

# Learning strategies and mental health in higher education: A systematic review (2019–2024)



Verónica Adriana Freire-Palacios<sup>a</sup>   | Lisbeth Carolina Escobar-Armijos<sup>b</sup>  |  
Yesseña Jacqueline Romero-Acosta<sup>c</sup> | Dora Marcela Lliguisupa-Pastor<sup>c</sup>

<sup>a</sup>Grupo de Investigación Bienestar Psicológico, Facultad de Ciencias de la Salud, Universidad Nacional de Chimborazo, Riobamba, Ecuador.

<sup>b</sup>Facultad de Ciencias de la Salud, Universidad Nacional de Chimborazo, Riobamba, Ecuador.

<sup>c</sup>Facultad de Ciencias de la Educación, Sociales, Filosóficas y Humanísticas, Universidad Estatal de Bolívar, Guaranda, Ecuador.

**Abstract** Introduction: University students face high academic stress, social demands, and unequal institutional resources that jeopardize psychological well-being. Learning-oriented approaches are increasingly promoted as preventive supports. Objective: To synthesize evidence on how instructional strategies relate to mental health outcomes in tertiary students. Methods: We conducted a systematic review following PRISMA 2020, searching PubMed, Scopus, Web of Science, and ERIC for 2019–2024 studies. Inclusion required empirical evaluation of a defined strategy and at least one mental-health-relevant outcome. Screening and eligibility proceeded in two stages (titles/abstracts and full texts) after duplicate removal. We summarized outcomes on stress, anxiety, burnout, self-confidence, persistence, and emotion regulation; findings were integrated narratively because interventions and measures were heterogeneous. Results: From 555 records, 20 studies met criteria. Strategies clustered into multimodal approaches; self-regulation frameworks; resilience and academic buoyancy programs; and technology-mediated interventions, including AI-supported tools. Across studies, interventions commonly reduced academic stress, anxiety, and burnout and improved self-regulation, persistence, and emotion regulation. Multimodal and self-regulation-based approaches were frequently associated with better academic performance and lower psychological distress. Online and hybrid delivery tended to foster autonomy and time management, whereas in-person formats supported collaboration and critical thinking. AI-enabled personalization contributed indirectly by increasing engagement, timely feedback, and adaptive pacing. Conclusion: Integrating evidence-based strategies into institutional programming can yield concurrent benefits for mental well-being and academic success. Implications: Universities should scale structured self-regulatory supports, train staff in resilience-focused pedagogy, and evaluate AI-assisted tools with attention to equity, privacy, and transparency. Future research should employ longitudinal, cross-cultural designs and standardized psychological measures to clarify durability and generalizability of effects.

**Keywords:** self-regulation, academic buoyancy, psychological distress, burnout, AI-enabled personalization, digital interventions

## 1. Introduction

The mental health of university students has become a growing concern in both the educational and public health fields. The transition to higher education involves multiple psychosocial demands: academic pressure, adaptation to new learning environments, uncertainty about the future, and, frequently, insufficient psychological support. These conditions have contributed to an increase in emotional disorders, mainly anxiety and depression, which affect not only academic performance but also students' ability to adapt and remain within the university system (Morales et al., 2020). Consequently, it is urgent to identify educational strategies that address both the cognitive needs and the emotional needs of this population simultaneously.

This situation worsened during the COVID-19 pandemic, when the abrupt shift to online modalities exacerbated isolation, academic workload, and emotional stress, particularly among "Generation Z" students, who value interaction and emotional support in learning processes (Li et al., 2022). Despite this adverse context, many students demonstrated resilience when supported through adaptive and emotionally intelligent teaching methods. These experiences underscore the need for educational systems that not only transmit knowledge but also promote mental health and holistic well-being. Furthermore, this challenge is not merely circumstantial but also structural, requiring sustainable and culturally adapted interventions in contemporary universities.

In this context, learning strategies have emerged as promising interventions. They are not limited to enhancing cognitive outcomes but also involve pedagogical processes that foster self-regulation, resilience, and interpersonal competence (Liu, 2019). Unlike learning styles, which are understood as relatively stable preferences for processing information, learning strategies are deliberate, flexible, and adaptive methods that students use to acquire, organize, and apply knowledge. This



distinction is essential, as it highlights the intentional and dynamic nature of strategies such as educational interventions aimed at promoting university students' mental health (Morales et al., 2020).

