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Mapping the multidimensional factors of medical student resilience development: A scoping review

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Abstract

Resilience plays a vital role in promoting mental wellbeing by facilitating recovery from stressful experiences. Medical students face intense academic and clinical requirements throughout their rigorous training. However, existing literature has predominantly focusing on individual attributes, neglecting the significant role that educational institutions play in resilience development. This scoping review seeks to comprehensively map both individual and institutional factors that contribute to the resilience development among medical students. This scoping review adhered to the Joanna Briggs Institute (JBI) methodology and following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines. To ensure a rigorous and comprehensive search, multiple databases including Google Scholar, Scopus, PsycINFO, and PubMed were searched for relevant studies published in English between 2000 and Feb 2025, focusing on the resilience or mental health of undergraduate medical students. Two reviewers independently screened the articles, and any discrepancy were resolved through a third reviewer. A descriptive analytical approach and thematic analysis were used to identify key themes in the data. Fifty-nine studies, mostly cross-sectional, were included. Identified themes were broadly categorize into individual factors (e.g., gender, personality traits, personal life events, financial constraints, health-related issues, academic performance) and institutional factors (e.g., academic workload, faculty support and peer interaction, learning environment, extracurricular activities, support systems). This review highlighted that both personal and institutional factors substantially impact medical students' resilience development. Cultivating a supportive learning environment, strengthening faculty-student relationships, and implementing targeted interventions such as resilience training, mentorship, and increased academic and financial support as well as access to mental health resources can mitigate stressors and enhance students' resilience. Addressing these multifaceted factors will empower medical students to thrive both personally and professionally, ultimately contributing to the provision of high-quality patient care.

Keywords Resilience, Well-being, Burnout, Medical education, Learning environment.

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Introduction

In recent years, the literature on the mental health challenges faced by medical students has been rapidly growing. Medical students experience high psychological distress, driven by the heavy academic workload, rigorous assessments, intensive clinical exposure, and a competitive learning environment [1]. The diverse challenges throughout their academic training are persistently escalating, prompting growing interest and focus from researchers and faculty members [2, 3]. While medical education is designed to provide students with opportunities for both personal and professional growth within a supportive environment, it often exposes students to significant mental health risks [4]. Hence, acknowledging the evolving dynamics of medical education and its impact on students' mental health is essential [5].

Enhancing medical students' well-being is not only fundamental to their mental health state and academic performance [6] but it is also critical for their future mental health and competence as doctors, affecting the quality of patient care [7]. Many studies have focused primarily on how medical students' mental health and well-being levels have been adversely affected [8–10], often overlooking any positive indicators of mental health and well-being. Positive psychological construct such as emotional intelligence, self-efficacy and social support have been shown to buffer the effect of stress and enhance coping mechanisms and overall quality of life [11, 12]. Resilience has emerged as a central concept in medical education research, recognised for its critical role in enabling students to adapt to the complex demands of medical training [13].

Resilience, which refers to the ability to bounce back from adversity, differs from well-being, which is a broader measure of overall mental and emotional health [14]. Resilience is a vital capability for students at university, as it underpins their capacity to manage academic demands, enable positive progress, and manage the pressure of work, life, and study [15]. Tempski et al. (2015) proposed that building resilience is essential to improve medical students' mental health and consequently, their capacity to learn [16]. Fostering student resilience helps them to develop effective coping strategies for challenging situations. Cultivating resilience-building skills early in the training enable students to better manage the demands of medical school and the long-term career path that lies ahead of them [17].

Bronfenbrenner (2005) revised bioecological theory provides a valuable theoretical framework for understanding the complex, interconnected factors that shape resilience development among medical students [18]. This theory highlights how an individual's resilience and coping abilities are influenced not only by personal traits and interpersonal relationships, but also by the proximal settings of classrooms, teachers, and peers, as well as distal institutional factors such as policies, resources, and broader sociocultural contexts [19]. Resilience is therefore proposed to be dependent on both individual and organizational elements [20], which interact in a dynamic, system-level process to impact student development over time.

It is found that medical students often experiencing higher rates of stress, anxiety, and burnout as compared to students in other fields [4]. Despite the clear importance of resilience, there is a notable gap in research concerning the specific individual and institutional factors that contribute to resilience development in medical students. Many existing studies on resilience focused on general mental health outcomes [21–23] or broad strategies for stress management [24] without delving critically into the distinct elements that foster resilience. Furthermore, while resilience is recognized as crucial for managing the challenges of medical education and subsequent professional practice [25], there is limited understanding of how different educational environments and personal characteristics interact to build resilience. This gap in knowledge hinders the development of systemic targeted interventions that could effectively support medical students.

Hence, the objective of this scoping review is to examine individual and institutional factors that have been associated with resilience development in medical students. By identifying these factors, the review aims to provide a consolidated understanding of how resilience can be fostered within the medical education context, ultimately enhancing students' well-being and academic success.

Methodology

Registration of protocol

This scoping review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology [26] and reported following the Preferred Reporting Items for Systematic Reviews Extension for Scoping Reviews (PRISMA-ScR) guidelines [27] (Appendix). The protocol for this scoping review is registered on the Open Science Framework which can be accessed at https://doi.org/10.17605/OSF.IO/3RCPK.

Search strategy

This review utilised the Population, Concept and Context (PCC) for inclusion [26] and operational definition of each component of PCC is summarized in Table 1. The search strategy aimed to identify both published and unpublished studies from year 2000 until February 2025. Two citation databases (Google Scholar and Scopus) and two discipline databases (PsycINFO and PubMed) were utilized to answer the review questions. The selection

Table 1 Inclusion and exclusion for articles screening in the scoping review

	Inclusion criteria	Exclusion criteria
Population	• Medical students (undergraduate)	• Focus on other health professionals or medical training other than undergraduate level
Concept	• Resilience, mental well-being	• Include effect of COVID-19 or online education due to COVID-19. • Focus on the outcome of intervention • Not focused on resilience /mental health (e.g., only on coping strategies)
Context	• Original studies– quantitative, qualitative, or mixed-method study design	• Review articles, letters, opinion papers, and editorials
Other	• English language • Full text available	• Languages other than English

keywords were informed by PCC elements and existing literature on medical students' mental health and resilience. Search terms ("resilience" OR "mental health" OR "well-being" OR "burnout" OR "mental distress" OR "anxiety" OR "stress" OR "depression") AND ("medical students" OR "medical education" OR "medical training" OR "learning environment") were used to capture the broad range of constructs related to psychological adaptation and mental health challenges faced by medical students. These specific terms were selected based on a review of the existing literature, which has highlighted these as key factors influencing the mental health and resilience of this population. While terms like "mental disorders" could have been included, the focus of this review was on understanding the positive and protective factors, as well as the overall well-being of medical students, rather than solely pathological conditions. Moreover, population and context terms were used to refine the search of relevant studies.

