critical thinking, cultivating a caring mindset and acquiring creative thinking. Together

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these attributes suggested that resilience among medical science educators extends beyond individual coping abilities and represents a multidimensional construct involving attitudes, higher-order capacities, self-directed functioning and adaptive ways of thinking that may develop through engagement with educational challenges and crisis situations.

In the third stage, exploring relationships within and between studies, relationships among the identified attributes were examined through interpretive comparison and conceptual abstraction. This process enabled the organisation of the twelve attributes into four overarching concepts: Meta-attitude, Metacapability, Self-determination and Higher-order thinking. These concepts represent broader dimensions of resilience and provide a conceptual structure for understanding how resilience may be strengthened among medical science educators.

In the fourth stage, assessing robustness of the synthesis, the coherence and internal consistency of the developing framework were reviewed through repeated examination of the included studies, revisiting earlier interpretations and iterative discussion within the research team. This stage supported refinement of conceptual boundaries and contributed to finalisation of the conceptual framework.

Overall the synthesis resulted in a conceptual framework consisting of twelve resilience attributes organised within four overarching concepts, providing a structured understanding of resilience among medical science educators during crises. To facilitate interpretation and practical application of the findings, each of the twelve resilience attributes was further interpreted and described based on patterns identified across the included studies. These interpretive descriptions were presented in summary tables under the four overarching concepts to provide a more structured and practice-oriented understanding of resilience among medical science educators during crises.

A: Meta-attitude

Attribute 1: Fostering tolerance and patience: Tolerance and patience are fundamental components of individual resilience and are viewed as essential elements in educational theory and practice [17]. Uncertainty tolerance is a teachable, multifaceted competency that can be developed through repeated exposure, psychologically safe learning environments, structured reflection, and flexible thinking [18]. In medical education and practice uncertainty is an unavoidable aspect of clinical decision-making, and tolerance of uncertainty is recognised as a core professional competency across major healthcare systems including the UK, US, EU, Canada and Australia [19]. Low uncertainty tolerance among physicians is linked to unfavourable attitudes toward patient-centred care and higher burnout risk. Therefore, finding factors that influence medical students' uncertainty tolerance is key for designing effective educational strategies [20].

Evidence-based interventions to improve uncertainty tolerance include curricular reforms such as problem-based learning, medical humanities, simulation training, reflective exercises and aligned assessment methods [19]. Stephens et al. point to moderators such as reflective learning, intellectual candour, orientation programmes, assessment structures and faculty communication as influential components within medical training environments [20]. Educational recommendations for fostering uncertainty tolerance emphasise integrating uncertainty into assessment practices, promoting peer teaching, cultivating institutional acceptance of uncertainty and using horizontally and vertically integrated developmental approaches [21].

Attribute 2: Providing conditions for personal thriving: In medical education, academic thriving encompasses cognitive engagement, emotional well-being, and a sense of belonging, with the educational environment playing a significant role in shaping these outcomes [22]. Thriving is characterized by positive growth, development, well-being, and successful functioning and is facilitated by personal and contextual factors, including psychological resilience [23]. Because resilient individuals inherently seek better ways of living for themselves and their communities, thriving becomes a central component of resilience within academic environments, particularly during crises.

Scheele argues that medical curricula should be designed to meet future community needs and that professionals thrive when granted autonomy, as their initiatives considerably influence programme success [24]. Similarly, teacher resilience and well-being are important for sustaining effective education during disasters and can contribute to broader community resilience [25].

Attribute 3: Strengthening the trait of hardiness: Hardiness is a personality characteristic that may buffer the effects of stressful life events and is characterised by commitment, a sense of control, and a vigorous orientation toward challenging circumstances [26].

Psychological hardiness has also been identified as an

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important factor associated with resilience under stressful conditions, particularly in organizational contexts, where leadership actions and organizational policies may contribute to strengthening hardiness and stress resilience [27]. Hardiness correlates positively with self-esteem, self-efficacy, optimism and an internal locus of control, particularly through the challenge dimension. Zhang and Wong emphasise that hardy individuals interpret stressful events as controllable and as opportunities for growth [28]. In medical education Faramarzi and Khafri show that self-esteem, mediated by psychological hardiness, positively influences critical thinking, a key component of clinical decision-making [29]. A conceptual summary of the distinctions among tolerance/patience, personal thriving, and hardiness is presented in **Figure 2**.

