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Systematic review on the effectiveness of meditation on health occupations students' psychological well-being

Revisión sistemática de la efectividad de la meditación en el bienestar psicológico en estudiantes de ciencias de la salud

Revisão sistemática da eficácia da meditação no bem-estar psicológico de estudantes de ciência da saúde

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Abstract: Meditation is an effective tool to promote psychological well-being and manage stress and psychological distress associated with highly demanding academic, clinical and healthcare situations in academic health contexts. This paper evaluates the impact of meditation-based interventions on the psychological well-being of health occupations students. Controlled clinical trials were searched in the Biblioteca virtual de Salud (BVS), Cochrane Library, Trip Database, Sage Pub, Springer Link, Wiley Online Library, Medline (via PubMed), Europe PMC, ScienceDirect, APA PsycInfo, and ERIC. 651 studies were identified. Thirteen studies that met the inclusion criteria were included. It was found that non-clinical meditation practice, mainly through mindfulness-based interventions, carried out in academic contexts has a positive effect on the psychological well-being and socio-emotional competence of the student body. Long-term benefits depend on students practicing meditation regularly. These findings have implications for health education. They suggest integrating meditation as a preventive approach to improve the psychological well-being of students.
Keywords: psychological well-being; psychosocial intervention; meditation; mindfulness; students; health

Resumen: La meditación es una herramienta eficaz para promover el bienestar psicológico y manejar el estrés y los trastornos psicológicos asociados con situaciones académicas, clínicas y asistenciales altamente demandantes en contextos académicos sanitarios. Este artículo evalúa el impacto de intervenciones basadas en la meditación, en el bienestar psicológico de estudiantes de ciencias de la salud. Se buscaron ensayos clínicos controlados en la Biblioteca virtual de Salud (BVS), Biblioteca Cochrane, Trip Database, Sage Pub, Springer Link, Wiley Online Library, Medline (vía PubMed), Europe PMC, ScienceDirect, APA PsycInfo y ERIC. Se identificaron 651 estudios. Se incluyeron 13 estudios que cumplieron con los criterios de elegibilidad. Se encontró que la práctica de meditación no clínica, predominantemente mediante intervenciones basadas en la atención plena (*mindfulness*), realizadas en contextos académicos tiene un efecto positivo en el bienestar psicológico y en la competencia socioemocional del estudiantado. Los beneficios a largo plazo dependen de que los estudiantes practiquen la meditación regularmente. Estos hallazgos tienen implicaciones para la educación sanitaria. Sugieren integrar la meditación como un enfoque preventivo para mejorar el bienestar psicológico del estudiantado.
Palabras clave: bienestar psicológico; intervención psicosocial; meditación; *mindfulness*; estudiantes; salud

Resumo: A meditação é uma ferramenta eficaz para promover o bem-estar psicológico, administrar o estresse e os transtornos psicológicos associados a situações acadêmicas, clínicas e assistenciais altamente demandantes em contextos acadêmicos sanitários. Este artigo avalia o impacto de intervenções baseadas na meditação para o bem-estar psicológico de estudantes de Ciências da Saúde. Foram buscados ensaios clínicos controlados na Biblioteca Virtual de Saúde (BVS), Biblioteca Cochrane, Trip Database, Sage Pub, Springer Link, Wiley Online Library, Medline (via PubMed), Europe PMC, Science Direct, APA PsycInfo e ERIC. Foram identificados 651 estudos. Foram incluídos 13 estudos que cumpriram os critérios de elegibilidade. Foi encontrado que a prática da meditação não clínica, predominantemente por meio de intervenções baseadas na atenção plena (*mindfulness*), realizadas em contextos acadêmicos, tem um efeito positivo no bem-estar psicológico e na competência socioemocional dos estudantes. Os benefícios a longo prazo dependem de que os estudantes pratiquem a meditação regularmente. Essas descobertas têm implicações para a educação sanitária. Sugerimos integrar a meditação como uma abordagem preventiva para melhorar o bem-estar psicológico dos estudantes.
Palavras-chave: bem-estar psicológico; intervenção psicossocial; meditação; *mindfulness*; estudantes; saúd

Mental health essentially involves a harmony between positive and negative feelings. Since negative emotions cannot be omitted, it refers to promoting the transcendence of positive feelings and coping with negative ones to ensure an ascending trend towards mental well-being (Zollars et al., 2019).

