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ACTIVE LEARNING METHODOLOGIES AND MEDICAL STUDENTS' MENTAL HEALTH: AN INTEGRATIVE LITERATURE REVIEW

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ABSTRACT
Introduction: The mental health of medical students has become an increasing concern, given the high prevalence of stress, anxiety, depression, and burnout. In this context, active learning methodologies, such as problem-based learning, clinical simulation, and gamification, have been identified as strategies that not only foster meaningful learning but also promote students' psychological well-being. Method: This study is an Integrative Literature Review (ILR) grounded in Evidence-Based Practice. The PICo framework guided the research question: What are the impacts of active learning methodologies on the mental health of medical students? Searches were conducted in PubMed, Scopus, Web of Science, ScienceDirect, and SciELO, including articles published between 2019 and 2025 in Portuguese, English, and Spanish. From 928 studies identified, 22 met the inclusion criteria and were analyzed regarding study design, level of evidence, population, and main findings. Results: Most studies were published in English-speaking countries, predominantly with quantitative designs. Findings indicate that active learning methodologies reduce stress, anxiety, and burnout while enhancing engagement, motivation, and socioemotional skills. Discussion: Gaps remain concerning methodological heterogeneity and the lack of longitudinal studies capable of measuring sustained effects. Conclusion: Active learning methodologies emerge as pedagogical resources and strategies for promoting mental health in medical education. Future research should expand longitudinal approaches and explore curricular proposals that integrate academic excellence with psychological well-being.
Keywords: mental health; medical students; active learning methodologies; problem-based learning; clinical simulation.

1. INTRODUCTION

The mental health of medical students has become one of the most debated topics in health education, due to the high prevalence of stress, anxiety, depression, and burnout within this academic group (Graner & Cerqueira, 2019; Schlittler *et al*., 2023). The intensity of the workload, performance pressure, early exposure to human suffering and death, combined with institutional and cultural factors, create a context that fosters psychological distress (Cazolari *et al*., 2020). In this scenario, it is essential to reflect on pedagogical and organizational strategies capable of mitigating these impacts, promoting not only technical training but also the emotional well-being of future physicians (Oliveira & Ribeiro, 2023).

In recent years, the adoption of active teaching and learning methodologies has emerged as a response to the limitations of traditional models and the contemporary demands of medical education. Grounded in student autonomy, active participation, and meaningful learning, practices such as problematization, problem-based learning (PBL), project-based learning, and the use of simulations seek to integrate theory and practice in a contextualized way (Portero & Medina, 2025; Maia *et al*., 2020). More than a pedagogical innovation, they represent a paradigm shift in which students move from a passive role to an active position in the construction of knowledge (Montenegro-Pires & Souza, 2022).

Several studies indicate that this shift in perspective can directly impact the mental health of medical students. By fostering collaboration, small-group cooperation, and the appreciation of prior experiences, active methodologies tend to reduce feelings of isolation, excessive competitiveness, and helplessness, factors traditionally associated with psychological distress during medical training. (Barbosa-Medeiros & Caldeira, 2021; Domínguez, Mora & Restrepo, 2023; Maia *et al*., 2020). Furthermore, closer contact with real healthcare situations, when mediated by tutors, can strengthen socioemotional skills such as empathy, resilience, and stress management, thereby contributing to a more holistic medical education (Ferreira *et al*., 2023; Oliveira, Stahnke, Horta & Costa, 2024).

Given this context, it is relevant to investigate how the scientific literature has examined the relationship between active learning methodologies and medical students' mental health. This article aims to analyze the connection between active teaching and learning strategies and the mental health of medical students, identifying pedagogical approaches that may foster academic well-being and reduce the risk of psychological distress.

2. METHOD

This study is an Integrative Literature Review (ILR), a methodological approach that encompasses different research designs with the purpose of gathering, synthesizing, and critically evaluating the scientific production related to the topic under investigation. Grounded in the principles of Evidence-Based Practice, this method enables the construction of consistent and applicable knowledge, both for pedagogical practice in health education and for the formulation of educational policies (Lemes *et al*., 2021; Ganong, 1987; Lockwood, Munn & Porritt, 2015).

The review followed the stages systematized by the specialized literature: (1) formulation of the research problem; (2) definition of inclusion and exclusion

criteria; (3) structured search in databases; (4) critical appraisal of the selected studies; (5) analysis and synthesis of the findings; and (6) presentation of the results. The guiding question was formulated according to the PICo strategy (Stern, Jordan & McArthur, 2014), establishing: P (medical students), I (active teaching and learning methodologies, including problem-based learning, clinical simulation, and project-based learning), and Co (mental health during medical training). The research question was: What are the impacts of active teaching and learning methodologies on the mental health of medical students?