Selection of relevant studies

All identified citations were collated in a Microsoft Excel sheet, and duplicates were removed. Titles and abstracts were screened by two independent reviewers (SRA and NSR) for assessment against the inclusion and exclusion criteria (Table 1). Reference lists of the included articles were searched for relevant papers to ensure a comprehensive search of the literature. Potentially relevant and eligible sources were retrieved in full and assessed for full text screening by two independent reviewers (SRA and NSR). A flowchart of the results was updated throughout the review process to detail the search results, duplicates, and screening results (Fig. 1). Reasons for the exclusion of sources that did not meet the inclusion criteria during full text screening were reported in the scoping review. Any disagreements that arose between the reviewers at each stage of the selection process were resolved by an additional reviewer (MSBY).

Data extraction

SRA extracted data from the included studies using a standardized data extraction tool. The extracted data included the year of publication, country, study design, methodology sample size, tool, and findings. The draft data extraction tool was piloted and revised as necessary before the data extraction commenced.

Data analysis

A descriptive analytical approach was employed to summarize and categorize the literature, including a numerical count of study characteristics (quantitative) and thematic analysis (qualitative). The researchers employed a six-step thematic analysis process proposed by Braun and Clarke (2006) to systematically analyze the data [28]. First, the research team read all included studies to familiarize themselves with the content. SRA assigned initial codes to relevant results or discussion in the included studies. SRA then grouped similar codes into potential themes. The research team then reviewed these themes, refining and validating them to ensure they accurately reflected the data. Finally, the themes were defined and named, providing a detailed account of the institutional and individual factors that enable or hinder resilience and mental well-being among medical students.

Results

The results of the search and screening process are presented in the PRISMA-ScR flow diagram (Fig. 1). As shown, the initial search retrieved 3786 publications. After removing duplicate records, 2176 articles were screened based on titles and abstracts, leading to 142 full-text articles being evaluated for eligibility against the inclusion and exclusion criteria. This screening process ultimately yielded 59 articles that were included in the review (Table 2).

Characteristics of the included studies

Most of the studies were cross-sectional studies ($n=52$) followed by longitudinal studies ($n=6$) and one retrospective study ($n=1$). Studies utilized mainly quantitative methodology ($n=52$), followed by mixed methods ($n=3$), and qualitative studies ($n=4$). 56% of the studies were published in the recent five years (Fig. 2). The highest number of studies originated from the United States ($n=16$) [29–44], followed by Malaysia ($n=5$) [45–49], Australia ($n=3$) [50–52], Germany ($n=4$) [3, 53–55], Pakistan ($n=3$) [56–58], China ($n=2$) [59, 60], Canada ($n=2$) [61, 62], Serbia ($n=2$) [63, 64] and multiple country ($n=2$) [48, 65]. Additionally, there was one study each from Belgium [66], Russia [67], Ethiopia [68], Uganda

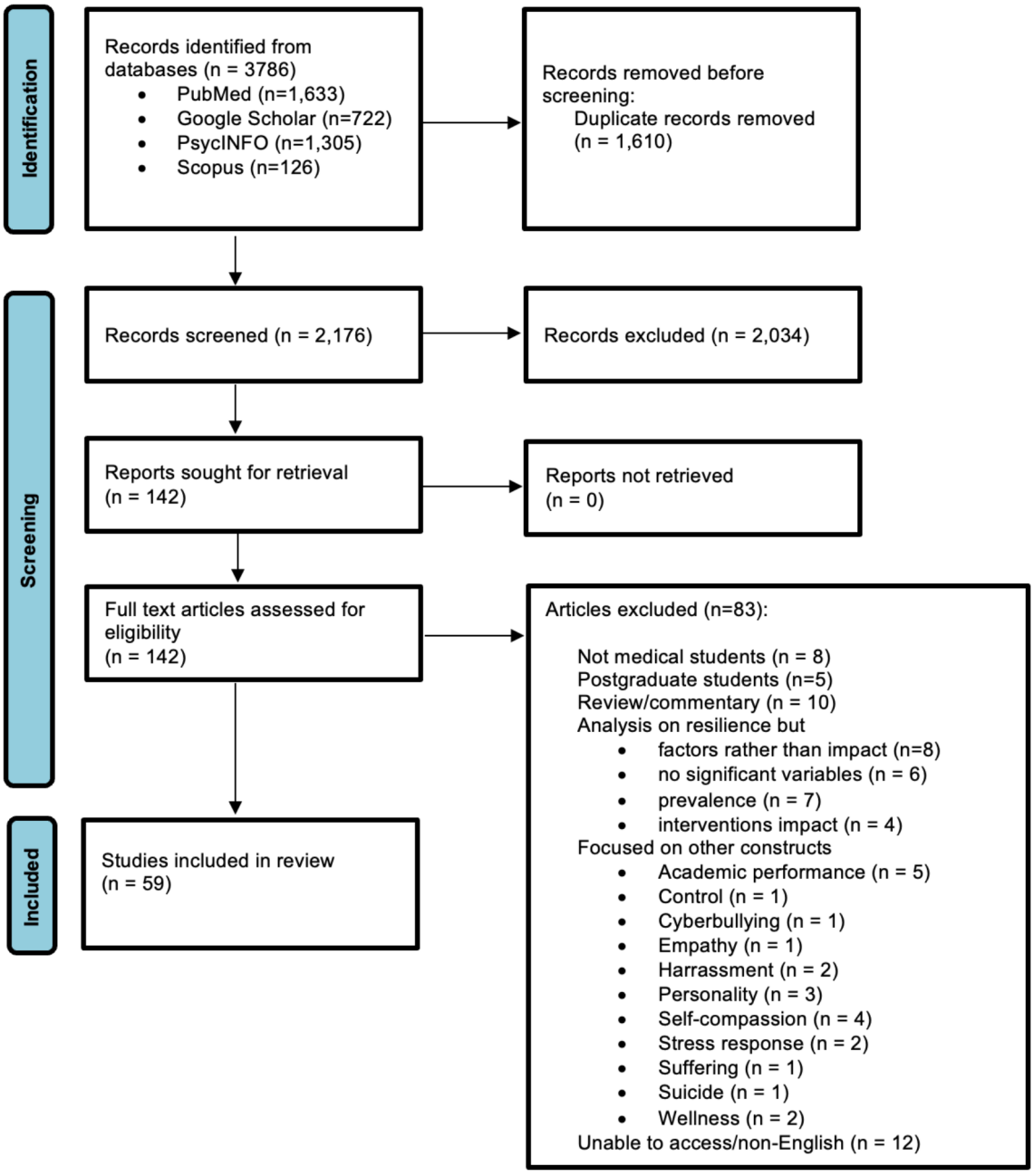

Fig. 1 Search results, study selection and inclusion process

[69], Nigeria [70], Bahrain [71], Tanzania [72], Saudi Arabia [73], Sri Lanka [74], the United Kingdom [75], Thailand [76], Switzerland [77], Indonesia [78], Brazil [79], Qatar [80], Vietnam [81], Morrocco [82], Netherland [83] and Sweden [84], (Fig. 3).