For psychology, well-being has been studied principally from two approaches. The first one focuses on subjective well-being referring to the evaluation of emotional, affective, and cognitive aspects, positive and negative effects, and satisfaction. On the other hand, the second one evaluates optimal human functioning known as psychological well-being, defined as the development of abilities and personal growth. Two psychological traditions have been proposed to explain positive functioning and the subject's well-being. (Zollars et al., 2019).

Mental o psychological well-being ("El bienestar psicológico" in Spanish) Psychological well-being is defined as the degree to which a person judges in positive ways his/her lifetime in general. It is related to being happy, feeling delighted with the possibility of improving personally and socially, and being comfortable with oneself (Rong et al., 2021; Ryff, 1989). In this context, it refers to the degree to which a person positively evaluates their quality of life partially or temporarily, at any given time, globally and structurally throughout their life. Thus, it alludes to how much a person likes the life they lead (Rong et al., 2021; Ryff, 1989).

According to the points of convergence between the proposals of the aforementioned approaches, Ryff (1989) proposed the multidimensional model of psychological well-being "Integrated Model of Personal Development". Six aspects are considered in this perspective's analysis of psychological well-being: self-acceptance, healthy interpersonal relationships, autonomy, environmental mastery, purpose in life, and personal development (Ryff, 1989).

Research on psychological well-being has primarily focused on personal development, overcoming life challenges, and the effort to achieve goals and acquire and develop values that allow them to feel alive and promote personal growth, rather than in engaging activities that generate pleasure and keep them away from pain (Alvarado-García et al., 2019; Henderson, 2021). It has been reported that people who set goals in line with their needs, values, and interests and who report higher levels of perceived satisfaction with the aspects considered in Ryff's multidimensional model have greater levels of psychological well-being (Alvarado-García et al., 2019; Henderson, 2021).

Health sciences coursework is highly demanding and stressful (Abu Bakar et al., 2021). These students must face many challenging circumstances during their scholastic and professional careers (Abu Bakar et al., 2021; Henderson, 2021). According to earlier

research, health students face stress and anxiety due to a variety of stressors, including poor learning environments, a fear of failing, an excessive workload, challenges treating patients, carrying out complicated procedures in confined spaces, difficulty dealing with theory-practice, and preclinical-clinical curriculum transitions, and challenging and problematic relationships with academic and healthcare staff (Abu Bakar et al., 2021; Henderson, 2021).

Likewise, it has been discovered that anxiety and stress increase corticosteroid levels (hormones released during stressful situations), which can affect memory, concentration, and learning. Therefore, high levels of stress and anxiety can make it difficult for students to concentrate and comprehend materials. Due to their interference with concentration and ability to process inputs produced by stress and anxiety, students may have poor cognitive performance in academic situations (Alhawatmeh et al., 2022). Bramlett (2014) analyzed the factors associated with academic performance in the Dentistry program and observed that, in stressful situations, students did not complete their academic performance to satisfactory standards. On the other hand, Chattu et al. (2020) found a significant association between subjective psychological well-being and academic performance of health sciences students.

By recognizing situations that generate concern in their initial stage or the presence of some triggering factors an individual can prevent negative emotions, problems, and feelings that are typically triggered to manage them appropriately. In severe situations, it is usually necessary to seek professional assistance. Treatment options may include traditional techniques (psychopharmaceuticals, cognitive therapy, systematic desensitization, gradual exposure therapy to the phobic element, breathing exercises, and relaxation techniques) or alternative medicine and complementary (music therapy, acupuncture, among others). However, if lifestyles are not changed, bad habits are not broken, and do not learn how to regulate emotions also if they are not treated promptly and appropriately, anxiety can lead to destructive practices (alcohol, tobacco, drug use), hinder productivity, significantly decrease an individual's quality of life, produce negative feelings and serious mental disorders, such as depression (Black & Grant, 2013).