The search was conducted in PubMed, Scopus, Web of Science, ScienceDirect, and SciELO databases, using combinations of controlled and uncontrolled descriptors: "active learning," "problem-based learning," "simulation," "project-based learning," "medical students," "mental health," "stress," "burnout," and "well-being." Boolean operators were applied to optimize both sensitivity and specificity of the search. Publications between 2019 and 2025 were included, written in Portuguese, English, or Spanish, and presenting empirical research of quantitative, qualitative, or mixed nature. Opinion articles, editorials, secondary reviews, and duplicates were excluded. Data extracted from the eligible studies were organized into a synthesis table, including: title and author, journal and year, country of origin and language, methodological design and level of evidence, main findings, and implications for educational practice.

For the classification of levels of evidence, we adopted the Joanna Briggs Institute taxonomy (Lockwood *et al*., 2020), which establishes: level I (systematic reviews and randomized controlled trials), level II (experimental studies), level III (quasi-experimental studies), level IV (observational and cohort studies), and level V (qualitative studies and case reports). This categorization added greater rigor to the critical analysis of the findings.

The search process identified 928 articles: 340 in PubMed, 275 in Scopus, 180 in Web of Science, 83 in ScienceDirect, and 50 in SciELO. All records were exported to EndNote X9 software, which was used for reference management and removal of duplicates. After initial screening by titles and abstracts, 412 studies remained for assessment. Of these, 88 were selected for full-text reading, resulting in the exclusion of 66 publications for not meeting the inclusion criteria or for diverging from the thematic scope. In the end, 22 articles comprised the final sample of this integrative review.

The methodological pathway adopted is represented in Figure 1, whose flowchart summarizes the stages of identification, selection, eligibility, and inclusion of studies, ensuring greater transparency in the review process. It is noteworthy that although 22 studies were included in the final sample, only 19 were mobilized in the Discussion section. This difference occurred because some articles, while relevant to the methodological and geographical characterization of the scientific production, did not present data directly related to the guiding question of this review and were therefore used only in the description of results.

Below, we present the flowchart based on the PRISMA model, which visually outlines the process of identification, exclusion, and inclusion of the studies.

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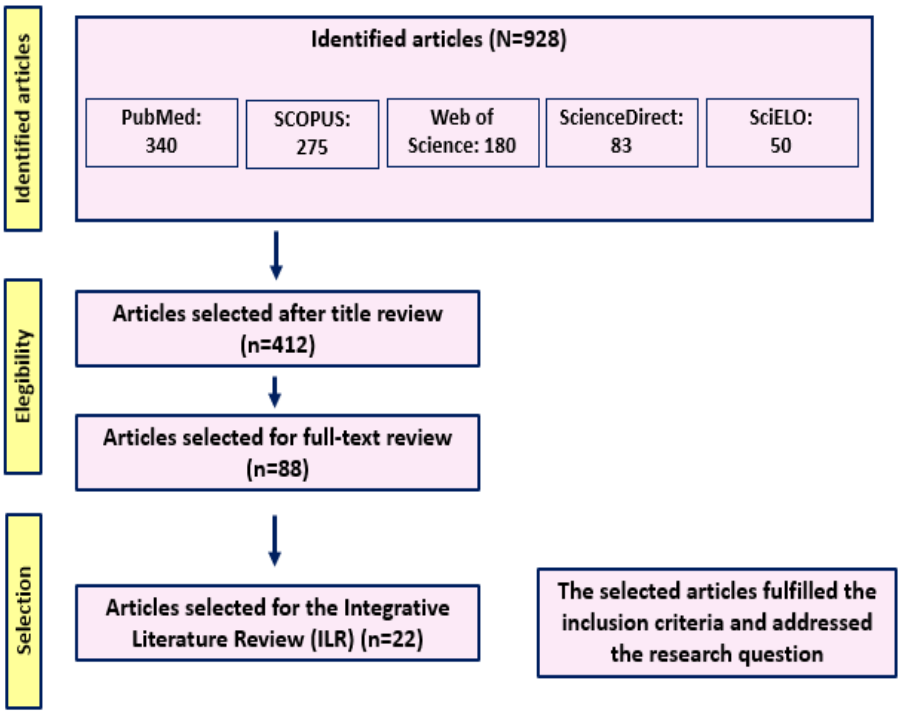
Figure 1. Flowchart of the selection process of the studies included in this review



Adapted from: Moher *et al*., 2009

3. RESULTS

After applying the previously established inclusion and exclusion criteria, 22 studies published between 2019 and 2025 were selected from the PubMed, Scopus, Web of Science, ScienceDirect, and SciELO databases. Most publications (approximately 64%) came from English-speaking countries, particularly the United States, the United Kingdom, and Canada, while around 27% originated from Latin America, mainly Brazil and Mexico. The remaining 9% were published in European countries where English is not the primary language.