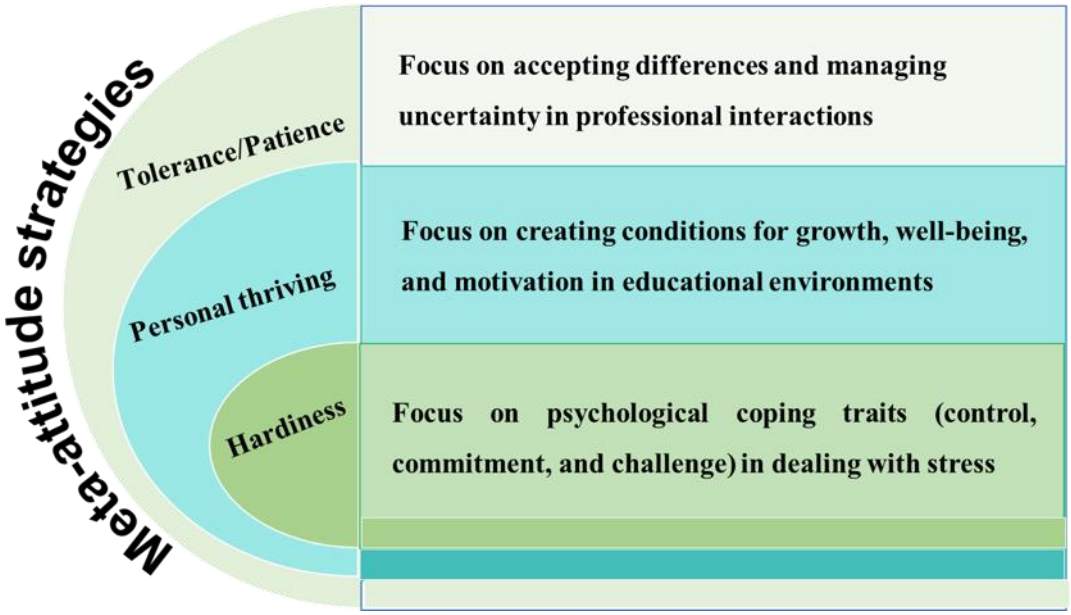

Figure 2. Distinctions among meta-attitude strategies: tolerance/patience, personal thriving and hardiness

B: Metacapability

Attribute 4: Acquiring meta-knowledge: Meta-knowledge refers to knowledge about knowledge, its acquisition, origins, applications, reliability and the understanding of what others know and need [30, 31]. In medical education where continuous learning is fundamental and becomes even more urgent during crises, meta-knowledge is an essential competency for both students and instructors. Davis and Buchanan argue that meta-knowledge enables individuals to "know what they know" and repurpose their knowledge in multiple ways including examining and refining it [30]. Meta-knowledge helps individuals understand the nature, types and context of their knowledge, supporting conscious decision-making, effective knowledge creation, sharing and application in complex and uncertain situations [32].

Attribute 5: Striving for meta-competencies: Meta-competencies are higher-order abilities that support learning, adaptation, anticipation and creativity by guiding the development and flexible application of skills. They underpin lifelong learning by enabling learners to improve and integrate competencies. Relatedly meta-cognition refers to awareness and regulation of cognitive processes, focusing on understanding and managing the act of learning itself [33]. In competency-based medical education, meta-competencies complement core competencies and enable physicians to manage multiple tasks across different conditions [34]. Brown and McCartney categorise them into four domains: cognitive, influencing, managing and personal [35].

The proposed meta-competencies include agency, adaptability, creativity, compassion, interbeing, self-awareness, and reflexivity, which were examined in relation to transformative resilience (transilience) in an educational setting [36]. Brown and McCartney note that meta-competencies, though deeply embedded in learning, cannot be taught through conventional

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methods; in contrast competencies represent knowledge-based skills that can be formally instructed [35]. Competency-based medical education proceeds through identifying competencies, designing educational programmes, developing assessments and defining standards. However narrowly defined competencies risk confining learners' mastery to prescribed tasks, limiting critical thinking and higher-order reasoning essential in medical practice. Meta-competencies address this gap by enabling individuals to acquire, integrate and apply competencies flexibly across diverse contexts [37].