Despite the growing interest in this intersection between education and mental health, systematic evidence on the effectiveness of learning strategies intentionally applied to improve psychological outcomes in higher education remains limited (Zajac et al., 2024). Therefore, this study aims to synthesize the available empirical evidence, analyze the extent to which these strategies help reduce academic stress, strengthen self-esteem and resilience, and foster students' emotional well-being (Ramírez et al., 2021). Moreover, it seeks to identify institutional and pedagogical factors influencing the effectiveness of these strategies, offering an integral and comparative perspective across different university contexts.

More specifically, this study addresses three central research questions: (1) How effective are learning strategies in reducing academic stress among university students? (2) In what ways do these strategies influence self-esteem, resilience, and emotional well-being over time? (3) How do institutional type and pedagogical approaches impact the effectiveness of these strategies in promoting students' mental health? These questions guide the systematic review and provide a conceptual framework that integrates dispersed findings and generates broader conclusions of academic value.

Addressing these questions will not only clarify the impact of learning strategies on students' mental health but also provide practical guidelines for their implementation in institutional well-being programs (Ubago et al., 2024). Additionally, the emerging role of artificial intelligence and other educational technologies is acknowledged as innovative resources that can enhance the personalization and cultural adaptation of interventions, thereby broadening their benefits for students' holistic development. In this way, the present study fills a gap in the literature by offering a critical, structured, and updated vision of the relationship between learning strategies and mental health in contemporary higher education.

### *1.2. Learning strategies versus learning styles*

Research in educational psychology has long distinguished between learning styles and learning strategies. While styles refer to relatively stable preferences in how individuals process information, strategies are understood as deliberate, adaptive, and flexible actions that can be taught and modified. According to Vinuesa and Cepeda (2025), unlike styles, strategies are intentional and pedagogically malleable. This distinction is crucial because it highlights the potential of strategies not only to improve cognitive learning outcomes but also to impact socioemotional dimensions, such as self-regulation, resilience, and psychological well-being.

### *1.3. University students' mental health and associated factors*

University life represents a critical developmental stage for young adults, involving high academic demands, social adjustment, and professional decision-making. In this context, mental health is often compromised, with increasing prevalence rates of anxiety, depression, and academic stress (Ortiz et al., 2019). The contributing factors include a lack of institutional support, performance-related pressure, and uncertainty about future employment. Recent studies have shown that students who possess effective coping strategies and receive adaptive pedagogical support display greater resilience and emotional balance. This emphasizes the need to consider mental health as a cross-cutting objective in higher education programs rather than a peripheral concern.

### *1.4. Learning strategies as interventions for mental health*

Several studies have demonstrated that the implementation of specific learning strategies can reduce symptoms associated with psychological distress in university contexts. Notable examples include mindfulness practices, self-regulation techniques, cooperative learning programs, and peer-tutoring methods. These interventions have been shown to decrease stress, anxiety, and depression while enhancing self-esteem and academic motivation (Estrada et al., 2019). Importantly, such strategies not only strengthen academic performance but also contribute to holistic well-being by fostering socioemotional skills that extend beyond the immediate educational environment.

### *1.5. Artificial intelligence and emerging educational technologies*

In recent years, artificial intelligence (AI) and other emerging technologies have gained increasing attention in the personalization of learning strategies. Adaptive learning platforms, educational chatbots, and intelligent tutoring systems provide flexible and tailored support aligned with students' individual needs. The evidence suggests that these tools not only enhance content acquisition but also may reduce academic stress and offer emotional support (Liu, 2019). However, their implementation raises ethical challenges, including data privacy and potential technological dependency. Despite these concerns, their potential to transform the relationship between learning and mental health represents a promising avenue for future research.