Meditation stands out among the most effective psychological techniques to manage emotions, (Gál et al., 2021; Malheiros et al., 2023; van der Riet et al., 2018). This technique from the ancient Buddhist philosophy has been practiced for over 3,000 years (Wolkin, 2015). The term "Meditation" is broad and encompasses a variety of mental techniques and exercises of concentration, contemplation, and abstraction, leading to greater self-awareness, spiritual enlightenment, and physical and mental health (Henderson, 2021). Psychology defines meditation as the state of consciousness in which the individual suppresses environmental stimuli from his or her thinking so that the mind can concentrate on one thing, producing a state of relaxation and stress relief (Wolkin, 2015).

There are different meditation techniques. In any case, certain minimum conditions are required: a calm place with as few distractions as possible, a specific comfortable posture (sitting, lying, walking, etc.), a focus of attention (a specific word, or bunch of words, an object, or the sensation of breathing), and an open attitude (allowing distractions come and go naturally without judging them) (Henderson, 2021).

Similarly, García Campayo (2022) has released some guidelines for mindfulness coaches that emphasize the need to develop appropriate attitudes in their practice. These recommendations include the authenticity of the trainers, who must be sincere and show vulnerability and compassion which is essential to establishing an environment of trust; and permanent professional training which implies a commitment to continue learning about mindfulness and emotional management techniques. Furthermore, the importance of maintaining a regular personal practice to transmit the information and knowledge effectively following ethical principles to ensure a safe and respectful environment, being adaptable to the needs of the participants, as well as encouraging self-reflection and self-assessment of their performance in the interventions.

According to Kabat-Zinn (1990) the practice of mindfulness requires the following seven attitudes: give, assume a beginner's mentality, assume no judgment, be patient, project confidence, don't force practices or attitudes, seek acceptance, and have a beginner's mindset. These attitudes are equally valuable for developing mindfulness in the professional field and academic contexts.

In general, meditation is used to increase physical calm and relaxation, improve psychological balance (Henderson, 2021), manage emotions to develop psychological and general health and well-being treat physical health problems, such as diabetes, hypertension and reduction of chronic and mental pain symptoms, such as anxiety disorders, depression, eating disorders, addictions (Wolkin, 2015).

In the academic field, meditation is a helpful and efficient tool for developing learning (Shirahatti et al., 2014), improving academic performance (Waters et al., 2015), managing stress, distress, anxiety, and treating some psychological disorders associated with challenging academic, clinical and healthcare situations (Da Silva et al., 2023; Henderson, 2021; McConville et al., 2017), develop concentration, become aware of emotions and produce relaxation, calm and psychological and physical well-being (Da Silva et al., 2023; Wolkin, 2015). In addition, some studies have found that meditation reduces students' perceived stress levels (Alvarado-García et al., 2019; Da Silva et al., 2023; Henderson, 2021), state and trait anxiety (Alvarado-García et al., 2019). However, Waters et al. (2015) discovered that meditation has small effects on students' psychological well-being, social competence, and academic performance in about 60% of interventions. Furthermore, other studies have not found a statistically significant effect of meditation on students' psychological well-being and academic performance (Henderson, 2021), depression, anxiety, and perceived stress (Ko et al., 2018).).

In recent years, numerous studies have been published that evaluate the effect of meditation-based interventions alone or in combination with other therapeutic techniques to improve student's psychological well-being. The increasing number of intervention studies has generated the need to conduct systematic reviews, mainly in English, to synthesize the effectiveness of virtual (Alrashdi et al., 2023; Yogeswaran & El Morr, 2021) and in-person interventions on depression, anxiety, stress, and psychological well-being of health science students (Da Silva et al., 2023; Hathaisaard et al., 2022; Yogeswaran & El Morr, 2021), Dentistry (Abu Bakar et al., 2021; Alzahem et al., 2014), Nursing (van der Riet et al., 2018), health sciences in general (Balasooriya Lekamge et al., 2022; Escobar-Domingo et al., 2021; McConville et al., 2017; O'Driscoll et al., 2021; al., 2017) and university students from other specialties (Alrashdi et al., 2023; Chiodelli et al., 2022; Dawson et al., 2020; Delgado et al., 2023; Gál et al., 2021; González-Valero et al., 2019; López et al., 2021; Worsley et al., 2022;