The total number of participants included in these studies were 77,833 with sample size varied considerably for each study ranging from 15 to 26,567. Fourteen out of 59 articles specifically mentioned resilience as the measured variable. Other included studies measured related variables such as burnout, stress and mental health.

The following section synthesizes the thematic analysis of individual and institutional determinants of resilience identified in the included studies. A conceptual framework outlining these factors is depicted in Fig. 4.

Individual factors

Gender and ethnicity The most reported individual factor influencing resilience and mental health was gender, with findings indicating that female medical students exhibited lower resilience as compared to their male counterparts. Many studies included in this review highlighted

Table 2 Extraction table for included studies

No	Country	Study design	Methodology	Sample size	Tool	Findings	
						Individual factors	**Institutional factors**
Ahmed et al. (2025)	Pakistan	Cross-sectional	Quantitative	291	Brief Symptom Inventory-18 (BSI-18) Perceived Stress Scale (PSS-10) International Physical Activity Questionnaire (IPAQ-7)	• Gender • Physical activity	
Al-Najdi et al. (2025)	Qatar	Cross-sectional	Qualitative	15	Interview	• Anxiety • Social isolation • Sleep deprivation, fear of failure	• Academic pressure • Stigma around mental health • Lack of support services
Alotiby (2021)	Saudi Arabia	Cross-sectional	Quantitative	572	Self-administered online questionnaire	• Female gender	• Teaching quality • Lacked learning resources
Asfaw et al. (2021)	Ethopia	Cross-sectional	Quantitative	523	Structured questionnaire	• Female gender • Alcohol use • Smoking • Living off campus	• Poor psychological support.
Azim & Baig (2019)	Pakistan	Cross-sectional	Mixed-Methods	188	Depression Anxiety Stress Scale traits 21-item (DASS-21) Focus group	• Female gender • Financial. • Poor lifestyles	• Lack of support services for stress management • Lack of physical and recreational facilities, • Number and duration lectures, • Increasing small group activities • Pre-scheduling exams.
Bacchi, & Licinio, (2017)	Australia	Cross-sectional	Quantitative	560	Connor-Davidson Resilience Scale (CD-RISC) Kessler Measure of Psychological Distress (K10)		• Financial support, • Clearer learning objectives • Continuous assessment
Bartlett & Fowler, (2020)	Canada	Cross-sectional	Quantitative	180	Kessler Psychological Distress scale Perceived Medical School Stress scale The Medical Student Health Survey		• Mental health stigma • Overwhelming curriculum
Beg et al. (2024)	Pakistan	Cross-sectional	Quantitative	301	Brief Resilience Scale Brief Cope	• Gender • Age • Coping style • GPA • Sleep hours • Study hours	
Behzadnia, Smith & Goodson (2018)	Malaysia	Cross-sectional	Quantitative	210	The Perceived Stress Scale (PSS-10), Medical Student Stressor Questionnaire, Revised Two-Factor Study Process Questionnaire	• Learning approach	

Table 2 (continued)

No	Country	Study design	Methodology	Sample size	Tool	Findings	
						Individual factors	**Institutional factors**
Boone et al. (2024)	Morocco	Cross-sectional	Quantitative	92	Maslach Burnout Inventory– Student Survey (MBI-SS) Copenhagen Psychosocial Questionnaire (COPSOQ) Big Five Inventory	• Neuroticism, • Perfectionism, • Gender, • Learning phase	
Bore, Kelly, & Nair, (2016)	Australia	Cross-sectional	Quantitative	127	Kessler Psychological Distress Scale	• Female gender • Emotional resilience • Self-control	• Social support
Brazeau, et al. (2010)	USA	Cross-sectional	Quantitative	127	Maslach Burnout Inventory, Jefferson Scale of Physician Empathy-Student Version Professionalism Climate Instrument.	• Empathy, • Professionalism	
Carrard et al. (2022)	Switzerland	Cross-sectional	Quantitative	886	Self-report questionnaires and anemotion recognition test.	•Female gender •Cognitive and Behavioural empathy	
Chatterjee et al. (2022)	USA	Longitudinal study	Mixed-Methods	49	Survey/interview		• Academic work, • Learning environment
Chye et al. (2024)	Malaysia	Cross-sectional	Qualitative	28	Interview	• Life experiences, • Personal attributes (mindfulness, religion, hobbies), • Socioeconomic challenges	• Support systems (peer, teacher, family) • Mentoring • Extracurricular activities, role modelling • Institutional environment
Cook et al. (2014)	USA	Cross-sectional	Quantitative	562	Maslach Burnout Inventory.		• Mistreatment
Cvejic, Huang & Vollmer-Conna (2018)	Australia	Cross-sectional	Quantitative	59	Self-reported measures of sleep, wellbeing and performance	• Poor sleep less refreshing sleep	
Dai et al. (2023)	China	Cross-sectional	Quantitative	318	Coping style questionnaire (SCSQ), Perceived social support scale (PSSS) Symptom checklist 90 (SCL-90)	• Sleep quality • Diet	• Social support,
Damiano, (2020)	Brazil	Cross-sectional	Quantitative	431	Medical Student Stress Factor Scale (MSSF)	• Lack of time. • Sleep deprivation	• Pressure for good grades • Lack of leisure time.
Dederichs et al. (2020)	Germany	Cross-sectional	Qualitative	71	Focus group		• Support system, • Attendance policy, • Less interactive teaching. • Assessment

Table 2 (continued)