## **2. Materials and Methods**

This study was conducted as a systematic literature review, following the PRISMA 2020 statement to ensure rigor, transparency, and reproducibility. This research evaluated the impact of learning strategies on the mental health of higher education students. From this scope, research questions were formulated, eligibility criteria were defined, and data extraction strategies were designed. In addition, a bibliometric analysis was carried out, considering the number of publications by year, country, and database, in line with the methodological approaches used in previous systematic reviews (Bolinski et al., 2020).

### 2.1. Research questions

The research questions, presented in Table 1, were structured around three fundamental axes: (1) the effectiveness of learning strategies in reducing academic stress, (2) their impact on self-esteem and emotional well-being, and (3) the comparison of strategies across different institutional and pedagogical contexts.

**Table 1** Research questions.

Question	Reason
How effective are learning strategies for reducing academic stress in university students?	To analyze the effectiveness of learning strategies in reducing academic stress among university students.
How do interventions based on learning strategies affect students' self-esteem and emotional well-being over time?	How do interventions based on learning strategies affect students' self-esteem and emotional well-being over time?
How do institutional type and pedagogical approach influence the effectiveness of learning strategies to improve university students' mental health?	To determine how institutional context and pedagogical approach affect the effectiveness of strategies to improve mental health.

### 2.2. Eligibility criteria

Eligibility criteria ensured the methodological rigor and relevance of the included studies. They focused on design, participants, interventions, outcomes, and the publication period. Studies not meeting these requirements were excluded to limit bias (Rethlefsen & Page, 2022). The detailed criteria are summarized in Table 2, which guided the screening and selection of the articles.

**Table 2** Inclusion and exclusion criteria by category.

Category	Inclusion	Exclusion
Study design	Studies implementing interventions based on learning styles to measure their impact on mental health, including RCTs, quasiexperimental, cohort, and pre-post studies.	Research without a control group or experimental or quasiexperimental design, such as case studies, cross-sectional studies, nonsystematic reviews and correlation studies without intervention.
Participants	College students between the ages of 18 and 30 enrolled in higher education programs	Participants who are not college students or who are outside the specified age range.
Intervention	Strategies designed for different learning styles conducted in academic or clinical settings, both individually and in groups.	General interventions that are not specific to learning styles or conducted in academic or clinical settings.
Measuring Results	Studies that use standardized measures to assess anxiety, depression, or stress.	Studies that use nonstandardized measures or that do not report comparable quantitative results.
Publication date	Studies published during the last 5 years in English or Spanish.	Studies published outside the period or in a language other than the established one.

The databases used were PubMed, Scopus, Web of Science and ERIC. In addition, we consulted clinical trial registries and reviewed reference lists of studies with the most relevant information on the topic.

### 2.3. Search strategy

The literature search was performed via Boolean operators and MeSH terms to retrieve studies published between 2019 and 2024 in English or Spanish. The databases used included PubMed, Scopus, Web of Science, and ERIC. Additional sources included clinical trial registries and backward reference screening of key articles. Keywords were as follows:

- ("learning strategies" AND "mental health" AND "college students")
- ("academic stress" OR "anxiety" OR "emotional well-being")
- ("intervention programs" AND "higher education")
- ("Adaptive learning" OR "experiential learning" AND "health education")
- ("artificial intelligence" OR "intelligent tutoring systems" AND "mental health" AND "higher education")



To improve accuracy and completeness, thematic and date filters were applied within each database. This combined approach ensured that both empirical studies and innovative interventions were captured in the review (Torres, 2023).

### 2.4. Data collection and selection process

A total of 555 records were initially identified. After removing duplicates (n=120), 435 records remained. Of these, 310 were excluded at the title/abstract level. The remaining 105 studies underwent full-text review, and 20 studies met all eligibility criteria. The process is summarized in the PRISMA flow diagram (Figure 1).

Data extraction was conducted independently by two reviewers via a standardized Excel template, which organized information on the intervention type, participant characteristics, outcomes measured, and reported impact. Discrepancies were resolved by consensus with a third reviewer. Methodological quality was assessed via the CASP and JBI checklists, and studies were classified as high, medium, or low quality. A bibliometric analysis with VOSviewer 1.6 was also performed, mapping keyword cooccurrences and research collaboration networks.