These researchers found that different techniques based on meditation can reduce, in the short and long term, stress, anxiety, and depression and improve psychological well-being, mindfulness, mood, self-efficacy, and empathy in health sciences students. Furthermore, its effects can remain in the long term (Chattu et al., 2020; Hathaisaard et al., 2022; Repo et al., 2022; Shirahatti et al., 2014; Waters et al., 2015).

Reviews that involve university students predominate without discriminating against the degree they are pursuing. Furthermore, most of these reviews included non-controlled, non-randomized, pre- and quasi-experimental clinical studies, and gray literature, which has implications for the quality of the selected evidence and its findings.

There are only four studies that evaluate interventions aimed at health sciences students: one analyzes virtual interventions for medical students (Yogeswaran & El Morr, 2021), one focuses on yoga and uses some meditation techniques (Escobar-Domingo et al., 2021), two are not sufficiently updated, as they included studies published until 2016 (McConville et al., 2017; O'Driscoll et al., 2017) and one review also included interventions for Social Work and Psychology students (O'Driscoll et al., 2017).

Likewise, reviews on the effect of meditation on the psychological well-being of students published in Spanish (Delgado et al., 2023; Escobar-Domingo et al., 2021; López et al., 2021) suffer from significant methodological errors related to the search, selection, and evaluation of studies, which compromise the quality of the evidence reported. One review was carried out in work contexts (Carmona-Rincón et al., 2023), and another one with secondary-level students (Langer et al., 2015).

Published reviews have observed a high risk of bias, variability, gaps, heterogeneity in effect size, and controversies in the interventions evaluated. Consequently, they suggest conducting more research that considers the sociocultural and demographic differences of students and the particularities of university majors, using physiological measures, longer follow-up evaluations, and larger samples to provide conclusive results on the impact of meditation on the psychological well-being of health students.

Therefore, given the positive impact of meditation on the mental health of university students and the limitations of previous reviews published in Spanish, this systematic review synthesizes the available and updated scientific evidence on the effectiveness of meditation-based interventions on the psychological well-being of health sciences students.

Methods

Protocol & Registration

A systematic search was conducted to identify, evaluate, analyze, and synthesize the findings of randomized controlled clinical studies on the impact of meditation on the psychological well-being of college students. In light of this, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol (Moher et al., 2015) and the Cochrane Library Manual (Higgins et al., 2008) served as guiding principles for the development of the research. On the other hand, the article's framework was based on the PRISMA checklist (Moher et al., 2009). Likewise, the protocol of this systematic review is registered in the PROSPERO database (code: CRD42023438917).

Formulation of the PICO research question.

First, a research question was formulated with the PICO (patients, intervention, comparison, outcome) strategy in mind (Stone, 2002): Based on research published within the last five years, what impact do meditation-based interventions have on the psychological well-being of health science university students? (Refer to Table 1 for criteria and description).

Table 1
Analysis of the PICO question

Criteria	Description
Population	Health Science Students
Intervention	Setting up a program for meditation
Comparison	Without therapy—psychotherapies, complementary therapies, yoga, or physical activity
Outcomes	Mental health, psychological well-being, including anxiety and depression symptoms, fatigue and stress, positive and negative emotions, are measured using standardized scales
Design of the studies	Controlled and randomized clinical trials

Data collection procedure

Search strategies: sources of information. The Virtual Health Library (VHL), Cochrane Library, Trip Database, Sage Pub, Springer Link, Wiley Online Library, Medline

(via PubMed), Europe PMC, Science Direct, APA PsycInfo, and ERIC are among the electronic information sources that can be accessed without requiring an institutional subscription, regardless of the users' academic or professional affiliation. Furthermore, the included articles and the reference list of earlier systematic reviews were manually searched in order to find pertinent studies that might have been missed in the original

Search strategies: descriptors. The search was carried out by combining the following descriptors using the Boolean logical operators AND, OR, NOT in Spanish: Health Sciences student OR Dentistry OR Medicine OR Nursing OR Nutrition OR Psychology OR Pharmacy AND meditation OR Meditation based on mindfulness AND stress OR anxiety OR psychological well-being OR mental health, or in English, health occupations OR medical OR dental OR nursing OR psychology OR pharmacy students AND meditation OR mindfulness-based intervention AND stress OR anxiety OR psychological well-being OR mental health.

