

Psychological Protective Factors Mediating the Relationship between Academic Stress and Common Mental Health Problems among Medical Students: A Conceptual Framework

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DOI: <https://doi.org/10.47772/IJRISS.2026.100700722>

Received: 22 July 2026; Accepted: 28 July 2026; Published: 11 August 2026

ABSTRACT

Medical students face substantial academic demands arising from intensive coursework, frequent assessments, clinical training, research expectations, and concerns about professional competence. These demands may increase their vulnerability to depression, anxiety, and suicidal ideation. Although academic stress has been consistently associated with mental health problems, the indirect mechanisms linking academic stress to these outcomes have not been sufficiently integrated within a unified theoretical framework. This conceptual paper develops a framework explaining the mediating roles of resilience, social support, and mindfulness in the relationships between academic stress and depression, anxiety, and suicidal ideation among medical students. A focused narrative review and theory-synthesis approach was adopted to integrate relevant stress theories, empirical evidence on medical students' mental health, and research on personal and social protective resources. Conservation of Resources theory provides the principal theoretical foundation for the framework, conceptualising academic stress as a continuing demand that may threaten or deplete resources required for psychological adaptation. Resilience is conceptualised as an adaptive and recovery resource, social support as an interpersonal and contextual resource, and mindfulness as an attentional and emotional self-regulation resource. The framework proposes positive direct relationships between academic stress and each mental health outcome, together with indirect relationships through the three parallel mediators. Depression, anxiety, and suicidal ideation are treated as separate but potentially correlated outcomes. The framework contributes to the literature by integrating risk and protective perspectives, distinguishing mediation from moderation, and incorporating suicidal ideation alongside depression and anxiety. It also suggests that resource-building initiatives should be accompanied by institutional efforts to address modifiable academic stressors and improve access to mental health support. Longitudinal and culturally sensitive research is required to test the proposed temporal and indirect relationships across medical education contexts.

Keywords: Academic stress; depression; anxiety; suicidal ideation; psychological protective factors

INTRODUCTION

University students' mental health has become an important educational and public health concern because psychological difficulties during higher education may adversely affect academic engagement, interpersonal functioning, professional development, and social adaptation. In this paper, common mental health problems are operationally defined as depression, anxiety, and suicidal ideation. Although suicidal ideation is not itself a mental disorder, it is included as a clinically significant indicator of psychological risk. The three outcomes are treated as distinct but potentially correlated variables. Medical students may be particularly vulnerable because they must manage the developmental and educational challenges of university life while preparing for a profession characterised by substantial responsibility and emotional demands. Mental health problems during

medical education may affect students' well-being, academic participation, and intention to continue their training (Dessauvague et al., 2022; Peng et al., 2023a).

Medical education involves multiple and frequently overlapping demands, including extensive coursework, frequent assessments, competitive achievement expectations, clinical skills training, research requirements, clinical rotations, and uncertainty about postgraduate training and employment. Students may also experience limited recovery time, disrupted sleep, financial pressure, and emotional exposure to illness, suffering, and death. When sustained across a prolonged period of training, these demands may contribute to psychological exhaustion and reduce students' capacity to manage subsequent academic and clinical challenges. A recent systematic review and meta-analysis identified academic, personal, environmental, and cultural stressors as relevant to depression and anxiety among medical students, although substantial differences in study design, setting, and measurement limit causal interpretation (Lin et al., 2024). Protecting medical students' mental health is therefore relevant to individual well-being, educational continuity, and the sustainability of the future healthcare workforce.

Available evidence indicates a substantial burden of common mental health problems among medical students. During the COVID-19 pandemic, a systematic review and meta-analysis of 201 studies involving approximately 198,000 medical students reported pooled estimates of 41% for depression, 38% for anxiety, and 15% for suicidal ideation (Peng et al., 2023b). Because most included studies used self-report screening instruments, these estimates should be interpreted as screening-based estimates rather than rates of clinically confirmed diagnoses. They also reflect the exceptional conditions of the pandemic, including disruption to clinical training, online-learning difficulties, social isolation, fear of infection, and uncertainty about academic progression. Nevertheless, evidence from China indicates that the problem predates the pandemic. A meta-analysis of 197 studies conducted between 2000 and 2020 across 23 Chinese provinces, involving 294,408 medical students, reported pooled screening-based estimates of 29% for depression, 18% for anxiety, and 13% for suicidal ideation (Wang et al., 2023). Although considerable heterogeneity was observed across instruments, cutoff scores, regions, and stages of training, these findings consistently identify medical students' mental health as an issue requiring sustained attention.

The Chinese medical education context may generate additional and continuing academic pressure. China's "5 + 3" medical training pathway generally combines five years of undergraduate medical education with three years of standardised postgraduate clinical training (State Council of the People's Republic of China, 2017). Students may also face competition for postgraduate education, residency positions, research opportunities, and employment. Although this training structure is intended to strengthen clinical competence, its duration and intensity require prolonged investment of time, attention, and emotional energy. Research among Chinese residents undergoing standardised residency training has identified close interrelationships among stress, burnout, depression, anxiety, reduced quality of life, and suicidality (Li et al., 2024). While residents are not equivalent to undergraduate medical students, this evidence illustrates the continuity of academic and professional pressure across successive stages of medical training.

Academic stress may be understood as psychological strain arising when students appraise educational demands as exceeding the resources available to manage them (Lazarus & Folkman, 1984). Among medical students, academic stress may arise from workload, examinations, fear of failure, clinical competency requirements, research obligations, limited recovery time, and uncertainty regarding future careers. Academic stress has been identified as an important correlate of depression, anxiety, and suicidal ideation among medical students (Mateen et al., 2024; Mengesha et al., 2025). However, exposure to similar academic demands does not necessarily result in equivalent mental health outcomes. This variation indicates that the relationship between academic stress and common mental health problems cannot be adequately understood by considering academic demands alone. Attention must also be given to the personal and interpersonal resources that may influence how students manage sustained academic pressure.

Depression, anxiety, and suicidal ideation are related but should not be treated as interchangeable outcomes. Depression and anxiety may coexist and share academic, personal, and environmental determinants. Suicidal ideation, however, may additionally involve hopelessness, social disconnection, defeat, and perceptions of entrapment. Evidence from 6,643 medical students in Hebei Province found that 11.5% screened positive for suicidal ideation and that stressful life events were associated with a higher likelihood of reporting it (Huang et

al., 2024). The inclusion of suicidal ideation alongside depression and anxiety therefore permits a more comprehensive assessment of psychological risk while recognising that the three outcomes may involve partly different pathways.

Despite growing attention to medical students' mental health, important conceptual and methodological limitations remain. Existing research has frequently concentrated on prevalence and direct correlates, with comparatively less attention to the mechanisms through which academic stress may be associated with different mental health outcomes. Much of the available evidence is cross-sectional, limiting conclusions concerning temporal ordering, reciprocal relationships, and causal mechanisms (Peng et al., 2023b; Wang et al., 2023). Furthermore, potentially protective resources have often been examined within separate research designs. For example, resilience has been studied in relation to academic burnout and well-being, mindfulness in relation to academic stress and mental health, and social relationships in relation to depression and anxiety (Koppenborg et al., 2024; Mengesha et al., 2025; Wang et al., 2022). Less attention has been given to their simultaneous roles as distinct mediating mechanisms within an integrated conceptual framework.

Conservation of Resources (COR) theory provides the principal theoretical foundation for addressing this gap. COR theory proposes that stress arises when valued resources are threatened, lost, or insufficiently replenished following substantial resource investment (Hobfoll, 1989; Hobfoll et al., 2018). Research applying COR theory to university students has demonstrated that resource loss may help explain relationships between stressful concerns and depression and anxiety, supporting the relevance of resource-based mechanisms in student mental health (Kelada et al., 2023). Within this perspective, resilience can be conceptualised as a personal adaptive and recovery resource, social support as an interpersonal and contextual resource, and mindfulness as an attentional and emotional self-regulation resource. Collectively, they are referred to in this paper as psychological protective factors, while their distinct personal and interpersonal characteristics are retained.