## 3. Results and Discussion

### 3.1. Study selection

A total of 555 records were identified through the database search. After removing duplicates (n = 120), 435 records remained for screening. Of these, 310 were excluded on the basis of title and abstract review. The remaining 105 articles underwent full-text screening, and 20 studies met all eligibility criteria and were included in the final synthesis. The study selection process is illustrated in the PRISMA 2020 flow diagram (Figure 1).

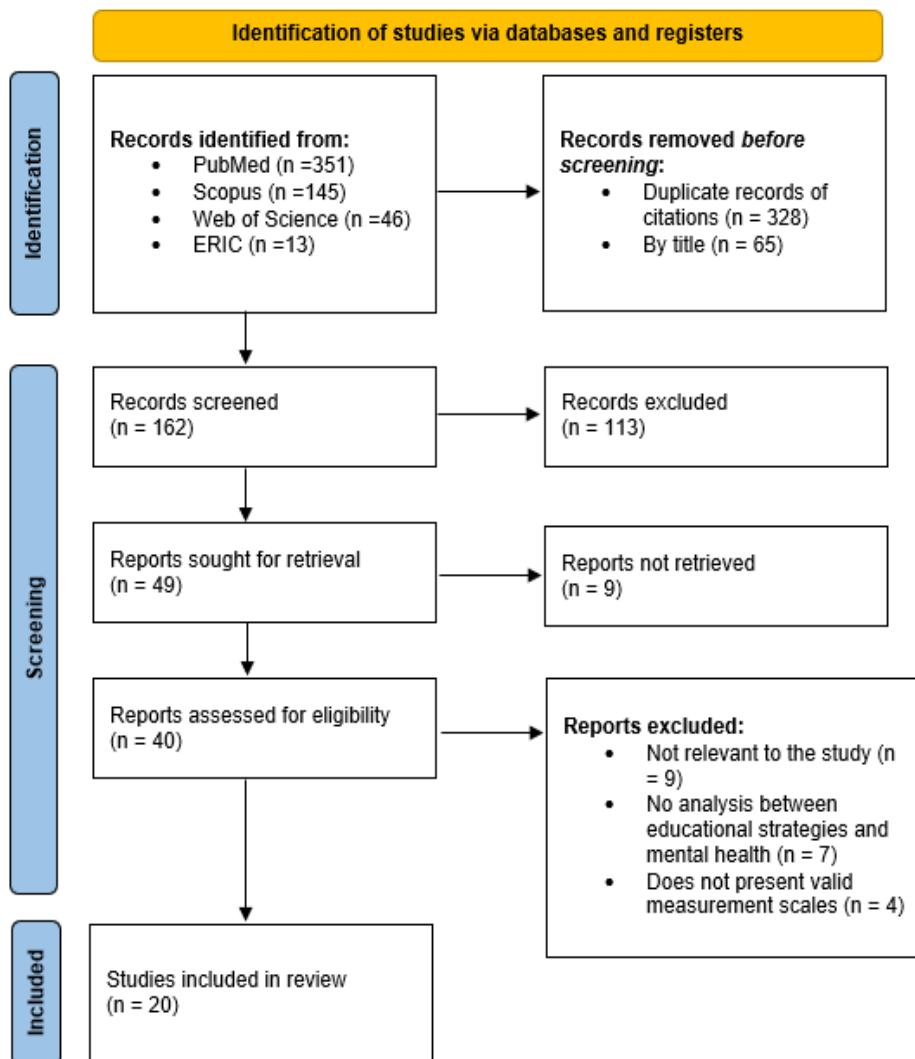


Figure 1 PRISMA flowchart.

The selected articles contained useful information from research on intervention strategies, learning styles, mental health, academic stress, emotional well-being, and student self-esteem.