Search strategies: search periods. The search for scientific articles was carried out between June and August 2023. Included were articles published in either Spanish or English within the last five years (starting from 2019), regardless of the date when the study was carried out.

Selection strategies: eligibility criteria

The full text of the articles was carefully read to determine whether the interventions met the following eligibility criteria: carried out in health sciences, interventions based on meditation, controlled and randomized clinical studies, with samples of ≥ 30 participants, evaluated with standardized scales, published between 2019 and 2023. Likewise, the following studies were excluded from this systematic review: carried out in areas other than Health Sciences, with observational, documentary designs, mixed or qualitative approach, gray literature, with students diagnosed and/or treated with psychiatric disorders.

Assessment of risk of bias of studies

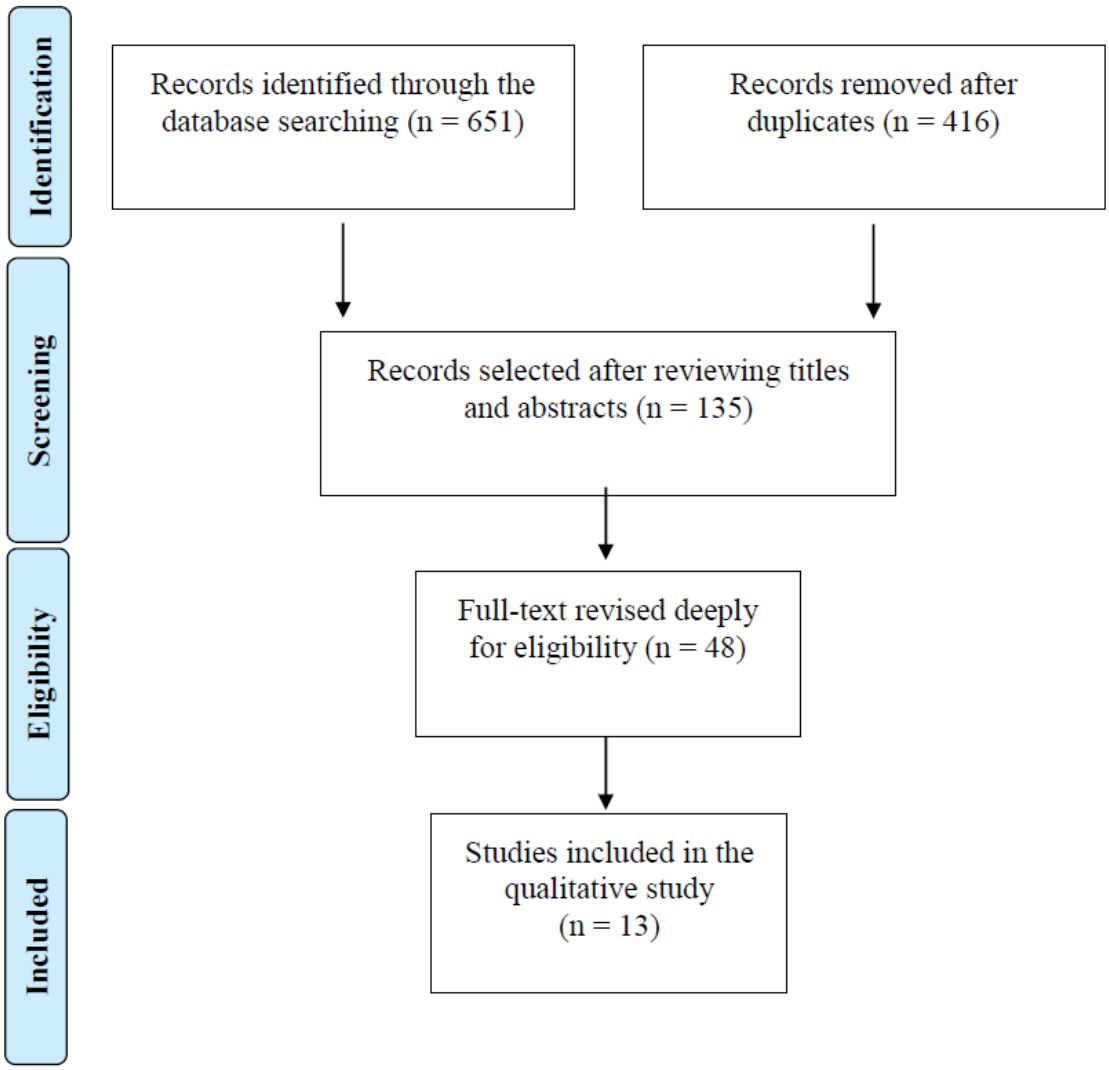
The authors of the present article independently assessed the risk of bias of the included articles based on the Cochrane Library's evaluation tool for experimental clinical studies, which covers random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessors, incomplete presentation of results, selective presentation of data, other sources of bias: sample size, dose, population, bioethical aspects, funding, baseline measurement (Higgins et al ., 2008).