Accordingly, this conceptual paper proposes resilience, social support, and mindfulness as parallel mediators of the relationships between academic stress and depression, anxiety, and suicidal ideation among medical students. The framework does not assume that academic stress inevitably produces common mental health problems or that the proposed temporal relationships have already been causally established. Rather, it specifies theoretically plausible direct and indirect relationships that require empirical testing. The framework contributes to the literature by integrating risk and protective perspectives, examining three complementary resource pathways, and treating depression, anxiety, and suicidal ideation as separate outcomes. In doing so, it provides a theoretical foundation for future longitudinal research and for interventions that combine the development of protective resources with institutional efforts to address modifiable academic stressors.

METHODOLOGY

This conceptual paper employed a focused narrative review and theory-synthesis approach to develop an integrated framework linking academic stress, psychological protective factors, and common mental health problems among medical students. Common mental health problems were operationally defined as depression, anxiety, and suicidal ideation, whereas psychological protective factors comprised resilience, social support, and mindfulness. A narrative approach was appropriate because the purpose was to integrate theoretically relevant evidence, clarify relationships among the constructs, and derive testable propositions rather than to conduct an exhaustive systematic review or estimate pooled effects. The conceptual development followed principles of transparent narrative reviewing and theory synthesis, including the specification of the review scope, literature-selection logic, theoretical basis, and process through which the propositions were derived (Baethge et al., 2019; Jaakkola, 2020; Sukhera, 2022).

Relevant literature was identified through searches of Web of Science, Scopus, PubMed, PsycINFO, Google Scholar, and the China National Knowledge Infrastructure. Search terms and their combinations covered academic stress, medical students, depression, depressive symptoms, anxiety, anxiety symptoms, suicidal ideation, resilience, social support, perceived social support, mindfulness, mediation, and Conservation of Resources theory. Related terms such as depressive symptoms, anxiety symptoms, and perceived social support were included only to capture terminological and measurement variations across studies; the constructs retained in the framework were depression, anxiety, and social support. Studies published between January 2021 and

November 2025 were prioritised to represent recent evidence, while earlier publications were included when they provided foundational theories or definitions. The final search was conducted in November 2025.

Peer-reviewed studies were considered when they addressed at least one relationship among academic stress, the three psychological protective factors, and the three mental health outcomes in medical students or, where directly relevant, broader university populations. Particular attention was given to systematic reviews, meta-analyses, longitudinal studies, intervention studies, and research conducted in China or comparable medical-education contexts. Publications were excluded when they did not address the focal constructs, lacked relevance to university or medical-education settings, or provided insufficient theoretical or empirical information to inform the proposed relationships. Reference lists of key reviews and highly relevant studies were also examined to identify additional foundational sources.

The selected literature was organised thematically around academic stress, depression, anxiety, suicidal ideation, resilience, social support, mindfulness, and resource-based explanatory mechanisms. Evidence was compared across study designs, populations, and contexts, with cross-sectional findings interpreted as associations rather than causal effects. Greater interpretive weight was assigned to systematic reviews, longitudinal research, and intervention evidence where available. Conservation of Resources theory was then used as the principal integrative lens: academic stress was conceptualised as a sustained demand on resources, resilience and mindfulness as personal resources, and social support as an interpersonal and contextual resource. Convergences, inconsistencies, and gaps in the literature were examined to formulate propositions concerning the direct relationships between academic stress and each mental health outcome and the specific indirect relationships operating through resilience, social support, and mindfulness.

LITERATURE REVIEW

The literature on medical students' mental health encompasses physiological, psychological, interpersonal, and educational perspectives. Academic stress has been conceptualised as an environmental demand, a response to demanding conditions, and a transactional process shaped by cognitive appraisal and coping resources. Medical students' mental health is similarly influenced by interactions among individual characteristics, interpersonal relationships, educational conditions, and broader contextual pressures. This review integrates these perspectives and examines resilience, social support, and mindfulness as distinct but potentially complementary resources in the relationships between academic stress and common mental health problems, operationally defined in this paper as depression, anxiety, and suicidal ideation.

Conceptualising Stress and Academic Stress

The scientific understanding of stress has developed from an emphasis on physiological responses towards more interactional explanations. Selye (1936) conceptualised stress as a general physiological response to harmful or demanding conditions and subsequently described the stages of alarm, resistance, and exhaustion within the General Adaptation Syndrome. Although this response-oriented perspective established that prolonged demands may produce cumulative consequences, it paid comparatively limited attention to how individuals interpret stressors. Holmes and Rahe (1967) later adopted a stimulus-oriented perspective, proposing that major life events require adaptation and that the accumulation of such events may increase vulnerability to illness. Their Social Readjustment Rating Scale operationalised this position by assigning life-change values to significant events. The continuing revision of this scale illustrates that the meaning and impact of environmental demands may vary across historical and social contexts (Wallace et al., 2023).

Lazarus and Folkman's (1984) Transactional Model of Stress and Coping shifted attention towards the dynamic relationship between individuals and their environments. Within this model, stress arises when a person appraises environmental demands as threatening, harmful, or exceeding the resources available for coping. Primary appraisal concerns the personal significance of a situation, whereas secondary appraisal concerns the resources and response options available for managing it. This model helps explain why students exposed to comparable academic demands may experience different psychological consequences. The physiological, stimulus-oriented, and transactional perspectives are therefore not necessarily incompatible: they respectively illuminate stress

responses, environmental demands, and the appraisal and coping processes that connect demands with psychological outcomes.

On this basis, academic stress can be conceptualised as the psychological strain associated with educational demands that students appraise as taxing or exceeding their available adaptive resources. Such demands may include examinations, workload, competition, concerns about academic performance, personal and family expectations, inadequate learning resources, and uncertainty about future academic or professional progression. Academic stress should be distinguished from general perceived stress, which is not necessarily education-specific, and academic burnout, which represents a more persistent state characterised by exhaustion, disengagement or cynicism, and reduced academic efficacy. Although continuing academic stress may contribute to burnout, the two constructs are not interchangeable.

Medical students may be especially vulnerable because medical education combines intensive theoretical learning, frequent assessments, clinical training, research requirements, and expectations regarding professional competence. Academic demands may coincide with exposure to patient suffering, fear of clinical mistakes, restricted opportunities for recovery, financial concerns, and uncertainty about postgraduate training and employment. A large systematic review identified academic and educational pressures as important correlates of psychological problems among medical students, together with loneliness, financial difficulties, insufficient social support, and disruptions to clinical education (Peng et al., 2023b). Academic stress should therefore be treated as a central but contextually embedded risk factor rather than solely as an individual deficiency in coping.

Measures of academic stress differ in their conceptual emphases. The Educational Stress Scale for Adolescents assesses pressure from study, workload, concerns about grades, self-expectation, and despondency (Sun et al., 2011), whereas the Student-Life Stress Inventory incorporates stressors and cognitive, emotional, behavioural, and physiological reactions (Gadzella, 1994). These instruments should not be assigned rigidly to a single stress theory because measures frequently combine demands, appraisals, and responses. Cross-cultural validation research further indicates that their measurement properties should be established within the educational and cultural population in which they are used (Moustaka et al., 2023). In the proposed framework, academic stress refers primarily to students' experienced strain in relation to educational demands rather than merely to the objective presence or number of academic tasks.

Common Mental Health Problems Among Medical Students

The present framework examines depression, anxiety, and suicidal ideation as separate but potentially correlated outcomes. Although the term common mental health problems is used as an organising category, the three constructs should not be treated as a single disorder or as conceptually interchangeable. Depression and anxiety represent distinct mental health constructs, whereas suicidal ideation is a clinically important suicide-related outcome rather than a psychiatric disorder. Moreover, much of the prevalence evidence involving medical students is derived from self-report screening instruments. Reported estimates should therefore generally be interpreted as positive screens or elevated scores rather than confirmed clinical diagnoses.