**Table 4** General characteristics of the studies.

Author(s) and Year	Objective	Strategy Type	Description of the Intervention	Duration Frequency	Measuring Instruments	Results/Impact
Liu, (2019)	To examine the impact of a mindfulness program (MBCT) on the mental health of Chinese university students.	Visual, auditory	8-week MBCT program with group sessions and home practices.	2.5 h per week + 30–60 mins per day	SCL-90	Reduction of anxiety, depression and somatization ( $p < 0.01$ ).
Estrada et al., (2019)	To relate learning styles with emotional intelligence in university students.	Cognitive and emotional	Adapting Whole Brain Diagnostics and TMMS-24	Unspecified	TMMS-24, Diagnosis of the Whole Brain	Right dominance improves emotional intelligence.
Ortiz et al., (2019)	To evaluate the effect of cognitive-behavioral workshops and yoga on mental health in medical students.	Visual, auditory, kinesthetic	Cognitive-behavioral workshop and yoga workshop	Unspecified	BAI, BDI, Noack Stress Profile	Significant reduction in anxiety and depression ( $p < 0.005$ ).
Laverde Gonzalez & Rodríguez (2025)	Customize learning paths in LMS with AI and PBL.	Visual, auditory, kinesthetic	Platform with neural networks and adapted content.	Unspecified	Kolb test, evaluation rubric	Improved academic performance through personalization.
Vinueza & Cepeda (2025)	Describe strategies for lifestyle change.	Visual, auditory, kinesthetic	Educational strategies on healthy habits.	Unspecified	Surveys, questionnaires	Promotion of healthy habits and cardiovascular health.
Zajac et al., (2024)	To relate mental health treatment to university dropouts.	Indirect clinical intervention	Follow-up of users of mental health services.	Unspecified	Administrative records	Increase in school dropout among those receiving treatment.
Morales et al., (2020)	Evaluate training in social and emotional skills.	Visual, auditory	Group sessions with practical exercises.	10 weeks	CHASO, EIE	Improvement in self-confidence and reduction of social anxiety ( $p < 0.01$ ).
Ubago et al., (2024)	To analyze the impact of emotional intelligence and academic self-concept.	Psychoeducational	Psychological evaluation applied to university students.	Unspecified	TMMS-24, AF5	Improved psychological well-being.
Canizales et al., (2020)	Explore the relationship between learning styles and classroom environment.	Visual, auditory, kinesthetic	Teaching adapted to learning styles.	Unspecified	Questionnaires, observation	Emotional well-being and less academic stress.

Orji & Vassileva (2023)	Evaluate predictive models of motivation and academic performance.	Motivational and self-regulating	Computational models with machine learning.	Unspecified	Self-reported data	Lower academic anxiety associated with better performance.
Ramírez et al., (2021)	Identify learning styles with AI.	AI personalization	Clustering algorithms and decision trees.	Unspecified	ML, quizzes	Personalization of learning reduces academic anxiety.
Dai et al., (2022)	To evaluate mindfulness in nursing students during the pandemic.	Visual	MLWC program focused on emotional resilience.	6 weeks, 2 sessions/week	DASS-21, FFMQ, PSSS, TAM	Reduced anxiety and stress; greater perceived social support.
Gogoi et al., (2022)	Stress management course in engineering students.	Visual, kinesthetic	Course with theory, breathing and teamwork.	12 weeks	Personality quizzes and tests	Improvement of the general emotional state ( $p < 0.05$ ).
Shimizu et al., (2022)	Compare collaborative online vs. face-to-face learning.	Visual, auditory	Clinical reasoning classes in both settings.	1 semester	SOCS, Focus Groups	Greater social interdependence in online mode.
Li et al., (2022)	Formulate effective strategies for nursing internships.	Visual, auditory, kinesthetic	Clinical teaching adapted to learning styles.	4 weeks	Kolb (KLSI 3.1), HCAT	Improvement in clinical competence ( $p < 0.01$ ).
Huang et al., (2023)	To analyze the prevalence of depression and associated factors in engineering students.	Visual, auditory	Cross-sectional study with OI-D subscale.	Not applicable	OI-D	35.3% have depression; neuroticism, self-esteem and social skills are influential.
Feng et al., (2020)	Examine the relationship between learning styles and volitional strategies.	Visual, auditory, kinesthetic	Strategies applied in groups during a semester.	1 semester	CHAEA, IEVA	Increased use of self-efficacy and reflective style.
Gandarillas et al., (2024)	To study diversity and its psychosocial predictors.	Visual, auditory, kinesthetic	Active methodologies with collaborative sessions.	1 semester	DinL, ENPI	Improved self-regulation and reduced academic stress.
Seppälä et al., (2020)	Evaluate three college wellness programs.	SKY, IE, MBSR	8-week interventions with specific techniques.	8 weeks	Pre and Post Questionnaires	Reduction of stress and depression; Greater mindfulness and social connection.
Taboada et al., (2019)	To evaluate the relationship between goal orientation and	Motivational (focus/avoidance)	Evaluation of perception of academic stressors.	Unspecified	Motivation and stress questionnaires	Avoidance orientation increases academic stress.