No	Country	Study design	Methodology	Sample size	Tool	Findings	
						Individual factors	**Institutional factors**
Duncan, Bell, & Hellman, (2023)	USA	Cross-sectional	Quantitative	205	Comprehensive Intellectual Humility Scale (CIHS) Levenson Multidimensional Locus of Control Scale Perceived Stress Scale (PSS) Olden-burg Burnout Inventory (OLBI) Adult Hope Scale (AHS	• Lack of exercise • Lack of sleep	
Dyrbye et al. (2009)	USA	Cross-sectional	Quantitative	1701	Maslach Burnout Inventory (MBI),	• Positive personal events	
Dyrbye et al. (2010)	USA	Longitudinal	Quantitative	1321	Maslach Burnout Inventory-Human Services Survey (MBI) Medical Outcomes Study Short Form (SF-8) Epworth Sleepiness Scale (ESS) Perceived Stress Scale (PSS)	• Resilient students less likely to have depression • Stressful life events, • Minority, • Employment status	• Social support, • Student -faculty relation.
Dyrbye, Satele, West, (2021)	USA	Cross-sectional	Quantitative	14,126	Second-year survey (Y2Q) 2016–2018 AAMC Graduation Questionnaire (GQ).		• Mistreatment • Less favourable learning environment
Ensz & Mohiyeddini, (2019)	USA	Cross-sectional	Quantitative	500	Oldenburg Burnout Inventory (OBI), Difficulties in Emotional Regulation Scale (DERS) Brief Resilience Scale (BRS	• Emotional regulation	• Mistreatment • Perceived the learning environment less favourable.
Findyartini et al. (2021)	Indonesia	Cross-sectional	Quantitative	1040	Connor-Davidson Resilience Scale (CD-RISC) Brief-COPE The Big Five Personality Test	• Personality trait • Academic performance	
Hahn et al. (2024)	Germany	Cross-sectional	Quantitative	90	German version of Gratitude Questionnaire-6 (GQ-6) German Resilience Scale (RS-25) German revised version of Life Orientation Test (LOT-R) General Self-Efficacy Scale (SES) Questionnaire on social support (F-SozU German translation of Perceived Stress Scale (PSS)	• Gratitude, • Optimism, • Self-efficacy	• Academic pressure • Social support
Hardeman et al. (2016)	USA	Longitudinal study	Quantitative	301	Multidimensional Inventory of Black Identity		• Low level of racial identity
Himmelberger et al. (2024)	USA	Cross-sectional	Quantitative	4,180	Growth Mindset Scale, Instructor Growth Mindset Flourishing Scale Brief Resilience Scale, Psychological Symptoms Scale	• Personal growth mindset, gender • Race,	• Instructor mindset, supportive • Learning environment

Table 2 (continued)

No	Country	Study design	Methodology	Sample size	Tool	Findings	
						Individual factors	**Institutional factors**
Hu, Chibnall, & Slavin, (2019)	USA	Cross-sectional	Quantitative	169	Centre for Epidemiologic Studies-Depression scale (CES-D) State portion of the State-Trait Anxiety Inventory (STAI) Almost Perfect Scale Revised (APS-R) Clance Impostor Phenomenon Scale (CIPS) Nine questions developed by the authors about shame, embarrassment, inadequacy, self-worth in relation to academic performance.	• Negative feelings of shame, embarrassment and inadequacy	
Ilic et al. (2024) a	Serbia	Cross-sectional	Quantitative	760	Maslach Burnout Inventory– Student Survey (MBI-SS)	• Gender • Smoking • Sedative use • Alcohol consumption	• Support service
Ilic et al. (2024) b	Serbia	Cross-sectional	Quantitative	760	Maslach Burnout Inventory– Student Survey (MBI-SS)	• Age • Sedative use • Alcohol use	• Academic workload, • Transition preclinical to clinical), imited support services
Kajjimu, Kaggwa, Bongomin, (2021)	Uganda	Cross-sectional	Quantitative	145	Maslach Burnout Inventory - Student Survey (MBI-SS).	• Willingly chosen Medicine as a career • Male gender	• Transition from pre-clinical to clinical years
Kilic, Nasello, Melchior, Triffaux, (2021)	Belgium	Cross-sectional	Quantitative	343	Questionnaire assessing academic burnout, perceived stress, empathy, and perceived social support.	• Female gender • Perceived stress • Cognitive empathy	• Lack of social support
Kötter et al. (2018)	Germany	Longitudinal, prospective study	Quantitative	376	Hospital Anxiety and Depression Scale (HADS)	• Lack of physical activity	
Kristoffersson et al. (2024)	Sweden	Cross-sectional	Quantitative	457	Clance Impostor Phenomenon Scale (CIPS), Brief Resilience Scale (BRS)	• Gender • Impostor feelings, • Resilience	• Educational environment, gender stereotypes
Langness et al. (2022)	USA	Longitudinal Prospective	Quantitative	2,984	Medical Student Wellbeing Survey (MSWS)		• Faculty support • Mentorship • Mental health services, • Academic scheduling
Le Minh et al. (2023)	Vietnam	Cross-sectional	Quantitative	300	Maslach Burnout Inventory– Student Survey (MBI-SS)	• Gender, • Academic year, • Academic performance	• Pre-clinical workload • Academic environment
Mahroon, et al. (2018)	Bahrain	Cross-sectional	Quantitative	124	Beck's Depression Inventory (BDI-II) Beck's Anxiety Inventory (BAI) Satisfaction With Life Scale (SWLS)	• Arab ethnicity, • Female gender, • Relationship with peers	• Year of study, • Academic performance,

Table 2 (continued)

No	Country	Study design	Methodology	Sample size	Tool	Findings	
						Individual factors	**Institutional factors**
Mboya et al. (2020)	Tanzania	Cross-sectional	Quantitative	402	Self-reporting questionnaire (SRQ-20)	• Family history of mental distress • Decreased grades	• Residing off-campus • Availability of social support
Moura et al. (2024)	Brazil	Cross-sectional	Quantitative	1,370	Jefferson Empathy Scale, Davis Empathy Scale Wagnild & Young Resilience Scale, Spirituality self-assessment	• Spirituality, • Empathy, • Optimism, • Self-efficacy	• Curriculum structure • Early exposure to patient care
Neufeld & Malin (2020)	Canada	Cross-sectional	Quantitative	183	Learning Climate Questionnaire (LCQ) Basic Psychological Needs Satisfaction and Frustration Scale (BPNFS) Psychological Well-Being Scale		• Lack of support • Feelings of relatedness and competence
Nwachukwu et (2021)	Nigeria	Cross-sectional	Quantitative	690	Hospital Anxiety and Depression Scale (HADS)	• Polygamous family setting	• Academic workload • Failure to meet academic expectation • Preclinical student ship
O'Marr, (2022)	USA	Retrospective	Quantitative	26,567	American Medical Colleges Graduation Questionnaire.		• Student-faculty interaction
Purani tee et (2022)	Thailand	Cross-sectional	Mixed-Methods	763 quantitative, 20 qualitaive	Semi-structured individual interviews Maslach Burnout Inventory The Basic Psychological Need Satisfaction at Work Scale (BPNSS-21) Utrecht Work Engagement Scale-Student Version (UWESS-9)		• Engagement • Sense of belongingness • Relevant learning task • Safety • Peer interaction • Collegiality
Radcliffe & Lester (2003)	UK	Cross-sectional	Qualitative	21	Interviews		• Examinations • Transition • Lack of support system
Rajapuram, (2020)	USA	Longitudinal Prospective study	Quantitative	3162	Medical Student Wellbeing Survey (MSWS)	• Female gender • Disability • Financial	• Clinical students
Reed et al. (2011)	USA	Cross-sectional	Quantitative	2,056	Perceived Stress Scale, Maslach Burnout Inventory, and Medical Outcomes Study Short Form (SF-8)		• Methods of assessment. • Pass fail grading
Roling et al. (2020)	Germany	Cross-sectional	Quantitative	176	Jefferson Scale of Physician Empathy - Student Version (JSPE-S) World Health Organization-5 Well-Being Index (WHO-5)		• Preclinical students, • Mistreatment, lack of a • Lack of compassionate culture in the clinical setting, • Negative professional behaviour