Depression is associated with low mood, diminished interest, hopelessness, fatigue, impaired concentration, and reduced functioning. Within medical education, depression has been linked to continuing workloads, academic competition, fear of failure, inadequate recovery time, clinical responsibilities, and uncertainty about professional progression. A network study involving 3,648 Chinese medical undergraduates found close interconnections among depression, anxiety, burnout, and dropout intention, with fatigue and worthlessness functioning as important bridge indicators within the network (Peng et al., 2023a). Because these data were obtained using self-report instruments, they demonstrate relationships among screening scores rather than clinically established disorders. Depression is relevant not only because it may impair learning, motivation, relationships, and academic functioning, but also because of its relationship with suicide risk. A scoping review of systematic reviews and meta-analyses found that depression was the most consistently reported risk factor for suicidal ideation and suicide attempts among medical students (Agyapong-Opoku et al., 2025). Nevertheless, much of the research linking academic stress with depression is cross-sectional. It cannot establish whether academic stress precedes depression, whether depression changes how academic demands are appraised, or whether reciprocal

relationships develop over time. The available evidence therefore supports an association but not a definitive causal direction.

Anxiety may involve excessive apprehension, difficulty controlling worry, physiological arousal, fear of failure, and heightened attention to potential threats. Medical students may experience anxiety in relation to examinations, clinical skills assessments, interactions with patients, fear of errors, public performance evaluation, and uncertainty about training or employment. Persistent anxiety may disrupt sleep, attention, working memory, learning, and clinical performance. International and Chinese reviews consistently identify anxiety as an important component of medical students' mental health burden, although reported prevalence varies according to the instrument, cutoff point, sampling strategy, and assessment period employed (Peng et al., 2023b; Wang et al., 2023). Academic stress may increase anticipatory worry and threat appraisal, while anxiety may impair performance and reduce students' confidence in managing subsequent demands. However, because much of this evidence is cross-sectional, reciprocal causation should not be assumed. The associations of anxiety with academic pressures, loneliness, financial difficulties, educational disruption, and inadequate social support nevertheless indicate that both personal and contextual resources are relevant to understanding this outcome (Peng et al., 2023b).

Suicidal ideation refers to thoughts about ending one's life and may range from passive wishes for death to active thoughts involving intention. It is distinct from a suicide plan, which involves consideration of how suicide could be carried out, and a suicide attempt, which involves potentially self-injurious behaviour undertaken with at least some intention to die. Although suicidal ideation is not a psychiatric disorder, it constitutes a clinically significant indicator of psychological risk. Contemporary suicide theories provide several explanations for the development of suicidal ideation. The Interpersonal Theory of Suicide proposes that suicidal desire may emerge from the combination of perceived burdensomeness and thwarted belongingness, particularly when these states are regarded as persistent (Joiner, 2005; Van Orden et al., 2010). The Integrated Motivational-Volitional Model proposes that experiences of defeat and entrapment contribute to suicidal ideation, whereas additional volitional factors influence whether ideation progresses towards suicidal behaviour (O'Connor & Kirtley, 2018). These theories indicate that suicidal ideation may develop through the interaction of emotional distress, social disconnection, hopelessness, and depleted coping resources rather than through academic stress alone.

Prevalence estimates vary considerably because studies use different definitions, recall periods, instruments, and thresholds. A scoping review of 12 systematic reviews and meta-analyses covering 378,081 medical students found that estimates of lifetime suicidal ideation ranged from 2.9% to 53.6%, while pooled estimates reported in the included meta-analyses generally ranged from 11% to 25%. Pooled estimates of suicide attempts ranged from 1.64% to 8% (Agyapong-Opoku et al., 2025). Such variation demonstrates the importance of specifying whether suicidal ideation refers to a recent period, the preceding year, or the respondent's lifetime.

Evidence from China also supports the relevance of suicidal ideation in medical education. A pre-pandemic meta-analysis reported a pooled estimate of 13% among Chinese medical students (Wang et al., 2023). In addition, a study of 6,643 medical students in Hebei Province found that 11.5% reported suicidal ideation and that stressful life events during the preceding 12 months were associated with elevated risk (Huang et al., 2024). Compared with depression and anxiety, however, suicidal ideation has less frequently been incorporated into integrated models of academic stress and psychological protection. Its inclusion as a distinct outcome is justified by its clinical importance and its possible association with cumulative resource loss.

Factors Influencing Medical Students' Mental Health

Medical students' mental health is shaped by factors operating at multiple levels. Individual factors include previous psychological difficulties, personality, coping strategies, sleep quality, self-efficacy, resilience, and emotional-regulation capacity. Interpersonal factors include family relationships, peer connections, social support, interpersonal conflict, loneliness, and willingness to seek assistance. Educational factors include workload, assessment frequency, competition, clinical responsibilities, research expectations, institutional support, and career uncertainty. Financial strain, major life events, public-health emergencies, and cultural expectations may provide additional sources of vulnerability (Agyapong-Opoku et al., 2025; Peng et al., 2023b).

These factors do not operate independently. For example, the effect of an examination may depend on students' confidence in their ability to recover from failure, the emotional and practical assistance available to them, and their capacity to regulate worry. Sleep deprivation, financial difficulties, and major life events may simultaneously reduce the resources available for meeting academic demands. An adequate conceptual model must therefore account for both academic stress and the resources through which students adapt to or recover from academic demands.

Psychological Protective Factors

Psychological protective factors refer here to personal and interpersonal resources that may help students maintain or regain psychological functioning under demanding conditions. Resilience, social support, and mindfulness are included because they represent different protective processes: adaptive recovery, interpersonal assistance, and attentional and emotional self-regulation. Their description as protective factors does not imply that they eliminate academic stress or guarantee the absence of mental health problems.

Resilience refers to the capacity or process through which individuals adapt, maintain functioning, or recover in the context of adversity. Contemporary perspectives increasingly treat resilience as a dynamic process influenced by personal and environmental resources rather than solely as a fixed personality trait. For medical students, resilience may facilitate adaptation following examinations, academic setbacks, clinical difficulties, or perceived failure. A three-wave longitudinal study of Chinese medical students found that resilience positively predicted subsequent life satisfaction and mediated the longitudinal relationship between academic burnout and life satisfaction. The relationship between resilience and burnout was also partly reciprocal, indicating that resilience may protect against burnout while sustained burnout may erode resilience (Wang et al., 2022). This study provides longitudinal support for resilience as a changing psychological resource, but it does not directly test the present framework: academic burnout is not equivalent to academic stress, and life satisfaction is not equivalent to depression, anxiety, or suicidal ideation. The evidence nevertheless demonstrates that resilience may form part of an explanatory process connecting educational adversity with psychological outcomes.

Social support is a multidimensional interpersonal resource involving emotional care, informational guidance, practical or instrumental assistance, appraisal, companionship, and a sense of belonging provided through relationships with family members, peers, teachers, institutions, and other significant individuals (Drageset, 2021). It may be assessed in terms of the support available within a social network, the support actually received, or an individual's evaluation of its availability and adequacy. These operational forms are related but should not be treated as identical. In the proposed framework, social support is the overarching construct; it is not restricted to perceived social support. Social support may help medical students by providing reassurance, practical assistance, academic information, opportunities for disclosure, and access to additional coping resources. Conversely, loneliness and insufficient support have been associated with depression, anxiety, and broader psychological distress among medical students (Peng et al., 2023b). However, such associations do not by themselves demonstrate mediation. Evidence for mediation would require support for the pathway from academic stress to social support and from social support to the mental health outcome, together with a statistically supported indirect effect. Several temporal explanations remain possible. Academic pressure may restrict opportunities for social interaction or reduce students' ability to mobilise available assistance. Conversely, social support may influence how demanding academic conditions are appraised, while depression or anxiety may contribute to withdrawal from interpersonal relationships. Longitudinal research is therefore needed to establish the temporal ordering of academic stress, social support, and mental health outcomes. This qualification is particularly important because social support is often examined as a moderator of stress rather than as a mediator. The proposed framework specifically evaluates mediation and should not describe the two mechanisms as interchangeable.