Regarding methodological designs, there was a predominance of quantitative studies (55%), followed by qualitative investigations (32%) and, to a lesser extent, mixed-methods research (13%). The target population analyzed in the

studies consisted mainly of undergraduate medical students (73%), although some works also included residents and faculty members in their assessments.

Mixed-methods studies were also identified, integrating quantitative and qualitative approaches within the same design, thereby enabling both the objective measurement of symptoms and academic indicators, as well as the exploration of students' subjective experiences and perceptions. The classification based on the Joanna Briggs Institute (JBI) revealed different levels of evidence among the studies analyzed, ranging from level I (systematic reviews) to level III (quasi-experimental studies), in addition to level IV and V investigations corresponding to observational and qualitative designs. This methodological heterogeneity broadens the understanding of the phenomenon by combining statistical data with narratives, thus providing greater consistency and depth to the evidence on the relationship between active learning methodologies and mental health in medical education.

The analyzed articles highlight different applications of active learning methodologies in the context of medical students' mental health. Findings indicate that strategies such as problem-based learning, clinical simulation, and interdisciplinary projects contribute to reducing stress and anxiety related to the educational process, while also fostering the development of clinical and socioemotional skills (Maia *et al*., 2020; Montenegro-Pires & Souza, 2022; Barbosa-Medeiros & Caldeira, 2021). Another frequently observed aspect concerns the influence of these methodologies on academic engagement, motivation, and sense of belonging, suggesting their potential to mitigate burnout and improve adaptation to the university environment (Cazolari *et al*., 2020; Armstrong & Reynolds, 2020; Domínguez-Espinosa *et al*., 2022; Oliveira & Ribeiro, 2023). The studies also emphasized the assessment of communicative and socioemotional skills developed through innovative methodologies, demonstrating that their adoption transcends the technical dimension and extends to the subjective aspects of the learning process (Freitas *et al*., 2023; Oliveira, Stahnke, Horta & Costa, 2024; Conceição *et al*., 2019).

Despite these promising results, several methodological gaps were identified. First, available instruments often prioritize cognitive, affective, or behavioral dimensions, but there remains a scarcity of measures that capture agentic or sociocultural aspects, which are fundamental for evaluating engagement and belonging in active learning contexts (Kassab *et al*., 2023). Moreover, many investigations rely on cross-sectional data and aggregated scales, which hinders the understanding of the temporal evolution of these variables and their complex interrelationships (Li *et al*., 2024).

Below, we present the synthesis table of the studies included in this review, which organizes the main methodological characteristics, levels of evidence, and contributions to the investigated field.

Table 1. Synthesis of the studies included in the integrative review on active learning methodologies and medical students' mental health

Title and Author	Journal and Year	Country / Language	Design / Level of Evidence (JBI)	Main Findings and Educational Implications
Prevalência de sintomas depressivos em estudantes de Medicina (PBL) (Maia *et al*.)	Revista Brasileira de Educação Médica, 2020	Brazil / Portuguese	Cross-sectional, quantitative – Level IV	Related PBL to depressive symptoms; recommends psychological support in active curricula.
Aprendiendo a aprender en el Aula Invertida Extendida (Domínguez; Mora; Restrepo)	Revista Colombiana de Psiquiatría, 2023	Colombia / Spanish	Quasi-experimental – Level III	Flipped classroom increased engagement and self-regulation; supports active methodologies as promoters of mental health.
Sofrimento psíquico em estudantes universitários (Graner; Cerqueira)	Ciência &Saúde Coletiva, 2019	Brazil / Portuguese	Integrative review – Level V	Highlighted high prevalence of psychological distress; recommends pedagogical innovations to mitigate it.
Níveis de Burnout e Bem-Estar em Estudantes de Medicina (Cazolari *et al*.)	Revista Brasileira de Educação Médica, 2020	Brazil / Portuguese	Cross-sectional, quantitative – Level IV	Found high prevalence of burnout; suggests collaborative methodologies as protective factors.
Prevalence of suicidal behavior in medical students (Schlittler *et al*.)	Revista Brasileira de Educação Médica, 2023	Brazil / English	Cross-sectional, quantitative – Level IV	Identified high suicide risk; emphasizes urgency of institutional support alongside pedagogical changes.
Measurement of student engagement in health professions education (Kassab *et al*.)	BMC Medical Education, 2023	International / English	Narrative review – Level V	Review revealed lack of engagement instruments; recommends new metrics applicable to active methodologies.
Learning engagement and implications for teaching (Li *et al*.)	BMC Medical Education, 2024	China / English	Cross-sectional, quantitative – Level IV	Identified engagement factors; recommends contextualized pedagogical integration.
Depressão entre estudantes: ensino tradicional vs. ativo (Montenegro-Pires; Souza)	Revista CES Medicina, 2022	Colombia / Portuguese	Comparative cross-sectional – Level IV	Students in active curricula had lower prevalence of depression; reinforces active learning as protective.
A saúde mental dos estudantes de Medicina: revisão integrativa (Ferreira *et al*.)	Research, Society and Development, 2023	Brazil / Portuguese	Integrative review – Level V	Showed multiple risk factors; suggests active methodologies as preventive tools.
Fear of Negative Evaluation and Student Anxiety (Downing *et al*.)	CBE–Life Science Education, 2020	USA / English	Quasi-experimental – Level III	Found that active practices can increase anxiety; highlights need for faculty preparedness.