Attribute 6: Acquiring meta-skills: Meta-skills are general and basic skills that enable individuals to learn, develop, and upgrade other specialized skills independently [38]. The rapidly changing healthcare environment requires primary care physicians to improve their professional skills, expand their horizons, adapt to changing realities, and develop meta-skills such as critical thinking and research competencies [39]. Skills Development Scotland conceptualizes meta-skills as innate higher-order abilities that enable individuals to learn and adapt across various contexts. Emerging early in life they act as foundational enablers for developing other competencies. Therefore, education should explicitly acknowledge these skills, making them visible and allowing learners to actively cultivate them [40].

For physicians working in increasingly complex and uncertain environments the development of meta-skills is essential. The Skills 4.0 framework groups meta-skills into three domains: self-management, social intelligence and innovation [41]. Within medical science meta-skills encompass capabilities such as maintaining purpose, pattern recognition, feedback literacy, storytelling, authenticity, perspective-taking, prioritisation and adaptability [38]. **Figure 3** provides a conceptual overview of meta-knowledge, meta-skills, and meta-competencies within the metacapability framework.

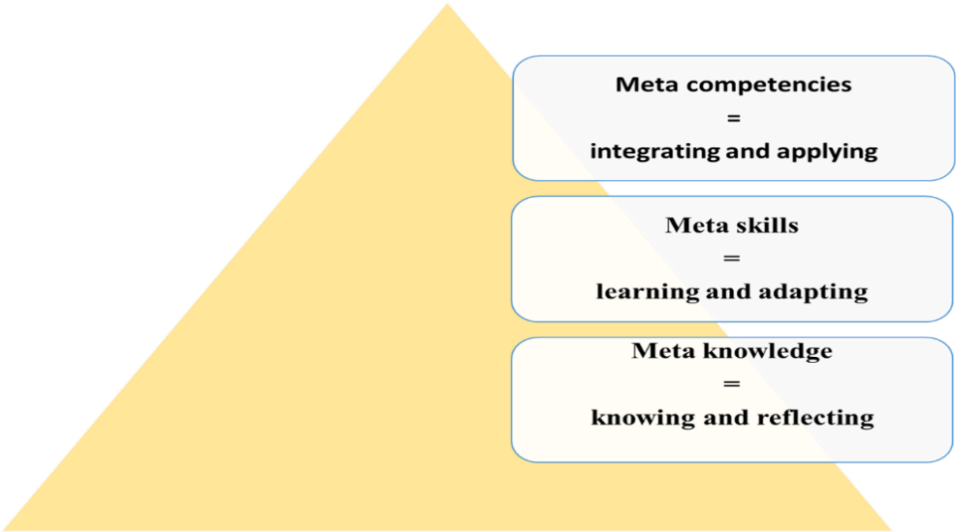

Figure 3. Conceptual distinctions among meta-knowledge, meta-skills and meta-competencies within the Metacapability framework

C: Self-determination

Attribute 7: Fostering self-authorisation: Self-authorisation describes the capacity of individuals to empower themselves to act for the public good without awaiting permission from authority figures [42]. Schmid conceptualises self-authorisation philosophically as a component of intentional subjectivity grounded in pre-reflective self-awareness, encompassing self-recognition, self-validation and self-commitment, qualities realised only within individual consciousness rather than collective agency [43]. In educational contexts the theory of self-authorisation supports developmental growth by encouraging learners to assume responsibility for their decisions and to engage in experiences that challenge existing worldviews. Salice, referencing Schmid, further elaborates on a personal knowledge structure tied to self-authorization, which is characterized by self-recognition, personal commitment, authorization, and validation [44]. Modern medical education requires comprehensive curricula that cultivate cognitive maturity, coherent identity formation, and advanced interpersonal competencies—core attributes of future healthcare professionals. Saunders, citing Magolda, notes that self-authorization is

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associated with three developmental dimensions: cognitive, intrapersonal, and interpersonal. Accordingly, curriculum design should integrate conventional learning objectives with broader developmental aims while creating supportive yet challenging environments grounded in clinical practice [45]. Self-governance and self-authorization are distinct but causally interdependent dimensions of autonomy [46]. Within the medical profession self-governance entails assuming responsibility for professional standards and ethical regulation, with self-governing bodies taking on defined responsibilities to guide the profession [47].