perception of academic stress.

The results of the review show that learning strategies with a focus on emotional, cognitive, and behavioral development have a positive effect on the mental health of university students. Interventions based on cognitive therapy and mindfulness Dai et al., (2022) significantly reduce symptoms such as anxiety, depression, and somatization. Similarly, programs focused on social and emotional skills (Morales et al., 2020), as well as those that promote learning style recognition and emotional intelligence (Estrada et al., 2019), reported improvements in self-confidence, self-regulation, and psychological well-being. Multimodal strategies, which integrate visual, auditory, and kinesthetic styles, are especially effective in adapting to students' diverse preferences (Canizales et al., 2020).

On the other hand, emerging technologies and artificial intelligence also bring relevant benefits in the personalization of learning and the improvement of academic performance, which indirectly contributes to better mental health. Studies (Laverde & Rodríguez, 2025) highlight the use of virtual platforms and machine learning algorithms to adapt content to individual learning styles, which reduces cognitive overload and academic anxiety. In addition, structured wellness programs (Seppälä et al., 2020) have improved mindfulness and social connection, key factors for the prevention of stress and depression. However, potential risks, such as a greater probability of dropping out of school among students receiving psychological treatment, have also been identified (Zajac et al., 2024), which highlights the need to integrate preventive strategies within the university educational environment.

On the basis of the analysis of the results, it has been determined that the largest number of studies use intervention strategies based on visual, auditory and kinesthetic learning styles together, whereas the remaining studies have focused specifically on the application of one or two strategies.

The figure 3 shows the number of studies that use each of the strategies on the basis of learning styles. On this basis, 35% (7 of 20) (A3, A4, A5, A9, A15, A17 and A18) of the studies used visual, auditory and kinesthetic strategies together. On the other hand, 20% (4 out of 20) (A1, A7, A14 and A16) use only visual and auditory strategies, and the other 45% (9 out of 20) (A2, A6, A8, A10, A11, A12, A13, A19 and A20) use specific strategies.

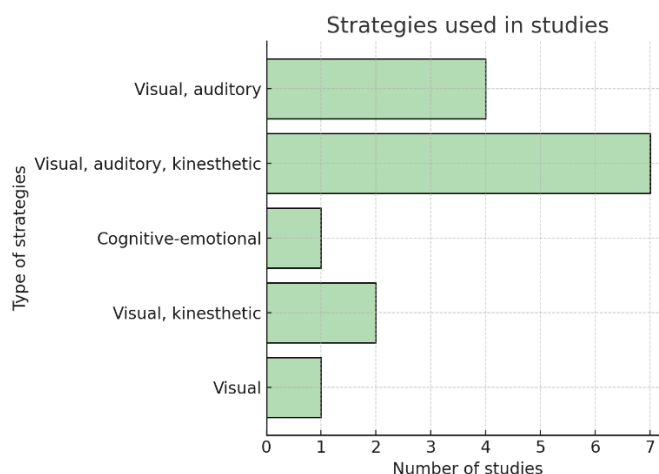


Figure 3 Types of strategies used by each study.

For the measurement instruments, the most common are the Beck Inventories for Anxiety (BAI) and Depression (BDI) and the Honey and Alonso Learning Styles Questionnaire (CHAEA), each used in 3 studies. Other instruments used include the Symptom Checklist 90 (SCL90), the Trait-Meta-24 Mood Scale (TMMS-24), the Social Skills Questionnaire (CHASO), the Depression, Anxiety, and Stress Scale (DASS-21), the Kolb Learning Styles Inventory (KLSI 3.1), the Academic Volitional Strategies Inventory (IEVA), and the Social Interdependence in Collaborative Learning Scale (SOCS). Figure 4 shows the distribution of the types of strategies and measurement instruments used in the studies.