Results

Description of the search and selection studies process

In this review, 651 studies were identified in 10 electronic information sources. After reviewing the titles, abstracts, and keywords of these documents, 135 articles were downloaded for further examination by reading the full text. After removing repetitions and analyzing the relevance of these studies, 48 of them were selected. Finally, the eligibility of this selection was tested and as a result, 13 articles that met the inclusion criteria were added. The flow chart in Figure 1 describes the process of searching and selecting articles in this study, based on the criteria established in PRISMA (Moher et al., 2009).

Figure 1
Flow diagram of the search process and study selection through PRISMA



Risk of bias of included studies

Table 2 shows the results of the bias assessment of the 13 included clinical trials. As can be observed all were assessed with a low risk of bias.

Table 2
Risk of bias assessment of included clinical trials

Risk of bias assessment of included clinical trialsAuthors & year	Random assignment	Allocation Concealment	Blinding of participants and personnel	Blinding of assessment	Incomplete results	Selective presentation of results	Other sources of bias	General Evaluation
Zollars et al. (2019)	*x*	*x*	*x*	√	√	√	√	*x*
Ortiz León et al. (2019)	*?*	√	*?*	√	√	√	*x*	*x*
Oblitas et al. (2019)	√	√	*x*	√	√	√	√	√
De Araujo et al. (2020)	√	*?*	*?*	*?*	√	√	√	√
Lavadera et al. (2020)	√	√	*x*	√	√	√	√	*x*
Neto et al. (2020)	√	√	*x*	√	√	√	√	√
Moore et al. (2020)	√	√	*x*	√	√	√	√	√
Gómez et al. (2021)	√	*?*	*?*	*?*	√	√	√	*x*
Gupta et al. (2021)	√	√	*x*	√	√	√	√	√
Rong et al. (2021)	*?*	√	*x*	√	√	√	*x*	√
Alhawatmeh et al. (2022)	√	*?*	*?*	*?*	√	√	√	√
Repo et al. (2022)	√	√	*x*	√	√	√	√	*x*
Fazia et al. (2023)	√	√	*x*	√	√	√	√	√

Note. √ = low level of bias; X = high level of bias; ¿ = insufficient or unclear information.

Synthesis of the results of the included clinical trials

Table 3 shows that 13 clinical trials were conducted in 10 countries across Asia, Oceania, America, and Europe between 2019 and 2023. This clinical health study involved 1,330 students from different specialties in health sciences: Medicine, Psychology, Nursing, Pharmacy, and Physiotherapy. The sample ranged between 30 and 362 students per study, with an average of 102 participants. All studies evaluated interventions aimed at students over 18 years of age who did not have psychological or medical disorders.