Attribute 8: Strengthening self-governance: Professional self-governance is a central asset of the medical profession in Germany, where emerging competencies that strengthen relationships among physicians, patients, and society require autonomy from socio-political directives [48]. Discussions at the Zentraleuropäische Vereinigung der Ärztekammern (ZEVA; Central European Association of Physicians' Chambers) Symposium (**Box 1**) emphasise that self-governance represents a form of active citizenship fundamental to democratic systems, grounded in conscious responsibility for professional duties and collective interests, even when these stand in tension with governmental policies. Such governance relies on internalised professional norms and shared understandings of appropriate conduct [47]. Self-governance in medicine refers to the profession's responsibility to govern and regulate its own professional affairs, including the establishment of standards for education, training, licensure, certification, professional practice, and continuing education. It also involves professional organizations and governing bodies taking responsibility for maintaining professional standards, accountability, and professionalism within the medical profession. Effective self-governance requires the medical profession to exercise this responsibility effectively and responsibly while remaining accountable to the public. [49]. Student self-governance differs conceptually from professional self-governance as learners are still developing their competencies. It is best understood as a collective process through which learners practise governing themselves, not by acting without constraints but by collaboratively establishing rules and adhering to them [50]. Findings from qualitative interviews with physicians and pharmacists in Thailand indicate that privatised digital platforms such as For-profit social media technology (**FPSMT**) can function as tools of self-governance, shaping professional conduct through cognitive frameworks of aspiration, regulation and responsibilisation [51].

BOX1. ZEVA; Central European Association of Physicians' Chambers

The ZEVA Symposium, organised by the Central and Eastern European Chambers of Physicians, derives its name from the German acronym Zentraleuropäische Vereinigung der Ärztekammern (Central European Association of Physicians' Chambers), and has come to symbolise unity and commonality among its participants.

Attribute 9: Enhancing autonomy: Autonomy, originating from the Greek autonomos meaning "having one's own laws", is a multifaceted concept widely applied in educational policy and practice. In schooling and teacher development autonomy is typically conceptualised within the tension between constraint and freedom [52]. In medical education autonomy is defined as the capacity to act independently without supervision, reflecting the importance of independence in professional practice.

As healthcare systems evolve and the traditional apprenticeship model becomes less central, maximising residents' opportunities for independent practice has become essential for improving learning, patient safety and future curricular design [53]. Research in educational settings suggests that self-assessment and creativity are associated with learner autonomy [54]. An autonomy-supportive teaching style can be flexibly applied in day-to-day interactions with medical learners across different educational settings and levels through regular practice and reflection [55].

Humanistic teaching practices further reinforce autonomy in medical education. When educators support learners' perspectives, agency and active engagement, students tend to show stronger humanistic attitudes in patient care, improved conceptual understanding and better psychological adjustment [56]. Given its multidimensional nature autonomy must be examined across diverse educational actors and national settings to clarify its meaning and implications for educators, learners, managers and policymakers [52]. **Figure 4** delineates the conceptual boundaries among self-authorization, self-governance, and autonomy as dimensions of self-determination.

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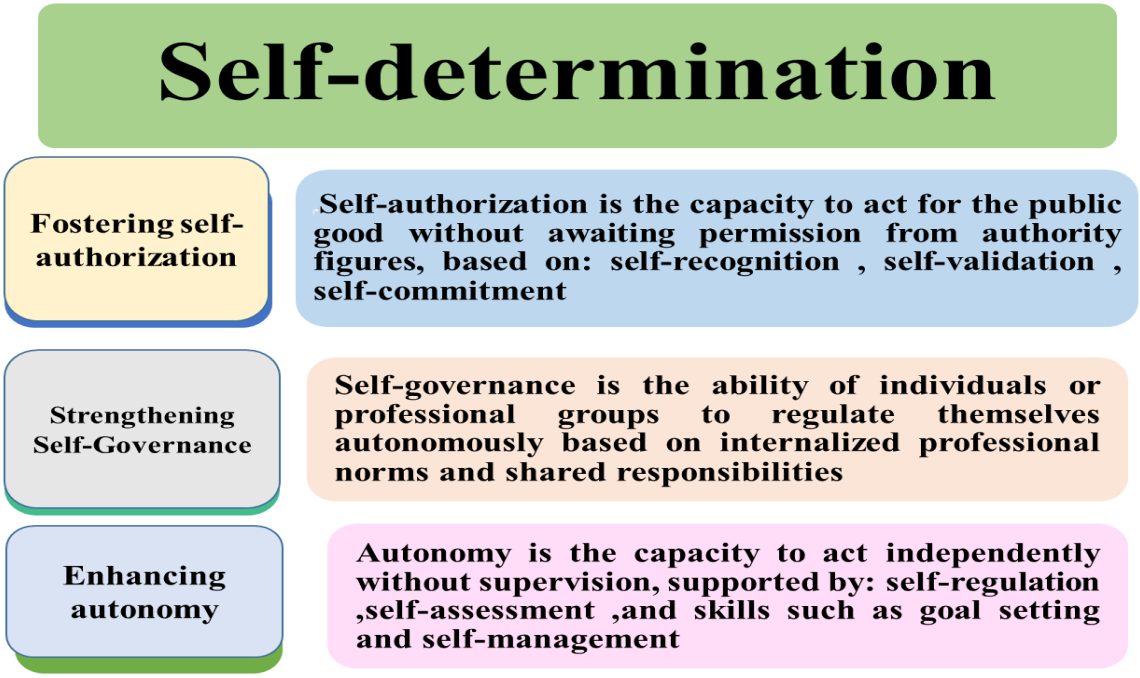