Mindfulness refers to receptive and non-judgmental awareness of present-moment experience. It may support psychological adjustment by reducing automatic emotional reactions, rumination, catastrophic appraisal, and experiential avoidance. In medical education, mindfulness may help students notice stressful thoughts and emotions without immediately responding to them as evidence of personal failure or uncontrollable threat. A systematic review and meta-analysis of 35 studies found that mindfulness interventions produced small but statistically significant reductions in medical students' stress across controlled and pre-post designs (Sperling et

al., 2023). Fazia et al. (2023) also conducted a randomised study of a multicomponent online mindfulness-based intervention that included meditation, dietary guidance, and brief yoga sessions. The intervention improved perceived stress, mental well-being, emotional regulation, resilience, attention, and broader psychological distress, although not every assessed outcome remained significant after correction for multiple testing.

These intervention findings demonstrate that mindfulness-related capacities may be modifiable and beneficial, but they do not directly establish the proposed mediation pathway. Intervention effects cannot automatically be equated with relationships involving dispositional mindfulness. Moreover, evidence that mindfulness training reduces stress does not demonstrate that academic stress reduces mindfulness or that changes in mindfulness subsequently influence depression, anxiety, or suicidal ideation. Its mediating role must therefore remain a theoretically derived proposition until tested using an appropriate temporal design.

Complementarity of the Protective Factors

Resilience, social support, and mindfulness represent complementary rather than interchangeable resources. Resilience primarily concerns adaptation and recovery, social support concerns interpersonal and contextual assistance, and mindfulness concerns attentional and emotional self-regulation. Their simultaneous inclusion may provide a more comprehensive explanation of psychological protection than examining any single resource independently.

The three factors may nevertheless influence one another. Supportive relationships may facilitate resilience, mindfulness may help students recognise and use available support, and resilience may sustain help-seeking during adversity. To maintain conceptual clarity and empirical testability, the proposed framework initially treats them as parallel mediators. This specification does not assume that they are causally independent. Sequential, reciprocal, or interactive relationships may be examined in subsequent theoretical refinements and longitudinal studies.

Synthesis and Research Gap

The literature supports academic stress as an important correlate of depression, anxiety, and suicidal ideation among medical students and identifies resilience, social support, and mindfulness as potentially relevant protective resources. However, three major gaps remain. First, suicidal ideation has received less attention than depression and anxiety in integrated models of medical students' mental health. Second, resilience, social support, and mindfulness are frequently examined separately or treated as direct predictors or moderators, leaving their possible parallel mediating roles insufficiently integrated. Third, the predominance of cross-sectional research limits conclusions about whether academic stress precedes resource reduction and whether changes in these resources precede changes in mental health outcomes (Agyapong-Opoku et al., 2025; Peng et al., 2023b; Wang et al., 2023).

Accordingly, the existing evidence establishes the relevance of the proposed constructs but does not confirm the proposed mediation pathways. A theoretical explanation is needed for why continuing academic demands may threaten or deplete personal and interpersonal resources and how such resource processes may be associated with depression, anxiety, and suicidal ideation. Conservation of Resources theory addresses this need by explaining stress through resource threat, loss, investment, and recovery. The following section therefore applies Conservation of Resources theory to integrate academic stress, resilience, social support, mindfulness, and the three mental health outcomes within a unified conceptual framework.

THEORETICAL FOUNDATION

Conservation of Resources Theory

Conservation of Resources (COR) theory provides the principal theoretical foundation for the proposed framework. It posits that individuals are motivated to acquire, retain, protect, and restore resources that they value. These resources include objects, conditions, personal characteristics, and energies that are valuable in themselves or facilitate the acquisition of other resources. Psychological stress arises when valued resources are

threatened or lost, or when substantial resource investment fails to generate the expected return (Hobfoll, 1989; Hobfoll et al., 2018).

Two principles of COR theory are particularly relevant. First, resource loss generally has a stronger psychological effect than an equivalent resource gain. Second, individuals must invest resources to prevent further loss, recover from previous loss, and acquire additional resources. People with fewer resources are consequently more vulnerable to further losses, potentially generating a resource-loss spiral. Conversely, those with stronger resource reserves are better positioned to manage demands and accumulate additional resources. COR theory also proposes that resources frequently coexist and develop as resource caravans, through which personal, interpersonal, and contextual resources may support one another rather than operate independently (Hobfoll, 2011; Hobfoll et al., 2018).

Academic Stress as a Process of Resource Depletion

Within medical education, academic stress can be conceptualised as a continuing demand on students' valued resources. Coursework, assessments, clinical training, research requirements, and academic competition require sustained investments of time, energy, attention, and emotional regulation. These demands are not inherently harmful and may promote competence when students possess sufficient resources and opportunities for recovery. However, when educational demands are appraised as exceeding available resources, or when sustained effort does not produce the expected academic outcomes, resource depletion may occur (Hobfoll et al., 2018).

A resource-loss spiral may emerge when academic demands reduce sleep, social participation, leisure, and opportunities for psychological recovery. Fatigue and impaired concentration may subsequently make academic tasks more difficult, requiring further investment from already diminished resources. Over time, this process may be associated with reduced motivation and adaptive capacity, persistent worry, helplessness, and diminished expectations of future success. COR theory therefore provides a plausible explanation for the proposed relationships between academic stress and depression and anxiety. These pathways remain theoretical, however, and should not be presented as established causal mechanisms without longitudinal evidence.

Accumulated resource loss may also be relevant to suicidal ideation when students experience their difficulties as inescapable and perceive few opportunities for recovery. Nevertheless, COR theory is not a comprehensive theory of suicidal behaviour. The Integrated Motivational-Volitional Model more specifically proposes that defeat and entrapment contribute to suicidal ideation, while separate volitional factors influence progression from ideation to suicidal behaviour (O'Connor & Kirtley, 2018). COR theory explains the broader context of resource threat and depletion, whereas suicide-specific theory clarifies processes that are more directly related to suicidal outcomes.

Psychological Protective Factors as Resources

The proposed framework conceptualises resilience, social support, and mindfulness as complementary resources. Resilience and mindfulness primarily represent personal psychological resources, whereas social support represents an interpersonal and contextual resource. These factors do not necessarily remove academic demands; instead, they may help students protect existing resources, mobilise additional resources, regulate their responses to academic pressure, and recover from resource loss. Their integration is consistent with the COR proposition that different resources may coexist and reinforce one another within resource caravans (Hobfoll, 2011; Hobfoll et al., 2018).

Resilience refers to the dynamic capacity to maintain or regain adaptive functioning during adversity. From a COR perspective, resilience represents a personal resource that may facilitate flexible coping, recovery following academic setbacks, and continued engagement with valued goals. A three-wave study of medical students found longitudinal relationships among resilience, academic burnout, and life satisfaction, suggesting that resilience may operate dynamically and may itself be affected by continuing educational adversity (Wang et al., 2022). Because that study examined academic burnout and life satisfaction rather than academic stress, depression, anxiety, and suicidal ideation, it provides related theoretical support but does not directly verify the pathways proposed here.

Social support is a multidimensional resource encompassing emotional, informational, instrumental, and appraisal assistance available or provided through relationships with family members, peers, teachers, institutions, and other significant individuals. It includes, but is not limited to, students' perceptions of support availability. Within COR theory, social support may preserve resources by providing reassurance, practical assistance, guidance, belonging, and access to resources beyond the individual's existing capacity. Broader mental-health research associates stronger social support with lower stress, depression, and anxiety, although this evidence is predominantly observational and does not establish causal direction (Acoba, 2024).