### 3.5. Learning strategies and reduction of academic stress

The evidence from this review confirms that learning strategies are effective in mitigating academic stress among university students, a recurring problem that compromises both performance and retention (Djiwandono, 2024). Out of the 20 included studies, the majority reported significant decreases in anxiety, perceived stress, and burnout symptoms following interventions such as multimodal learning strategies and self-regulated learning frameworks. These findings reinforce prior meta-analyses on e-mental health and psychosocial programs showing positive outcomes for stress management in higher education (Zingoni et al., 2024). By diversifying the ways in which students process academic demands, multimodal strategies provide flexible tools that support adaptation and reduce stress in challenging environments (Siira et al., 2024).





Figure 4 Types of strategies used by each study.

Moreover, the combination of online and face-to-face modalities appears to offer synergistic benefits. Hybrid designs promoted autonomy and time management, while in-person interactions enhanced collaboration and reduced isolation, particularly relevant in the post-pandemic context (Chacón et al., 2024). These findings highlight that learning strategies do not operate in a vacuum but are influenced by the mode of delivery and the broader social environment. Interventions that acknowledged students’ social and emotional needs demonstrated stronger protective effects against stress and anxiety, aligning with calls for pedagogical innovation that integrates cognitive and affective dimensions (Leyland & Choucri, 2024).

Nevertheless, limitations must be acknowledged. A large proportion of the studies relied on quasi-experimental designs and diverse assessment instruments, which complicates comparability and the potential for meta-analytical synthesis. In addition, most interventions were short-term, limiting the understanding of the durability of effects (Yue et al., 2024). To strengthen causal claims, future research should adopt longitudinal randomized controlled trials in culturally diverse contexts (Ben et al., 2024). Despite these challenges, the evidence provides consistent support for the hypothesis that learning strategies serve as effective buffers against academic stress, reinforcing the importance of integrating them into institutional well-being programs (Moulton et al., 2024).

### 3.6. Effects on self-esteem, resilience, and emotional well-being

The second research question focused on how learning strategies shape students’ self-esteem, resilience, and emotional well-being. The review identified consistent benefits, particularly from programs based on resilience training, buoyancy frameworks, and emotional intelligence (Chacón et al., 2024). Such interventions fostered greater persistence, self-confidence, and capacity for emotion regulation, contributing to improved academic trajectories. This aligns with prior evidence indicating that socio-emotional competences play a pivotal role in both academic adjustment and psychological well-being in higher education (Stinson et al., 2024). By addressing the emotional dimension, learning strategies extend beyond academic enhancement to the promotion of holistic student development (Diert & Moncada, 2024).

Multimodal approaches, in particular, were repeatedly linked to improvements in self-perceptions of competence and adaptability. Combining visual, auditory, and kinesthetic inputs strengthened engagement and inclusivity, offering protective factors against anxiety and low self-esteem (Batat, 2024). These results resonate with the inclusive learning literature, which suggests that providing varied and adaptive pathways enhances students’ sense of belonging and academic identity. Emotional well-being was especially supported when strategies were framed within collaborative contexts that emphasized interpersonal connections, reinforcing resilience and buffering against mental health difficulties (Schwerter & Brahm, 2024).

However, methodological and contextual limitations remain evident. Several interventions lacked standardized tools for assessing resilience or self-esteem, making cross-study comparisons difficult (Hanif & Parpio, 2024). Furthermore, many studies were concentrated in specific geographic or disciplinary contexts, which limits generalizability. The scarcity of longitudinal evaluations also prevents a clear understanding of whether gains in resilience and self-esteem are sustained beyond immediate post-intervention assessments (Chalak & Mair, 2024). Addressing these gaps will require broader, culturally sensitive research designs that can illuminate how diverse institutional conditions shape the long-term psychosocial impacts of learning strategies.