Figure 4. Distinctions among self-determination strategies: self-authorization, self-governance and autonomy

D: Higher-order thinking

Attribute 10: Cultivating critical thinking: Critical thinking as defined by the American Philosophical Association is purposeful self-regulated judgment that employs cognitive tools such as interpretation, analysis, evaluation, inference and explanation to make reasoned decisions [57]. It is a teachable and learnable cognitive skill that improves decision-making, problem-solving and professional competence. In medical education critical thinking enables students to assess their learning needs, understand diverse perspectives and make effective clinical decisions [58, 59]. Effective educators encourage critical thinking by reflecting on teaching strategies, identifying barriers and creating environments conducive to inquiry and discussion [59]. Teaching approaches include problem-based learning, case-based learning, flipped classrooms, reflective writing, think-pair-share strategies and the Script Concordance Test, which evaluates trainees' judgment in uncertain clinical scenarios against expert panels [58]. Critical thinkers demonstrate self-awareness, curiosity, reflection, analytical reasoning, logical and intuitive thinking, resilience, autonomy, fairness, creativity and practical problem-solving orientation [60]. In clinical settings cultivating critical thinking is essential for navigating complex medical knowledge and improving patient care. Faculty can strengthen these skills by creating research-oriented discussion-rich learning environments, offering workshops on information evaluation, questioning and reasoning techniques, and addressing barriers to effective cognitive engagement [59]. The cognitive process involves information gathering through observation, reflection and reasoning; posing critical questions; evaluating evidence; employing abstract ideas; drawing reasoned conclusions; testing solutions against standards; and communicating effectively to develop complex solutions [60].

Attribute 11: Cultivating a caring mindset: Caring thinking is a form of higher-order thinking that integrates cognitive and emotional components, grounded in values, empathy and concern for others [61]. Lipman introduced the concept, linking it to critical and creative thinking, while Sharp emphasised caring as an intrinsic human capacity that can be nurtured through education [62]. Caring thinking guides students in transforming feelings into informed decisions, fostering strong value systems, empathy, respect, compassion and ethical judgment. It encompasses four domains: caring for inquiry tools, caring for others, caring for meaningful problems and caring for communication processes [61, 63]. Key attributes associated with caring thinking include mindfulness, curiosity, courage, resilience

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, ethics and leadership, all of which support learners in making principled and passionate judgments [63]. Integration of caring thinking into curricula promotes personality and character development alongside intellectual growth.

Attribute 12: Acquisition of creative thinking: Creative thinking is an active innovative approach to problem-solving that emphasises identifying opportunities, generating novel solutions and thinking beyond conventional frameworks [64]. Its development involves stages of discovery, definition, development and presentation, fostering transferable lifelong learning skills, collaboration and leadership in medical education [65, 66]. Two core components of creative thinking are perspective-shifting and creative collaboration. Perspective-shifting encourages teamwork and diverse viewpoints, while creative collaboration engages multiple participants in generating innovative ideas collectively [67].

Techniques include brainstorming, mind mapping, reframing, challenging assumptions and iterative feedback [64]. Creative thinking enables medical students to generate and apply new concepts, view situations from new perspectives, identify alternative approaches, and explore new connections to address problems [65]. The conceptual distinctions among critical, caring, and creative thinking as higher-order thinking strategies are captured in **Figure 5**.