Sustained academic stress may restrict opportunities for social participation, strain interpersonal relationships, or reduce students' capacity to mobilise assistance. Conversely, limited social support may make academic demands more difficult to manage. The proposed direction from academic stress to social support is therefore a theoretically derived pathway rather than an established causal relationship and requires longitudinal validation.

Mindfulness refers to receptive and non-judgmental awareness of present-moment experience. In the present application of COR theory, it represents a personal self-regulatory resource supporting attention regulation, emotional awareness, and less automatic responses to academic stress. Mindfulness may conserve cognitive and emotional resources by reducing rumination, catastrophic appraisal, and prolonged emotional reactivity. Systematic reviews indicate that mindfulness-based interventions may reduce stress, anxiety, depression, and broader psychological distress among medical students, although findings vary across interventions and study designs (da Silva et al., 2023; Kaisti et al., 2024). Intervention effectiveness does not, however, establish that mindfulness mediates the relationships between academic stress and the three mental health outcomes.

Proposed Mediating Mechanism

The distinction between mediation and moderation is central to the framework. Moderation would indicate that a protective factor changes the strength or direction of the relationship between academic stress and a mental health outcome. Mediation instead proposes an indirect pathway through which academic stress is associated with the protective resource, which is subsequently associated with the outcome. The proposed mechanism can therefore be represented as:

Academic Stress→Psychological Protective Factors→Common Mental Health Problems

Specifically, continuing academic stress may be associated with diminished adaptive and recovery capacity, reduced access to or mobilisation of social support, and depletion of the attentional and emotional resources associated with mindfulness. Lower levels of these resources may subsequently be associated with greater depression, anxiety, and suicidal ideation. Resilience, social support, and mindfulness are treated as parallel mediators because they represent conceptually distinct resources and because this specification produces a parsimonious and empirically testable model.

This formulation does not exclude possible moderating, reciprocal, or sequential relationships. Nor does it suggest that the protective factors are interchangeable or that resource-building interventions can replace institutional efforts to reduce avoidable academic demands. Given that much of the available evidence is cross-sectional, the proposed temporal ordering remains theoretically derived. Longitudinal research is required to determine whether academic stress precedes changes in the three resources and whether those changes subsequently precede depression, anxiety, and suicidal ideation.

Theoretical Integration

In summary, COR theory conceptualises academic stress as a sustained demand on students' resources that may require continuing investment and, when adequate recovery or resource replenishment is unavailable, contribute to resource depletion. Within this framework, resilience represents adaptive and recovery capacity, social support provides interpersonal and contextual resources, and mindfulness facilitates attentional and emotional self-regulation. Although these resources are conceptually distinct, COR theory suggests that resources may coexist and reinforce one another within resource caravans (Hobfoll, 2011; Hobfoll et al., 2018). For conceptual clarity and empirical testability, the proposed framework nevertheless specifies resilience, social support, and mindfulness as parallel mediators.

The framework does not assume that these protective resources are interchangeable, causally independent, or the sole determinants of depression, anxiety, and suicidal ideation among medical students. Nor does it imply that strengthening individual and interpersonal resources can substitute for institutional efforts to address avoidable or excessive academic demands. Rather, it integrates personal, interpersonal, and contextual resources into a parsimonious explanation of how academic stress may be indirectly associated with the three mental health outcomes. Building on this theoretical foundation, the following section specifies the proposed relationships, formulates the corresponding propositions, and presents the conceptual framework.

FRAMEWORK AND PROPOSITIONS

Proposed Conceptual Framework

Drawing on Conservation of Resources (COR) theory, the proposed framework specifies the direct and indirect relationships between academic stress and common mental health problems among medical students. Common mental health problems are represented by depression, anxiety, and suicidal ideation. Academic stress is proposed to be positively associated with each outcome and indirectly associated with the outcomes through resilience, social support, and mindfulness. The model also retains a direct path from academic stress to each mental health outcome after the three proposed mediators are included.

Resilience, social support, and mindfulness are specified as parallel mediators rather than as dimensions of a single higher-order construct. Resilience represents adaptive and recovery capacity, social support represents interpersonal and contextual assistance, and mindfulness represents attentional and emotional self-regulation. Depression, anxiety, and suicidal ideation are likewise treated as separate but potentially correlated outcomes. This structure permits the specific indirect relationship through each protective factor to be examined separately for each outcome while preserving a parsimonious and empirically testable model.

Academic Stress and Common Mental Health Problems

Academic stress requires medical students to invest sustained cognitive, emotional, temporal, and energetic resources in coursework, examinations, clinical training, research activities, and other educational responsibilities. According to COR theory, psychological vulnerability may increase when these demands threaten or consume valued resources, prevent adequate recovery, or require continuing investment without sufficient resource replenishment. Academic stress may consequently be associated with depression through resource depletion, reduced motivation, helplessness, and diminished expectations of academic success. It may also be associated with anxiety by increasing anticipatory worry, threat appraisal, and concerns about failure or professional competence.

Empirical research has reported associations among academic stress, depression, and anxiety in medical students. For example, a cross-sectional study conducted during the COVID-19 period found significant relationships among academic stress, depression, and anxiety in medical students, although its design did not establish temporal or causal direction (Avila-Carrasco et al., 2023). The proposed paths from academic stress to depression and anxiety should therefore be understood as theoretically specified directional relationships requiring longitudinal confirmation rather than as established causal effects.

Academic stress may also be associated with suicidal ideation when prolonged educational pressure co-occurs with depression, anxiety, hopelessness, burnout, interpersonal difficulties, or perceptions that existing demands cannot be escaped. A systematic review identified academic pressure and professional expectations among the factors reported in studies of suicidal ideation among medical students, while also showing that suicidal ideation is associated with multiple interacting personal, interpersonal, and educational conditions (Mateen et al., 2024). Academic stress is therefore conceptualised as a relevant risk factor, not as a necessary or sufficient cause of suicidal ideation.

Proposition 1a: Academic stress is positively associated with depression among medical students.

Proposition 1b: Academic stress is positively associated with anxiety among medical students.

Proposition 1c: Academic stress is positively associated with suicidal ideation among medical students.

Academic Stress and Psychological Protective Factors

COR theory proposes that continuing stress may threaten, consume, or restrict the mobilisation of valued resources. In the present framework, academic stress is therefore expected to be negatively associated with resilience, social support, and mindfulness. These paths represent theoretically proposed resource processes; they should not be interpreted as established causal effects.

Academic stress may be negatively associated with resilience when repeated demands, unsuccessful resource investment, and inadequate recovery weaken students' capacity to adapt to and recover from academic difficulties. A three-wave study of medical students demonstrated dynamic longitudinal relationships among resilience, academic burnout, and life satisfaction, indicating that resilience may vary in relation to educational experiences rather than function exclusively as a stable characteristic (Wang et al., 2022). However, because academic burnout is distinct from academic stress, this study provides adjacent support for the proposed process rather than a direct test of the academic stress-to-resilience pathway.

Academic stress may also be negatively associated with social support by restricting opportunities for social participation, straining supportive relationships, discouraging help-seeking, or limiting students' capacity to access and mobilise emotional, informational, and instrumental assistance. This proposed direction requires particular caution. Social support may also influence how academic demands are appraised and managed, and the relationship may therefore be reciprocal. Proposition 2b represents a theory-derived pathway in which academic stress is associated with reduced access to or mobilisation of social resources; it does not assume that academic stress necessarily reduces the objective existence of students' social networks.

Finally, academic stress may be negatively associated with mindfulness because sustained worry, attentional overload, rumination, and automatic emotional reactions are inconsistent with receptive and non-judgmental awareness of present-moment experience. A cross-sectional study of international university students found significant relationships among academic stress, mindfulness, and mental health, although the non-medical sample and cross-sectional design limit its direct applicability to medical students and prevent conclusions about temporal direction (Koppenborg et al., 2024). The academic stress-to-mindfulness pathway therefore remains a theoretically grounded proposition requiring direct testing in the intended population.

Proposition 2a: Academic stress is negatively associated with resilience among medical students.