Instructor strategies to alleviate stress and anxiety (Hsu; Goldsmith)	CBE–Life Science Education, 2021	USA / English	Experimental – Level II	Instructor strategies reduced anxiety in active environments; highlights importance of faculty training.
Assessing Burnout and Risk Factors in Medical Students (Armstrong; Reynolds)	Journal of the National Medical Association, 2020	USA / English	Cross-sectional, quantitative – Level IV	Identified burnout risk factors; recommends practices that reduce curricular overload.
Saúde mental de acadêmicos de Medicina: estudo longitudinal (Barbosa-Medeiros; Caldeira)	Revista Brasileira de Educação Médica, 2021	Brazil / Portuguese	Longitudinal, quantitative – Level IV	Academic stressors linked to illness; suggests collaborative methodologies as social support.
Saúde mental e qualidade de vida em estudantes de Medicina (Oliveira; Ribeiro)	Revista Hygeia, 2023	Brazil / Portuguese	Cross-sectional, quantitative – Level IV	Identified engagement and support networks as protective factors; supports active methodologies.
Prevalência de depressão em estudantes de Medicina (Goiás) (Oliveira; Stahnke; Horta; Costa)	Revista Brasileira de Educação Médica, 2024	Brazil / Portuguese	Cross-sectional, quantitative – Level IV	Found high prevalence of depression; recommends adoption of active practices as protective alternatives.
Sintomas de depressão, ansiedade e estresse em estudantes da saúde (Freitas *et al.*)	Revista Latino-Americana de Enfermagem, 2023	Brazil / Portuguese	Cross-sectional, quantitative – Level IV	Related psychological symptoms to lower quality of life; suggests active methodologies as support.
Fostering academic engagement through soft skills (Wang *et al.*)	Frontiers Psychology, 2025	China / English	Cross-sectional, quantitative – Level IV	Soft skills and positive emotions increased engagement; reinforces active methodologies as allies of mental health.
Burnout and mental health in Mexican residents (Dominguez-Espinosa *et al.*)	PLOS One, 2022	Mexico / English	Cross-sectional, quantitative – Level IV	Sociodemographic variables modulated burnout; highlights need for pedagogical adaptation to context.
Saúde mental dos estudantes de Medicina brasileiros: revisão sistemática (Conceição *et al.*)	Avaliação (Campinas), 2019	Brazil / Portuguese	Systematic review – Level I	Showed high prevalence of mental disorders; recommends integration of emotional support into active methodologies.

Synthesis table of the studies included in the integrative review on active learning methodologies and medical students' mental health

4. DISCUSSION

This integrative review sought to analyze the relationship between active learning methodologies and the mental health of medical students, bringing together recent evidence that explores both the benefits and limitations of these strategies. Overall, the findings reinforce that the implementation of participatory pedagogical practices, such as clinical simulation, problem-based learning, gamification, and collaborative methodologies, has a positive impact on students' psychological well-being (Maia *et al*., 2020; Domínguez, Mora & Restrepo, 2023).

At the same time, it is necessary to acknowledge that the mental health of this population is already compromised by the high prevalence of stress, anxiety, depression, and burnout (Graner & Cerqueira, 2019; Cazolari *et al*., 2020; Schlittler *et al*., 2023). Therefore, the benefits of active methodologies must be interpreted within a scenario of academic vulnerability. Furthermore, challenges related to curricular overload and methodological heterogeneity remain obstacles to be addressed (Kassab *et al*., 2023; Li *et al*., 2024).