Table 2 (continued)

No	Country	Study design	Methodology	Sample size	Tool	Findings	
						Individual factors	**Institutional factors**
Ruzhenkov et al. (2018)	Rusia	Cross-sectional	Quantitative	166	The Educational Stress Test. Perceived Stress Scale (PSS). Hospital Anxiety and Depression Scale (HADS).	• Living far away from their parents • Problems in their personal lives • Irrational learning process • Reluctance to learn	• Lack of textbooks • Large training load
Scheepers et al. (2024)	Netherlands	Cross-sectional	Quantitative	372	Study Demands–Resources Scale, Utrecht Burnout Scale, Utrecht Work Engagement Scale, Life Satisfaction scale	• Academic burnout, • Academic engagement, • Life satisfaction	• Workload, • Peer support • Growth opportunities
Wimberly (2022)	Sri Lanka	Cross-sectional	Quantitative	327	Mental Health Continuum-Short Form, Kessler 10 Psychological Distress Scale, and Oldenburg Burnout Inventory.	• Female gender	• Final year students • Social connections • Extracurricular activities
Wolf & Rosenstock (2017)	USA	Cross-sectional	Quantitative	662	Modified Maslach Burnout Inventory-General Survey (MBI GS) Epworth sleepiness scale Godin Leisure-Time Exercice Questionnaire Two-item patient health questionnaire (PHQ-2)	• Decrease physical activity • Inadequate sleep.	
Yu et al. (2023)	China	Cross-sectional	Quantitative	2411	Psychological environnement questionnaire Collective self-esteem scale, Psychological capital scale and Academic burnout scale.	• Collective self-esteem	• Learning environment
Yusoff (2011)	Malaysia	Cross-sectional	Quantitative	312	General Health Questionnaire (GHQ-12) Medical Student Stressor Questionnaire (MSSQ)		• Summative exams.
Yusoff, et al. (2013)	Malaysia	Longitudinal prospective study	Quantitative	196	Universiti Sains Malaysia Emotional Quotient Inventory Depression Anxiety Stress Scale traits 21-item (DASS-21)	• Neuroticism Personality trait, • Emotional intelligence • Previous academic performance	
Yusoff, Rahim, & Yaacob (2011)	Malaysia	Cross-sectional	Quantitative	92	Malay Beck's Depression Inventory (M-BDI)	• Female students • Personal relationship • Poor general health.	
Zalts, Green, Tackett, & Lubin, (2021)	Israel, Malaysia, and China	Cross-sectional	Quantitative	400	Johns Hopkins Learning Environment Perceptions Scale (JHLES) Dundee Ready Education Environment Measure (DREEM)	• Motivation	• Learning environment

Table 2 (continued)

No	Country	Study design	Methodology	Sample size	Tool	Findings	
						Individual factors	Institutional factors
Zimovjanova, et al. (2023)	Czechia, Iran, Kenya, and Venezuela.	Cross-sectional	Quantitative	2033	Depression Anxiety Stress Scale traits 21-item (DASS-21)	• Female gender • Low socioeconomic • Poor social life	