Proposition 2b: Academic stress is negatively associated with social support among medical students.

Proposition 2c: Academic stress is negatively associated with mindfulness among medical students.

Psychological Protective Factors and Common Mental Health Problems

Resilience, social support, and mindfulness are expected to be negatively associated with depression, anxiety, and suicidal ideation through conceptually distinct resource processes. These relationships are proposed on the basis of COR theory and relevant empirical evidence, but the strength of the available evidence differs across the three protective factors and mental health outcomes.

Resilience supports adaptation to adversity, recovery from setbacks, and continued engagement with valued goals. Among Chinese medical students, Zhao et al. (2021) reported a negative association between resilience and depression scores and found that coping styles partly accounted for this relationship. However, the cross-sectional design did not establish temporal or causal direction. Evidence concerning resilience in relation to anxiety and suicidal ideation among medical students is less extensive. Nevertheless, COR theory suggests that greater adaptive and recovery capacity may help students preserve functioning under continuing academic demands, while suicide-specific models identify resilience as a potentially relevant protective factor in the development of suicidal ideation (O'Connor & Kirtley, 2018).

Proposition 3a: Resilience is negatively associated with depression among medical students.

Proposition 3b: Resilience is negatively associated with anxiety among medical students.

Proposition 3c: Resilience is negatively associated with suicidal ideation among medical students.

Social support provides emotional reassurance, informational guidance, instrumental assistance, appraisal, companionship, and a sense of belonging. These resources may reduce the interpersonal and practical costs of coping with academic demands and facilitate access to assistance when psychological difficulties emerge. Reviews of medical students' mental health have identified inadequate social support, loneliness, and interpersonal difficulties as correlates of depression and anxiety, although much of the evidence is cross-sectional (Peng et al., 2023a). Social support may also be relevant to suicidal ideation because social connection and belonging can provide alternatives to isolation and entrapment. However, suicidal ideation remains a multifactorial outcome influenced by psychological, interpersonal, clinical, and contextual conditions (Mateen et al., 2024; O'Connor & Kirtley, 2018). Social support should therefore be conceptualised as a potentially protective resource rather than a sufficient safeguard against suicidal ideation.

Proposition 4a: Social support is negatively associated with depression among medical students.

Proposition 4b: Social support is negatively associated with anxiety among medical students.

Proposition 4c: Social support is negatively associated with suicidal ideation among medical students.

Mindfulness may support psychological adaptation through present-moment awareness, attention regulation, and reduced automatic engagement with worry, rumination, and negative emotional reactions. A cross-sectional study of international university students reported associations among academic stress, mindfulness, depression, and anxiety, although the non-medical sample and cross-sectional design limit causal and population-specific conclusions (Koppenborg et al., 2024). Systematic reviews of mindfulness-based interventions among medical students have also reported reductions in stress, anxiety, depression, or broader psychological distress, but intervention effects do not necessarily establish equivalent relationships involving dispositional mindfulness (Kaisti et al., 2024; Sperling et al., 2023).

Direct evidence concerning mindfulness and suicidal ideation among medical students remains limited. Its proposed relationship with suicidal ideation is therefore based primarily on the theoretical possibility that present-moment awareness and reduced rumination may help interrupt processes involving hopelessness, defeat, and entrapment. Proposition 5c should accordingly be regarded as more exploratory than the proposed relationships of mindfulness with depression and anxiety.

Proposition 5a: Mindfulness is negatively associated with depression among medical students.

Proposition 5b: Mindfulness is negatively associated with anxiety among medical students.

Proposition 5c: Mindfulness is negatively associated with suicidal ideation among medical students.

Mediating Roles of Psychological Protective Factors

The central theoretical contribution of the framework is the proposition that academic stress is indirectly associated with depression, anxiety, and suicidal ideation through changes in personal and interpersonal resources. Under continuing academic demands, students may experience reduced adaptive and recovery capacity, greater difficulty accessing or mobilising social support, and disruption to the attentional and emotional regulation associated with mindfulness. Lower levels of these resources may subsequently be associated with poorer mental health outcomes.

The three mediators represent distinct mechanisms. Resilience concerns adaptation and recovery following adversity; social support concerns interpersonal and contextual assistance; and mindfulness concerns present-moment awareness and attentional and emotional self-regulation. They should therefore be specified as parallel

mediators rather than combined into a single composite score. Treating them separately also permits the specific indirect relationship through each resource to be estimated while accounting for correlations among the mediators.

For resilience, COR theory suggests that sustained academic stress may weaken or exhaust adaptive resources, making recovery from subsequent demands more difficult. Reduced resilience may then be associated with depression, anxiety, or suicidal ideation. Accordingly:

Proposition 6a: Resilience mediates the relationship between academic stress and depression among medical students.

Proposition 6b: Resilience mediates the relationship between academic stress and anxiety among medical students.

Proposition 6c: Resilience mediates the relationship between academic stress and suicidal ideation among medical students.

For social support, academic stress may restrict social participation, strain relationships, discourage help-seeking, or reduce students' capacity to mobilise available assistance. Lower social support may subsequently be associated with depression, anxiety, or suicidal ideation. Because social support may also precede and influence the appraisal of academic stress, these indirect relationships require particular attention to temporal ordering:

Proposition 7a: Social support mediates the relationship between academic stress and depression among medical students.

Proposition 7b: Social support mediates the relationship between academic stress and anxiety among medical students.

Proposition 7c: Social support mediates the relationship between academic stress and suicidal ideation among medical students.

For mindfulness, continuing academic stress may be associated with attentional overload, worry, rumination, and automatic emotional reactions that interfere with mindful awareness. Lower mindfulness may subsequently be associated with depression and anxiety and, theoretically, with suicidal ideation:

Proposition 8a: Mindfulness mediates the relationship between academic stress and depression among medical students.

Proposition 8b: Mindfulness mediates the relationship between academic stress and anxiety among medical students.

Proposition 8c: Mindfulness mediates the relationship between academic stress and suicidal ideation among medical students.

Together, Propositions 6a–8c specify nine distinct indirect relationships. Their formulation as separate subpropositions is necessary because an indirect relationship may be supported for one mental health outcome but not for another. Moreover, these propositions describe theoretically specified mediation pathways rather than established causal mechanisms. Longitudinal data with appropriately separated measurement occasions are needed to determine whether academic stress precedes changes in resilience, social support, and mindfulness and whether those changes subsequently precede depression, anxiety, and suicidal ideation.

Framework Summary

The proposed framework specifies academic stress as the predictor; resilience, social support, and mindfulness as three distinct parallel mediators; and depression, anxiety, and suicidal ideation as separate but potentially

correlated outcomes. Academic stress is proposed to be directly associated with each mental health outcome and indirectly associated with each outcome through each of the three protective resources.

For visual parsimony, Figure 1 groups resilience, social support, and mindfulness under psychological protective factors and groups depression, anxiety, and suicidal ideation under common mental health problems. These groupings are conceptual rather than statistical. The three mediators are not combined into a single composite mediator, and the three outcomes are not combined into a single composite outcome. Instead, the framework specifies three predictor-to-mediator paths, nine specific indirect relationships, and three direct predictor-to-outcome paths. The mediators and outcomes may covary within their respective sets, but these covariance paths are omitted from the figure for visual clarity.

Grounded in Conservation of Resources theory, the framework proposes that sustained academic stress may be associated with diminished personal and interpersonal resources, which may subsequently be associated with depression, anxiety, and suicidal ideation. The magnitude and statistical support of the proposed direct and indirect relationships remain matters for empirical testing.