### 3.7. Institutional contexts, pedagogical approaches, and the role of AI

The third objective examined how institutional and pedagogical factors condition the effectiveness of learning strategies, particularly in light of the integration of digital technologies and artificial intelligence (AI). Results suggest that universities with explicit well-being policies and flexible pedagogical models achieved more robust outcomes (Tyagi & Krishankumar, 2024). Interventions embedded in supportive institutional frameworks demonstrated greater success in



reducing stress and fostering resilience, underscoring that strategies are most effective when aligned with systemic organizational support (Marsch et al., 2024). Institutional culture thus emerges as a critical determinant of the success of psychosocial and pedagogical innovations.

Emerging technologies, especially AI-based tools, were frequently identified as valuable complements to traditional pedagogies. AI-enabled personalization, adaptive feedback, and predictive analytics supported students' engagement and emotional regulation, indirectly improving mental health outcomes (Steel et al., 2024). Similarly, digital interventions tailored to students' learning styles or mental health profiles showed potential to mitigate dropout risks and foster equity (Cano et al., 2024). However, concerns were raised regarding digital divides, overreliance on automated feedback, and privacy risks, highlighting the necessity for ethical and pedagogically informed integration of AI technologies in higher education.

The synthesis indicates that future interventions must consider both contextual and ethical dimensions to maximize their impact. Universities should not only adopt multimodal and AI-assisted strategies but also ensure equitable access, cultural sensitivity, and transparent use of student data (Dong et al., 2024). Moreover, faculty training emerges as a key factor, as teachers need to acquire competencies to effectively combine traditional and digital pedagogies. Strengthening these dimensions will allow institutions to leverage learning strategies as transformative tools that simultaneously enhance academic achievement and safeguard student mental health in increasingly complex educational ecosystems.

#### 4. Final Considerations

This systematic review confirms that learning strategies, when designed as intentional, personalized, and culturally contextualized interventions, can substantially improve both the mental health and academic performance of university students. Across the studies analyzed, consistent reductions in symptoms of anxiety, depression, and academic stress were observed, alongside improvements in resilience, self-regulation, and self-esteem. These findings highlight the role of pedagogy not only in cognitive development but also in creating healthier, more inclusive, and emotionally sustainable learning environments.

The effectiveness of these strategies depends on their alignment with institutional, cultural, and technological contexts. Universities that adopt flexible, student-centered, and inclusive models, particularly those integrating collaborative, experiential, or digital methodologies, report stronger psychoeducational outcomes. Within this framework, artificial intelligence (AI) has emerged as a key catalyst of educational transformation, providing opportunities for continuous personalization, emotional monitoring, and data-driven decision-making.

Tools such as adaptive platforms, intelligent tutoring systems, and sentiment analysis algorithms enable more precise and proactive responses to student needs. When implemented responsibly, these innovations can foster scalable and ethically sustainable interventions that address the diverse demands of higher education systems. AI should therefore be understood not merely as a technical supplement but also as a strategic ally for building emotionally intelligent ecosystems focused on holistic student well-being.

Future research should evaluate the long-term impact of AI-driven strategies, their scalability across sociocultural contexts, and their implementation under rigorous ethical principles. Key priorities include protecting sensitive data, ensuring algorithmic fairness, and promoting transparency in automated decision-making. In this way, technological advances in education align with human values, rights, and needs, reinforcing the social mission of higher education.

#### 5. Future Lines of Research

Future research should explore the longitudinal impact of personalized and AI-powered learning strategies on mental health and academic performance across diverse cultural and geographic contexts. It is necessary to examine how these interventions maintain their effectiveness in institutions with varying technological and social resources. Likewise, further investigation into the psychological and neurocognitive mechanisms that explain the relationship between educational personalization and emotional well-being is needed. Another crucial area is the ethical analysis of AI use in education, particularly with respect to privacy, fairness, and transparency in automated systems. Finally, the development of standardized instruments to measure psychosocial effects will be essential to enable comparative and scalable implementation of these strategies.

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#### Ethical Considerations

Not applicable.

## Conflict of Interest

The authors declare that they have no conflicts of interest.

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