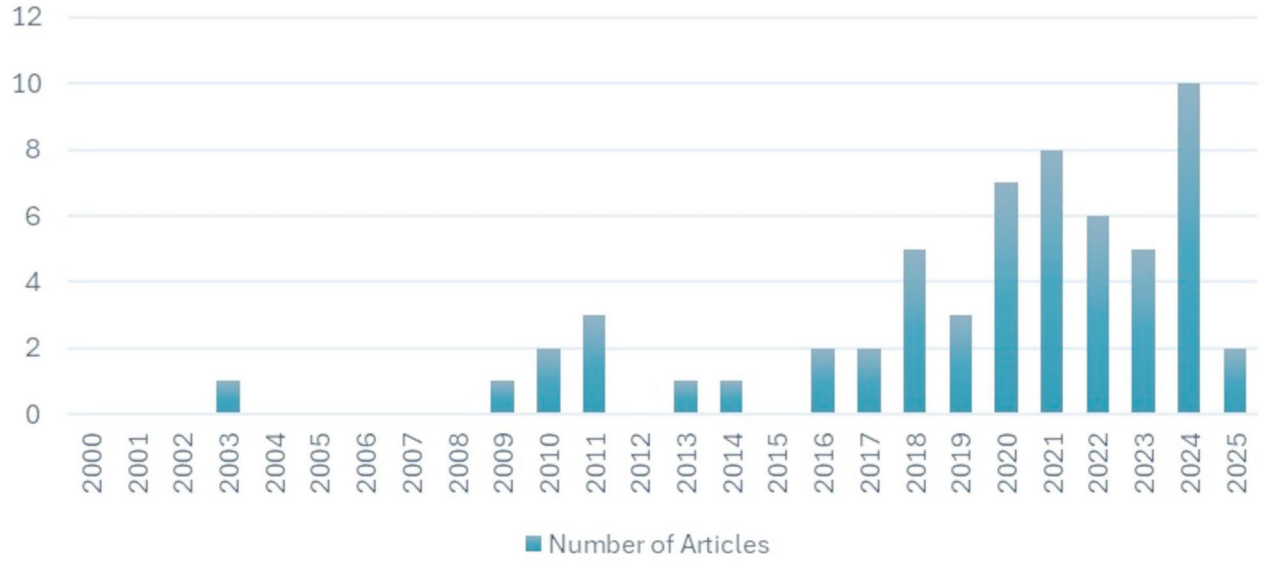

Fig. 2 Articles based on year of publication

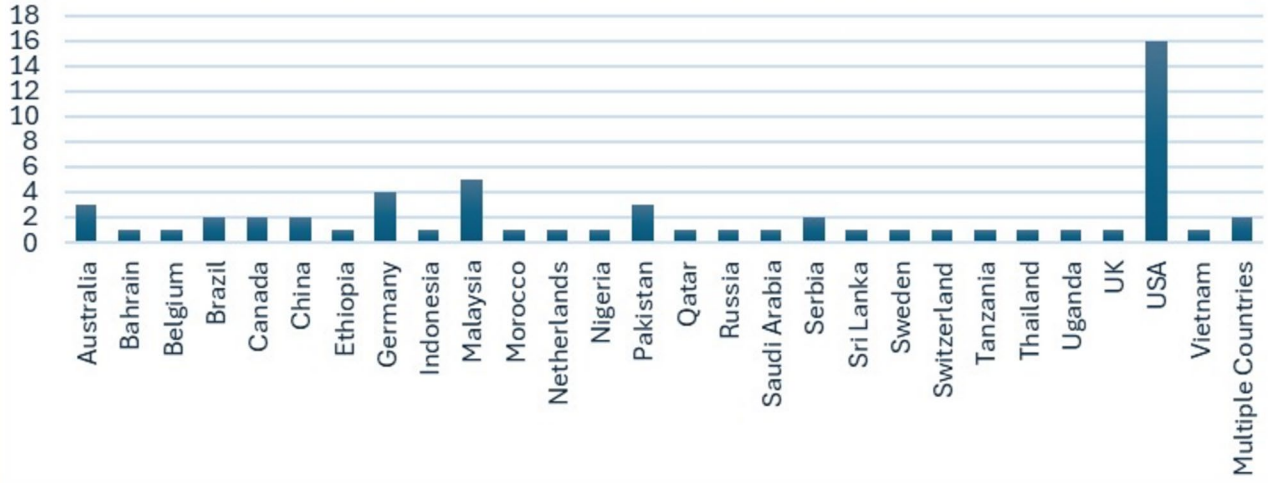

Fig. 3 Published articles based on country of origin

female gender as a risk factor for poorer mental health outcomes [41, 49, 51, 56, 57, 65, 66, 68, 71, 73, 74, 77]. A recent study reported higher impostor phenomenon and lower resilience among female students [84]. Additionally, a study reported gender differences in spirituality and empathy but not in resilience scores [85]. Two studies reported higher susceptibility to burnout among male students [63, 69]. One study reported Arab ethnicity as factor inhibiting resilience [71] while another study found minority status [31] as one of the potential contributors to burnout among medical students.

Personality traits Several studies reported various personality traits such as empathy [37, 66, 78], profes-

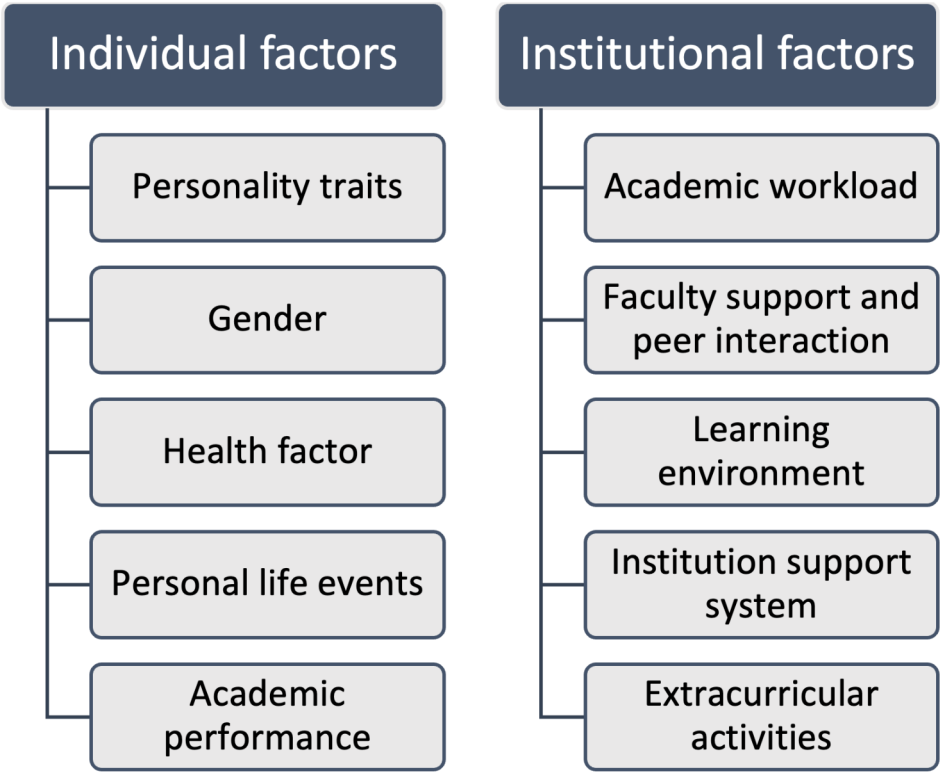

Fig. 4 Conceptual framework of individual and institutional factors influencing medical students' resilience development

sionalism [37], resilience as a dispositional trait [31, 51], self-control [51], emotional regulation, distancing and intelligence [3, 46, 78, 79] and optimism [55] that linked with resilience. Conversely, neuroticism [3, 46] and negative feelings of shame, embarrassment, and inadequacy [35] were the factors that inhibited resilience and mental well-being among medical students. In addition to commonly identified individual factors, studies reported other personality-related attributes in shaping resilience and well-being among medical students. Beg et al. (2024) reported that problem-focused coping was associated with higher resilience level, while avoidant or emotional strategies predicted lower resilience level [58]. Having a spiritual orientation correlated positively with resilience [85] while impostor phenomenon was found to be negatively correlated with resilience [84].

Personal life events Personal life events such as illness or death were associated with resilience and mental health. One study reported correlation between positive personal experiences and resilience, lower burnout levels and improved coping [32]. Exposure to adversity specially in early life was perceived by students as a formative contributor to their ability to cope [46, 86]. In contrast, voluntarily choosing medicine as a career path [69], personal problems [31, 65, 67, 70], financial constraints [31, 56], living far from parents [67], living off-campus [68], low socioeconomic status [65] and polygamous family setting [70] were associated with increased risk of burnout and reduced mental health. A recent qualitative study also reported that social isolation and lack of family support negatively affected students' resilience [80].

Health-related issues This review found that various health-related factors such as lack of sleep [29, 43, 50, 59, 79], poor sleep quality and diet [59, 58], disability [41], poor health [49], lack of physical activity [29, 43], sedative and substance abuse [63, 64, 68] were associated with a higher level of mental distress among medical students.

Academic performance This review found that poor academic performance was linked to higher levels of burnout and low resilience [71, 78].

Institutional factors

Academic workload

Studies reported various academic factors as contributor of resilience and mental health. Factors such as teaching quality [73], clear learning objectives [52], using pass-fail grading instead of grading categories with three or more categories [38], relevant learning tasks [76], proactive learning approach [45, 66] and continuous assessment [52] were associated with lower burnout rates. A recent

study reported that opportunities for academic growth improved students' psychological well-being [83].

Conversely, factors such as lack of textbooks and learning resources [67, 73], overwhelming curriculum [33, 56, 61, 70], summative exams [47] strict attendance policies [54], unfavourable schedules and timetables [36, 56] and less interactive teaching methods [54] were associated with reduced mental health and resilience. Significant academic stressors, such as heavy clinical workloads, work-home conflicts, and a reduced sense of meaningfulness, led to emotional exhaustion and cynicism [64, 82]. On top of that, transition periods, such as from preclinical to clinical years [69] and final year of study [74] were associated with mental distress.