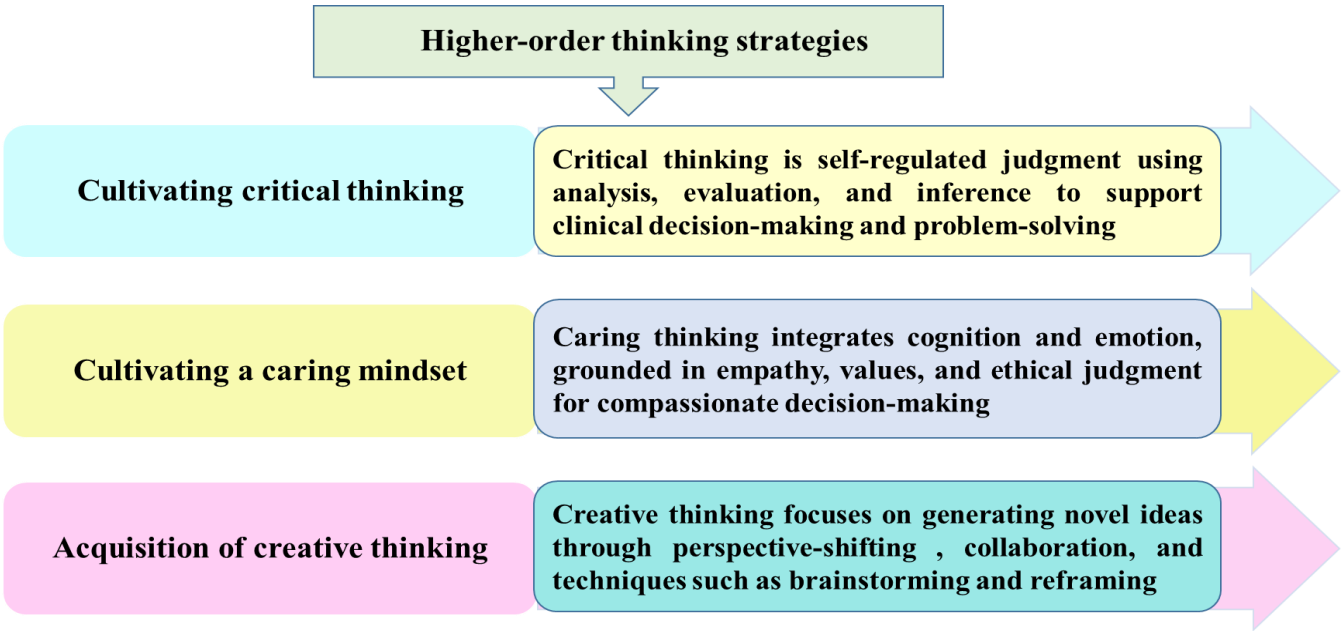

Figure 5. Distinctions among higher-order thinking strategies: critical thinking, caring thinking and creative thinking

Discussion

This study aimed to develop a conceptual understanding of resilience among medical science educators during crises through a narrative synthesis of the existing literature. Healthcare professionals are at increased risk of burnout in the context of high workloads, emotionally demanding work, long working hours, and chronic occupational stress [68]. Recent evidence further shows that physician burnout remains a key systemic challenge influenced by high-pressure clinical environments, extensive documentation requirements and insufficient organizational support [69]. In addition, findings support the detrimental effects of moral injury on the mental health of physicians and healthcare professionals during crisis situations [70]. Similarly high levels of burnout have been reported among medical residents during the Syrian crisis [71].Overall these findings suggest that maintaining professional functioning and sustaining the quality of medical education and healthcare delivery during crises requires greater attention to resilience capacities among the medical education workforce. Previous studies have shown that strengthening individual resilience among medical educators can improve teaching quality, reduce burnout and support professional growth [12]. Therefore, medical science educators may benefit from deliberate and proactive approaches to strengthening resilience to more effectively prepare future healthcare professionals [5].In

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this regard Mahmood et al. argued that physicians' ability to cope with difficult economic conditions is associated with moral resilience and adaptive capacity; however, sustaining the quality of healthcare requires moving beyond individual resilience toward institutional resilience through stable employment conditions, managerial accountability and structured psychological and professional support systems [72]. Likewise, studies conducted in Gaza have reported alarming levels of burnout among healthcare workers, exacerbated by ongoing conflict and limited mental health infrastructure. In this context religious coping emerged as a prominent coping mechanism; nevertheless, supportive interventions aimed at promoting mental well-being and reducing burnout remain urgently needed [73]. Collectively these findings emphasize the importance of addressing resilience at both individual and institutional levels. The present synthesis suggests that resilience among medical science educators extends beyond an individual psychological trait and may be conceptualized as a multidimensional construct composed of attitudes, capabilities, self-regulatory capacities and higher-order modes of thinking.