Theoretical Foundation: Conservation of Resources Theory

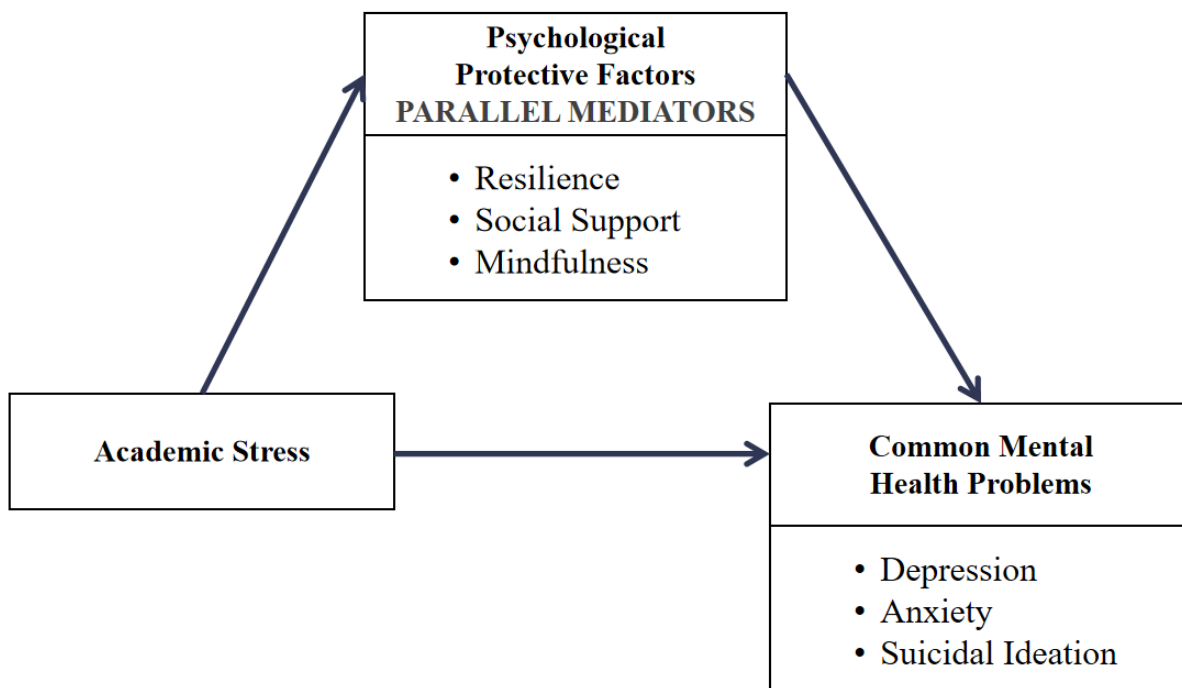


Figure 1. Proposed Parallel Mediation Framework Linking Academic Stress to Common Mental Health Problems Among Medical Students

Note. Resilience, social support, and mindfulness are grouped for visual parsimony but are modelled as three distinct parallel mediators rather than as indicators of a single composite mediator. Depression, anxiety, and suicidal ideation are similarly grouped under common mental health problems but are modelled as separate outcomes that are allowed to correlate rather than as indicators of a single composite outcome. The arrows summarise three predictor-to-mediator paths, nine specific indirect relationships, and three direct predictor-to-outcome paths. Covariances among the mediators and among the outcomes are omitted for visual clarity.

DISCUSSION

The proposed framework offers a theoretical explanation of how resilience, social support, and mindfulness may mediate the relationships between academic stress and depression, anxiety, and suicidal ideation among medical students. Its central premise is that academic stress may be associated with these outcomes both directly and indirectly through changes in personal and interpersonal resources. Rather than treating the three outcomes as

indicators of a single mental health construct, the framework retains depression, anxiety, and suicidal ideation as conceptually distinct but potentially correlated outcomes. It thereby integrates risk and protective perspectives while permitting the resource pathway associated with each mediator and outcome to be examined separately.

Theoretical Contributions

The first contribution is a context-specific extension and integration of Conservation of Resources theory within medical education. Existing research has consistently associated academic and educational pressures with mental health problems among medical students, but evidence of association does not by itself explain the processes through which these relationships may develop (Peng et al., 2023a). Drawing on COR theory, the framework conceptualises academic stress as a sustained demand requiring continuing investment of time, attention, energy, and emotional-regulation resources. When demands persist without adequate recovery or resource replenishment, students may become increasingly vulnerable to adverse psychological outcomes (Hobfoll et al., 2018). The theoretical contribution therefore lies not in claiming the first application of COR theory to students, but in using its resource principles to organise a specific set of relationships among academic stress, three protective resources, and three mental health outcomes in medical education.

The second contribution is the specification of resilience, social support, and mindfulness as distinct but potentially correlated parallel mediators. Resilience represents adaptive and recovery capacity, social support provides interpersonal and contextual assistance, and mindfulness supports present-moment awareness and attentional and emotional self-regulation. Although COR theory suggests that resources may coexist and reinforce one another within resource caravans, their functions should not be treated as interchangeable (Hobfoll, 2011). Modelling the three resources separately permits the specific indirect relationship through each mediator to be estimated for each outcome. This specification may reveal that one resource pathway is supported for depression but not for anxiety or suicidal ideation, or that different resources account for different proportions of the relationships. The framework therefore provides greater conceptual and analytical precision than would be possible if the three resources were represented by a single composite protective-factor score.

The third contribution is the inclusion of suicidal ideation alongside depression and anxiety. Suicidal ideation is not a psychiatric disorder and should not be treated as equivalent to depression or anxiety. It is instead a clinically significant suicide-related outcome that may involve additional processes, including defeat, entrapment, hopelessness, perceived burdensomeness, and social disconnection. The Integrated Motivational–Volitional Model is therefore used to complement, rather than replace, the broader resource explanation provided by COR theory (O’Connor & Kirtley, 2018). Recent synthesis also indicates that suicidal ideation among medical students is associated with multiple psychological, interpersonal, educational, and contextual factors, with depression emerging as one of the most consistently reported risk factors (Agyapong-Opoku et al., 2025). Treating suicidal ideation as a distinct outcome expands the scope of the framework while avoiding the implication that academic stress or resource loss alone is sufficient to produce suicidal thoughts.

The fourth contribution is the explicit distinction between mediation and moderation. Protective resources are frequently described as “buffering” stress, which implies that they change the strength or direction of the relationship between a stressor and an outcome. Such a hypothesis represents moderation. The present framework instead specifies mediation: academic stress is proposed to be associated with resilience, social support, and mindfulness, which are subsequently proposed to be associated with the mental health outcomes. Mediation and moderation therefore represent different theoretical questions and require different statistical tests (Hayes, 2022). This distinction allows the framework to formulate nine specific indirect relationships rather than relying on a general buffering assumption. Nevertheless, statistical evidence of an indirect effect—particularly when derived from cross-sectional data—would not by itself establish causal or temporal mediation. Longitudinal designs are needed to determine whether academic stress precedes changes in the proposed resources and whether those changes subsequently precede depression, anxiety, and suicidal ideation.

Practical Implications

The proposed framework suggests that medical schools should consider both the academic demands placed on students and the personal and interpersonal resources available for managing those demands. Approaches that

focus exclusively on individual coping may inadvertently locate responsibility primarily within students while leaving modifiable educational conditions unexamined. Resource-building initiatives should therefore be considered alongside institutional review of workload distribution, assessment frequency, curriculum organisation, competitive practices, clinical learning conditions, and opportunities for rest and recovery. The framework does not establish that any single institutional change will improve mental health; rather, it identifies educational conditions and resource processes that warrant context-specific assessment.

At the individual level, initiatives intended to support resilience may help students develop more adaptive responses to academic setbacks, while mindfulness-based programmes may support attention and emotional regulation. However, these interventions should not be assumed to be universally acceptable or effective. An overview of 13 systematic reviews found some evidence that mindfulness interventions may reduce stress, anxiety, and depression; that mental health programmes may reduce anxiety and depression but are generally ineffective in reducing stress; and that pass/fail grading may reduce stress. The quality and consistency of the underlying evidence were nevertheless limited for many interventions (Bennett-Weston et al., 2024). Medical schools should therefore evaluate intervention acceptability, accessibility, effectiveness, sustainability, and potential unintended consequences within their own educational and cultural contexts rather than assuming that programmes developed elsewhere will produce equivalent outcomes.