Extracurricular activities

Reduced leisure time and limited participation in extracurricular activities were associated with an increased risk of burnout [56, 73, 74, 79].

Faculty support and peer interaction

This review also found that strong faculty support [36] and positive peer interactions [76] were associated with lower burnout rates. Conversely, low levels of faculty support [36], limited student-faculty interaction [39], lack of mentoring, role modelling, and support from faculty [86] hindered resilience development. A recent study also proposed that students who view their instructors as having a growth-oriented mindset tend to demonstrate greater resilience [44].

Learning environment

Several factors on institutional learning environment were reported to influence medical student well-being and resilience. Positive perceptions of the learning environment, such as feelings of engagement, belongingness, and safety [76] were associated with lower burnout rates and increased resilience among medical students. On the contrary, experiences of mistreatment [42, 53, 87], unfavourable perceptions of the learning environment [30, 33, 48, 60, 87] and negative professional behaviour [53] were associated with an increased risk of burnout. Additionally, a judgmental and unsupportive learning culture was found to contribute to mental distress and discourage help-seeking among students [80].

Support system

Institutional support systems were proposed as one of the determinants for medical students' well-being and resilience. Lack of institutional social [3, 31, 51, 54, 56, 59, 62, 66, 73, 75] and psychological support [68], absence of mentorship [36] and insufficient financial support [41, 53, 56] were associated with an increased risk of burnout. Moreover, inadequate mental health services [36] and stigmatization of mental health issues [61, 80] were linked with an increased risk of burnout risk among medical students.

Conversely, access to peer support and role models plays a pivotal role in strengthening coping mechanism and buffering against academic stress [82, 86]. Beyond formal support services, the broader psychosocial climate of medical school plays a crucial role in fostering resilience. Interestingly, high academic workload has been shown to be mitigated by strong peer support [83].

Discussion

Medical training is a rigorous and emotionally demanding journey marked by numerous personal and academic challenges [36]. The well-being and resilience of medical students are critical for their success and the quality of care they will provide as future healthcare professionals [62]. It is found that resilient students experienced less psychological symptoms, better quality of life, fewer stressful life events, higher social support, and a more positive perception of learning environment as compared to their more vulnerable counterparts [32]. The ability of medical students to develop resilience, an essential trait for managing these challenges, is influenced by a combination of individual and institutional factors which is highlighted in this review. These factors range from gender, personality traits, academic performance and health status to institutional aspects such as learning environment, support system, transition period, and academic load.

The reviewed studies consistently highlighted gender as a significant factor, noting that female medical students often report experiencing elevated stress levels and low resilience as compared to their male peers [41, 49, 51, 56, 65, 66, 73, 74, 77, 84]. This inclination aligns with broader literature which suggest that females are often more competitive and concerned about their exam performance, contributing to elevated stress levels [56]. Gender differences were also observed in spirituality and empathy traits, with female students scoring higher, although these did not translate to differences in resilience levels [85]. It is suggested that women tend to internalize stress, which can impact their physical and mental well-being, while men are more likely to externalize stress through behaviours such as aggression [88]. However, one study reported no significant association between gender and resilience, emphasizing the need to view resilience as a multifactorial construct [89].

This review identified several personal traits that were linked with higher resilience among medical students including empathy, motivation, self-control, and emotional regulation. These traits are valuable in helping students to cope with high workloads, patient care, responsibilities, academic pressures, and their own

psychological health [66, 78]. Students with high emotional regulation are better equipped to manage burnout and stress, as they can effectively mitigate the negative impacts of these challenges [40, 46]. Bore (2016) reported that emotional regulation mediates the link between resilience and burnout, and students with higher positive emotional regulation demonstrated lower levels of burnout and higher resilience [51]. Similarly, empathy has been identified as key enabler of resilience. A recent systematic review of 21 studies highlighted that medical students with higher levels of empathy tend to experience lower levels of burnout, as empathy fosters a sense of accomplishment and reduces stress [90]. The review also proposed that students who adopt problem-focused coping skills tend to demonstrate better resilience [58]. Such strategies enable individuals to confront challenges directly, leading to better psychological outcomes [91]. Similarly, spiritual orientation and a sense of meaning have also emerged as protective traits, promoting emotional balance and empathy, even in high-pressure environments [85]. Spirituality helps to buffers the stress and enhances well-being [92]. Studies also reported positive link between professionalism with resilience and mental well-being [93]. These findings highlight the importance of nurturing personal traits to ensure resilience and well-being in medical students which is essential for their academic and professional success. Additionally, addressing personality-related vulnerabilities such as the impostor phenomenon may be equally important, as these traits can significantly undermine confidence and coping [84].

Conversely, this review found that negative personal traits such as neuroticism, feeling of shame, embarrassment, and inadequacy are associated with higher levels of psychological vulnerability [46]. Such experiences may be amplified during significant life events, including bereavement, family conflict, living away from family or academic failure which can act as a pivotal moment in a student's resilience trajectory [31, 67, 68, 70]. These traits may isolate students from their peers and faculty, inhibiting their access to social support networks that are vital for resilience building [35].

Findings from this review suggest that academic performance and learning approach has significant roles in promoting resilience [71, 78]. Academic success has been shown to enhance self-esteem, motivation, ability to cope with the challenges thereby supporting overall well-being [78]. Additionally, adopting deep learning approaches encourages students to engage meaningfully with learning content and fosters greater resilience in managing associated stress. Surface learners, on the other hand, reported higher levels of stress associated with academics [45]. Deep learners, by focusing on understanding rather than rote memorization, tend to develop stronger problem-solving skills and emotional regulation. While individual factors are not always within an institution's control, these factors can be modified or supported by the institution to bolster student resilience [94]. Early identification of students at risk of developing psychological distress allows institutions to provide targeted support to maintain their mental well-being throughout their medical education [94].

In addition to individual factors, institutional policies and practices have a significant impact on the resilience of medical students. Academic workload has consistently been identified as a major risk factor associated with reduced resilience among medical students. Several studies in this review have pointed to challenges that negatively impact students' mental health. including limited access to resources, demanding programs, vast curricula and inconsistent or rigorous evaluation methods [38, 52, 56, 73, 76]. According to Bergmann et al. (2019) academic stress often dominates medical students' lives, leading to feelings of guilt when engaging in non-academic activities which causes social isolation and exacerbating mental stress and decrease resilience [95]. Heavy clinical workloads increase emotional exhaustion by overwhelming students' coping capacities and reducing opportunities for recovery, hence increasing their susceptibility to burnout [96]. A shift towards more flexible, student-centred educational approaches including continuous assessment, active learning and curriculum that prioritizes depth over volume could alleviate academic pressure and foster resilience [78].