The resulting conceptual framework organized twelve resilience attributes into four overarching concepts: Meta-attitude, Metacapability, Self-determination and Higher-order thinking. These concepts should not be viewed as isolated characteristics; rather they represent interconnected dimensions that collectively support adaptive professional functioning in educational environments shaped by crisis and uncertainty. Meta-attitude emphasises internal orientations including tolerance, personal thriving and hardiness that contribute to educators' sustainability under challenging conditions. Metacapability refers to capacities that help individuals understand, regulate and adapt their knowledge and professional functioning across changing contexts.

The domain of Self-determination suggests that resilience may be strengthened through personal agency and dimensions such as self-authorisation, self-governance and autonomy. Finally, Higher-order thinking highlights the role of critical, caring and creative modes of thinking in responding effectively to complex educational situations. An important implication of this framework is that supporting resilience among medical science educators may require integrated faculty development approaches rather than isolated interventions. Educational institutions may use these findings to design professional development initiatives, create supportive environments and establish policies that strengthen adaptive capacity, learning and responsiveness during crises.At the same time these findings should be interpreted in light of the conceptual and interpretive nature of the study. The proposed framework was developed through synthesis and conceptual abstraction of the existing literature and does not represent empirically tested relationships. Future studies are therefore needed to operationalise, examine and validate these attributes across different educational and crisis contexts to further refine the framework and improve its applicability in educational practice and policy.This study used a narrative synthesis approach to develop a theoretically informed conceptual framework of resilience attributes among medical educators during crises. Thus the findings are presented at a conceptual level and were not intended to directly develop or evaluate applied interventions or context-specific implementation strategies. While this synthesis provides a comprehensive understanding of educator resilience, further work is needed to translate these findings into operational guidance.

Conclusion

This study developed a conceptual framework of resilience among medical science educators during crises through a narrative synthesis of the literature. The framework identified twelve core resilience attributes organised into four overarching concepts: Meta-attitude, Metacapability, Self-determination and Higher-order thinking. Together these concepts provide a structured understanding of resilience and offer a conceptual foundation for developing a practical guide to support and sustain the quality of medical education in crisis contexts. Educators and institutions may use this framework to inform faculty development initiatives, professional growth programmes and supportive institutional policies. Given the conceptual and interpretive nature of the study, future research should focus on the empirical validation and operationalisation of these attributes through design-based, interventional or mixed-methods studies in authentic crisis contexts. Such efforts may refine the framework and support its translation into an evidence-informed practical guide for educational practice, policy development and resilience-building strategies in crisis-responsive medical education systems. **Figure 6** provides an overview of the concepts associated with personal resilience.

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Figure 6. Concepts related to personal resilience

Ethical considerations

As this study was conducted using a narrative synthesis approach based exclusively on published literature and did not involve human participants, biological materials or identifiable personal data, formal ethical approval and informed consent were not required. The study was performed in accordance with ethical principles for research integrity, accurate reporting and responsible use of published sources.

Artificial intelligence utilization for article writing

Artificial intelligence tools were used only to support language refinement. All conceptual development, study design, interpretation of findings, critical revisions and final approval of the manuscript were performed by the authors. The authors take full responsibility for the content of this article.

Acknowledgment

The authors sincerely acknowledge all researchers whose published findings contributed to the development and completion of this study.

Conflict of interest statement

The authors declare no conflict of interest.

Author contributions

Conceptualisation and methodology were led by Shahram Yazdani and Poorandokht Afshari. Literature search and study selection, as well as data extraction and synthesis, were performed by Poorandokht Afshari and Snor Bayazidi. The original draft was prepared by Poorandokht Afshari, and subsequent review and editing were carried out by Poorandokht Afshari and Snor Bayazidi. Shahram Yazdani provided supervision, and all authors gave final approval of the manuscript.

Funding

This research received no external funding.

Data availability statement

No datasets were generated or analysed during the current study beyond information extracted from the published literature included in the narrative synthesis.

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