At the interpersonal level, institutions could strengthen social support through appropriately designed peer-support programmes, faculty mentoring, academic advising, and accessible professional counselling. The nominal availability of services alone may be insufficient if students encounter stigma, confidentiality concerns, scheduling barriers, uncertainty about eligibility, or difficulty navigating referral procedures. Institutions should therefore consider not only whether support is formally provided but also whether students can access, trust, and mobilise it when needed. Peer and faculty support should complement, rather than replace, qualified mental health care where professional assessment or treatment is indicated.

The inclusion of suicidal ideation requires specific safeguards. Resilience, social support, and mindfulness may form part of a broader preventive environment, but they cannot substitute for professional assessment, evidence-informed intervention, or appropriate mental health treatment. Medical schools should establish clearly defined procedures for early identification, timely referral, urgent response, continuity of care, and follow-up. Such procedures should protect students' privacy while clearly communicating the professional and legal limits of confidentiality when immediate safety concerns arise. Screening should be implemented only when it is linked to appropriate assessment and response pathways; it should not be treated as a stand-alone preventive intervention. Consistent with the World Health Organization's multisectoral approach, institutional procedures should form part of a comprehensive suicide-prevention strategy involving educational institutions, health services, families or support networks where appropriate, and relevant community systems (World Health Organization, 2021).

Directions for Future Research

The proposed framework requires empirical validation. Future studies should first evaluate whether academic stress, resilience, social support, mindfulness, depression, anxiety, and suicidal ideation can be represented as empirically distinguishable constructs. Confirmatory factor analysis should compare the proposed measurement model with plausible alternative models, including models that combine the three protective factors or the three mental health outcomes. Evidence of model fit, convergent validity, and discriminant validity should be established before the structural relationships are interpreted. Depression, anxiety, and suicidal ideation should be modelled as separate but potentially correlated outcomes, while resilience, social support, and mindfulness should be represented as distinct parallel mediators.

The interpretation of depression and anxiety should also correspond to the measurement instruments employed. When self-report screening scales are used, scores represent levels of the respective constructs or positive screening results rather than confirmed clinical diagnoses. Researchers should report the instrument version, scoring procedure, assessment period, threshold source where applicable, and psychometric properties in the study population. Suicidal ideation should similarly be distinguished from suicide plans and attempts, and its assessment period should be clearly specified.

Future studies should estimate the specific indirect relationship through each mediator while accounting for correlations and shared variance among the three mediators. Direct paths from academic stress to depression, anxiety, and suicidal ideation should be retained to estimate the relationships remaining after the mediators are included, without presupposing that mediation will be partial or complete. Inferences about indirect relationships should be based on effect estimates and bootstrap confidence intervals rather than solely on individual path significance. If researchers seek to determine whether one indirect relationship is stronger than another, formal contrasts between specific indirect effects are required; comparing whether one effect is statistically significant and another is not does not constitute a valid test of their difference (Coutts & Hayes, 2023).

Longitudinal designs would provide a stronger test of the proposed temporal sequence than cross-sectional data. Cross-sectional mediation may identify a pattern consistent with an indirect relationship, but it cannot determine whether academic stress precedes changes in resilience, social support, or mindfulness or whether those changes precede the mental health outcomes. Cross-sectional estimates may also be biased when the underlying process unfolds over time (Maxwell & Cole, 2007). Ideally, studies should include at least three theoretically timed measurement occasions and assess all focal constructs at each occasion. Such designs would permit baseline adjustment and examination of reciprocal pathways, including whether depression and anxiety predict subsequent academic stress or reduce students' capacity to access and mobilise social support. Nevertheless, longitudinal observational evidence would strengthen temporal inference rather than establish causality by itself.

The framework should also be examined across student characteristics and educational contexts. Potential variation by sex, year of study, preclinical or clinical stage, socioeconomic background, and institutional environment may clarify the conditions under which particular resource pathways are most relevant. Before comparing structural paths across groups or measurement occasions, researchers should establish an appropriate level of measurement invariance so that observed differences are not attributable to inconsistent measurement (Putnick & Bornstein, 2016). Replication across universities, regions of China, and different medical-education systems would be necessary before generalising the framework beyond its initial setting. Future research should also use adequate sample sizes for detecting indirect effects, report missing-data and attrition procedures, and test theoretically plausible alternative models.

Limitations of the Proposed Framework

The proposed framework has several limitations. First, its parsimonious structure includes only resilience, social support, and mindfulness as mediators. Other individual, interpersonal, educational, and contextual factors—including coping, sleep, financial strain, previous mental health conditions, clinical exposure, and institutional climate—may also contribute to depression, anxiety, and suicidal ideation. Their exclusion establishes the boundaries of the framework but may leave relevant pathways unrepresented.

Second, the three protective resources are specified as parallel mediators to preserve conceptual clarity and empirical testability. This specification does not imply that they are statistically or causally independent. Social support may facilitate resilience, mindfulness may influence the recognition and mobilisation of support, and the three resources may operate sequentially or reciprocally. These more complex relationships should be examined through comparisons with alternative models after the proposed parallel mediation structure has been evaluated.

Third, the directional paths remain theoretically proposed rather than causally established. Academic stress may weaken or restrict access to protective resources, but lower resilience, less accessible social support, and lower mindfulness may also increase vulnerability to academic demands. Depression and anxiety may similarly impair academic functioning and contribute to subsequent stress. Cross-sectional evidence cannot resolve these competing temporal explanations and may produce biased estimates of processes that unfold over time (Maxwell & Cole, 2007).

Fourth, the framework was developed through a focused narrative review rather than an exhaustive systematic review with formal risk-of-bias assessment. Selection and interpretation bias therefore cannot be excluded. Moreover, much of the available evidence relies on cross-sectional self-report data and screening instruments. Reported depression and anxiety scores should consequently not be interpreted as confirmed clinical diagnoses. Differences in medical curricula, family expectations, help-seeking norms, social support, and access to mental health services may also limit generalisation across cultural and educational settings.

Finally, COR theory explains resource threat and loss but does not fully account for the processes underlying suicidal ideation or its progression to suicidal behaviour. Suicide-specific theories remain necessary to explain mechanisms involving defeat, entrapment, and the transition from ideation to action (O'Connor & Kirtley, 2018). The proposed framework should therefore be understood as a theoretically grounded and testable representation rather than an established causal model.

CONCLUSION

Academic stress is an important concern in medical education because of its associations with depression, anxiety, and suicidal ideation among medical students. However, existing research has not sufficiently integrated the resource processes that may account for these relationships. To address this gap, this paper proposes a conceptual framework in which resilience, social support, and mindfulness operate as parallel mediators between academic stress and the three mental health outcomes.

Grounded in Conservation of Resources theory, the framework conceptualises sustained academic demands as potential threats to the personal, interpersonal, and contextual resources required for psychological adaptation. Resilience represents adaptive and recovery capacity, social support provides interpersonal and contextual assistance, and mindfulness supports attentional and emotional self-regulation. These resources are treated as distinct but complementary mediators, while depression, anxiety, and suicidal ideation are treated as separate but potentially correlated outcomes.

The framework contributes to the literature by integrating risk and protective perspectives, distinguishing mediation from moderation, and extending the conceptual scope of medical students' mental health research to include suicidal ideation alongside depression and anxiety. It also highlights the importance of considering resource-building initiatives together with institutional efforts to address avoidable academic demands and improve access to appropriate mental health support.

Because the proposed relationships are theoretically derived, the framework should not be interpreted as an established causal model. Longitudinal and culturally sensitive research is needed to examine temporal ordering, reciprocal relationships, and the nine specific indirect relationships across medical-education contexts. Overall, the framework provides a parsimonious and testable foundation for investigating how distinct protective resources may account for the relationships between academic stress and common mental health problems among medical students.

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