This review also highlights the importance of creating a learning environment that enhances engagement and belonging thereby reducing stress and improve students' resilience [39]. Strong mentoring relationships, dynamic peer interaction, and compassionate faculty members are essential for supportive educational experience [36, 39]. Supportive faculty and positive peer relationships are crucial for promoting a sense of belonging and psychological health, which buffer against exhaustion and develop resilience [4]. Faculty who positively role modelling and mentoring induced the emotional development and coping skills of students [86]. Moreover, when instructors demonstrate a growth mindset, students felt encouraged to deal with academic challenges [44].

Medical schools that cultivate supportive atmospheres, through mentoring and psychological support, provide students with the resources to manage stress more effectively [32, 36]. The absence of these elements leads to students feeling unsupported and disconnected especially during challenging situations they faced during their education [56, 69]. These challenges are often exaggerated during transition periods, such as the shift from preclinical to clinical training, where students are exposed to new academic challenges, emotional challenges and increased clinical responsibilities [56, 69, 75]. Providing

accessible and comprehensive support services is essential to safeguarding medical students' mental health and promoting resilience, particularly as they navigate the demanding and high-pressure environment of medical education. During such times, timely and effective support can significantly impact their ability to adapt and thrive. Furthermore, students from minority and underprivileged backgrounds may benefited from inclusive environments where their challenges are acknowledged and supported [83].

Provision of institutional support is not always straightforward, as the stigma associated with seeking help, particularly for mental health concerns, often deters students from utilizing the resources they need [61]. Institutions should strive to provide mental health services in a stigma-free environment. By removing these barriers, students can better focus on their studies and maintain a healthier balance between their academic responsibilities and personal well-being [60, 87]. For example, initiatives like anonymous counselling services tailored to student needs could be effective in supporting resilience and improving overall mental health [68]. Fear of judgment often prevents students from openly discussing their mental health struggles, thereby hindering timely support and intervention [80]. Encouraging help-seeking behaviour and normalizing mental health conversations are critical steps toward creating an inclusive, responsive, and supportive learning environment [4]. Moreover, physical health conditions, such as chronic illness [49] and disability [41] may further reduce students' resilience by limiting their capacity to manage academic and emotional demands. This highlights need of accessible medical care and accommodations within academic policies.

Unhealthy lifestyle factors such as lack of leisure time and extracurricular activities from heavy curriculum contribute to the deterioration of student well-being [74, 79]. Poor lifestyle habits, including substance abuse, inadequate sleep, unhealthy diets, and lack of physical activity, exacerbate mental distress among medical students and reduce resilience [49, 56, 57, 59]. Ample opportunities for recreation, sports, and extracurricular activities should be provided by institute to promote a balance between academics and mental well-being of students. Students who participate in physical and social leisure activities experience enhanced emotional well-being, reduced symptoms of anxiety and depression and fostered social connections with other students [76, 97]. Similarly, a study by Mukesh et al. (2023) found that students involved in extracurricular activities not only perform better academically but also exhibit stronger coping mechanisms and greater life satisfaction [98]. Therefore, academic institutions must prioritize the provision of adequate opportunities for students to engage in non-academic activities, as this balance is vital for nurturing well-rounded individuals who are not only academically proficient but also mentally resilient.

Financial challenges can also exacerbate stress level and access to the essential resources, which further emphasizes the importance of students' financial support systems for overall well-being [60, 87]. Implementing tailored financial aid programs and accessible counselling services can help alleviate financial stresses and promote better mental health and academic success [86].

Limitations of the study

While four databases were used, including additional specialized or regional databases could have provided broader coverage of relevant studies, especially from underrepresented regions. Only studies in English were included, which may lead to the exclusion of important research published in other languages, potentially limiting the global generalizability of the findings. Though resilience and well-being are examined, the review does not focus on interventions that could provide actionable insights into improving these outcomes in medical students. While many factors were explored, some key variables, such as the role of cultural differences or coping strategies, might not have been explored in depth due to the scope of the review.

Strengths of the study

The study employed well-defined criteria to focus the inclusion of relevant studies on medical undergraduates' resilience and mental health, ensuring targeted and relevant findings. The use of both citation and discipline-specific databases enhanced the sensitivity and coverage of the relevant literature, increasing the robustness of the study. The inclusion of both quantitative and qualitative studies, along with the application of thematic analysis, enriched the data interpretation, providing a more nuanced understanding of individual and institutional factors affecting resilience. Two independent reviewers extracted the data, minimizing potential bias and enhancing the reliability of the results. The study adhered to established frameworks, specifically the Joanna Briggs Institute methodology and the PRISMA-ScR guidelines, ensuring systematic and transparent reporting. Despite the search was limited to studies published in English, included studies came from a wide range of countries allowed for a more globally representative understanding of the resilience and well-being of medical students.

Conclusion & recommendations

This scoping review examined various individual and institutional factors that play a significant role in fostering resilience among medical students. At the individual level, key contributors include personality traits, gender, health, personal life events and academic performance.

At the institutional level, manageable academic workload, having balanced lifestyle through extracurricular activities, positive faculty and peer interaction, institution support system, and positive learning environment were shown to promote resilience by reducing burnout and enhancing a sense of belonging.

To enhance resilience among medical students, medical schools should adopt a comprehensive and multilevel strategy. Resilience-building programs should be integrated within the curricula, focusing on emotional regulation training, problem solving, stress, and time management. Structured mentorship programs should also be implemented, with trained mentors and clearly defined goals to strengthen social support among students. Anonymous and stigma-free counselling and mental health services, including online and drop-in support, are essential to ensure that students can seek help without fear of judgment. In addition, structured wellness policies that encourage regular physical activity, protect leisure time, and provide financial counselling are vital for promoting a balanced and healthy academic life. Medical schools should consider integrating resilience as a core competency within its training and prioritize student wellbeing through faculty development, routine mental health screening, and establish channels for student feedback on institutional stressors.

As the review consolidates the important role of institutions on the development of medical students' resilience, future research should focus on the development of valid assessment tools to monitor these factors. Additionally, research should evaluate the impact of modifications to institutional factors to improve students' resilience. This future work is crucial to expand our understanding of how institutions can effectively support and nurture resilience among medical students.

Abbreviations

SRA	Syeda Rubaba Azim
NSR	Nurhanis Syazni Roslan
MSBY	Muhamad Saiful Bahri Yusoff

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Nil.

Author contributions
S.R.A., N.S.R., and M.S.B.Y. conceived the study concept and developed the review protocol. S.R.A. and N.S.R. conducted the initial literature review and drafted the manuscript. All authors contributed to the review process, revised the manuscript critically for important intellectual content, and approved the final version of the manuscript.

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Data availability
The full scoping table is included in the manuscript and complete extraction sheet is available on request to the authors.

Declarations

Ethical approval and consent to participate
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