4.1 Active learning methodologies and mental health: mitigating stress and anxiety

The results indicate that active learning methodologies contribute to reducing symptoms of stress and anxiety among students, mainly by promoting greater autonomy in learning and better preparation for practical situations (Montenegro-Pires & Souza, 2022; Maia *et al*., 2020). Analyzed studies demonstrated that clinical simulation activities, for example, provide a safe environment for training technical skills, thereby reducing insecurity and anxiety when facing real clinical scenarios (Ferreira *et al*., 2023). Similarly, gamification has shown potential to make assessment processes less threatening, transforming them into playful experiences that enhance self-confidence (Domínguez, Mora & Restrepo, 2023).

Another relevant aspect is the influence of active methodologies in addressing burnout. By moving students from a passive position to a more engaged role, there is a reduction in the emotional exhaustion frequently associated with curricular overload (Cazolari *et al*., 2020; Armstrong & Reynolds, 2020). Active involvement in projects and collaborative groups emerges as a strategy for re-signifying academic routines, reducing the perception of isolation and pressure for individualized performance (Barbosa-Medeiros & Caldeira, 2021; Domínguez, Mora & Restrepo, 2023; Oliveira & Ribeiro, 2023).

However, it is important to note that such strategies, when applied without adequate pedagogical planning, can produce the opposite effect. Overlapping activities, lack of curricular integration, and insufficient faculty preparation to implement active methodologies have been identified as factors that, in some contexts, intensified students' stress (Domínguez-Espinosa *et al*., 2022). Recent evidence also shows that active practices can heighten anxiety, particularly when involving fear of negative evaluation or forced participation, such as in cases of cold-calling (Downing *et al*., 2020; Hsu *et al*., 2021). This ambivalence highlights

the need for careful implementation, accompanied by institutional support and ongoing faculty development.

4.2 Engagement, social support, and academic resilience

In addition to mitigating psychological symptoms, the literature shows that active methodologies foster protective dimensions of mental health, such as engagement, sense of belonging, and resilience (Oliveira & Ribeiro, 2023; Oliveira, Stahnke, Horta & Costa, 2024). By stimulating cooperation and teamwork, problem-based learning and collaborative projects strengthen social support networks among students, which are widely recognized as protective factors against anxiety and depression (Conceição *et al*., 2019; Freitas *et al*., 2023).

Academic engagement, understood as the combination of vigor, dedication, and absorption in learning activities, was also found to be strengthened. Gamification, in particular, was associated with intrinsic motivation and enjoyment of learning, key elements in maintaining balanced mental health in the face of medical training pressures (Wang *et al*., 2025; Domínguez, Mora & Restrepo, 2023). This positive dimension contrasts with traditional approaches centered on unidirectional content transmission, which are often associated with demotivation and emotional strain (Graner & Cerqueira, 2019).

Finally, it is worth noting that active methodologies stimulate the development of socioemotional skills and adaptive coping strategies, both fundamental to resilience throughout medical training (Freitas *et al*., 2023). The ability to deal with frustration, recognize limitations, and develop emotional self-regulation skills emerges as an indirect but significant outcome of active learning (Oliveira, Stahnke, Horta & Costa, 2024). This characteristic positions these methodologies not only as pedagogical tools but also as preventive and health-promoting strategies in medical education.

5. CONCLUSIONS

This study aimed to analyze, through an integrative literature review, the relationship between active learning methodologies and the mental health of medical students. The findings indicate that strategies such as problem-based learning, clinical simulation, gamification, and collaborative projects have a positive impact on reducing stress, anxiety, and burnout symptoms, while also promoting engagement, social support, and greater academic resilience. At the same time, gaps were identified related to the lack of methodological uniformity and the risk of increased overload when practices are implemented in a fragmented manner.

The contributions of this study lie in recognizing active learning methodologies not only as pedagogical resources but also as tools for promoting mental health in the context of medical education. Valuing student protagonism, strengthening support networks, and developing socioemotional skills emerge as elements that favor meaningful learning and improve students' quality of life. In this sense, the incorporation of innovative pedagogical practices may represent a

promising pathway to balance academic excellence with psychological well-being, dimensions that are inseparable in the training process.

Despite the advances identified, this review presents limitations inherent to its methodological design, such as the diversity of criteria in the studies analyzed, the lack of comprehensive longitudinal trials, and the predominance of research conducted in international contexts, which may limit the generalization of findings to specific realities, such as Brazil and Latin America. Future research should therefore deepen the analysis of the long-term effects of active methodologies on mental health, as well as explore curricular implementation strategies that minimize overload risks and maximize pedagogical and psychological benefits.

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