In terms of the modality, in-person workshops are the most common type of intervention. Only three studies assessed virtual meditation modalities (Moore et al., 2020; Repo et al., 2022; Zollars et al., 2019). All included studies compared meditation with a control group without intervention, except for Repo et al. (2022) compared the effectiveness of in-person and virtual meditation with the control without intervention.

The duration of the programs and intervention sessions showed variability. Table 3 shows that sessions ranging from 10 min to 240 min were recorded. The programs, for their part, lasted between 3 and 12 weeks.

About the meditation technique used, interventions based on full attention (mindfulness) predominated. Merely one study (Lavadera et al., 2020) evaluated the combined use of meditation and physical activity.

Variability was also found in the aspects associated with the psychological well-being of the students that were evaluated. Mindfulness, mental well-being, perceived stress, anxiety, depressive symptoms, negative and positive emotions, quality of life, self-compassion, chronic fatigue, self-efficacy, empathy, serum cortisol, and serum C-reactive proteins were assessed. For this purpose, all studies used different standardized psychological scales. Additionally, the presence of serum cortisol and serum C-reactive protein was analyzed (Alhawatmeh et al., 2022; Repo et al., 2022). In general, all the interventions evaluated significantly improved the indicators of students' mental well-being, except for three studies (Alhawatmeh et al., 2022; Neto et al., 2020; Oblitas et al., 2019), which found no differences statistically significant in stress levels, psychological well-being, mental health and quality of life.

Table 3
Synthesis of included studies

Author (year, country)	Objective	Sample and groups	Age	Type of intervention	Duration	Technique used	Evaluated outcome	Measuring instrument	Results
Zollars et al. (2019) EE.UU.	Determine the Effects of Mindfulness Meditation Using the Headspace™ App on Mindfulness, Mental Well-Being, and Perceived Stress in Pharmacy Students	96 Pharmacy students, two groups	18–25	Online	10 min sessions, 4 weeks	Mindfulness	Mindfulness, mental well-being and perceived stress	Health Promoting Lifestyle Profile (HPLP), Five Facet Mindfulness Questionnaire (FFMQ), Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS) and Cohen Perceived Stress Scale (PSS)	The intervention significantly improved mindfulness and mental well-being and reduced perceived stress.
Ortiz León et al. (2019) México	Evaluate whether the interventions of a cognitive behavioral workshop and yoga reduce the symptoms of stress, depression, and anxiety in medical students.	44 Medicine students, two groups	20	Workshop	90 min sessions, 8 weeks	Mindfulness	Anxiety, depressive symptoms, stress	Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), Nowak profile	In both interventions, there was a reduction in symptoms of anxiety and depression, but the cognitive-behavioral workshop group also experienced a decrease in stress.
Oblitas et al. (2019) Perú	Evaluate the effect of mindfulness on academic stress in Psychology students.	54 Psychology Students, two groups	21	Workshop	8 weeks	Mindfulness	Stress	SISCO Academic Stress Inventory	No statistically significant differences were observed in the stress levels of the group that participated in the mindfulness program compared to those who did not receive the training.
De Araujo et al. (2020) Brasil	Evaluate the Effects of a Mindfulness Meditation Course on Health Students' Emotion Management and Kindness.	30 Health Science Students, two groups	22	Course	240 min sessions, 9 weeks	Mindfulness	Perceived stress, mindfulness, negative and positive emotions	Interviews, PSS, Mindful Attention Awareness Scale (MAAS), Positive and Negative Affect Schedule X (PANAS-X), and the WHO-5 Well-being Index	The elective course focused on mindfulness meditation and compassion developed social-emotional, wellness, and self-awareness skills in students, and reduced negative emotions.
Lavadera et al. (2020) EE.UU.	Evaluate the effect of MAP training on the frequency of ruminative thoughts, perceived stress, and quality of life.	61 Medicine students, two groups	24	Training program with meditation and aerobic exercise	90 min sessions, 8 weeks	Mental and physical training (MAP)	Ruminative thoughts, perceived stress, subjective rating of quality of life	Stanford Personal Health Questionnaire Depression Scale (PHQ-8), PSS, Ruminant Response Scale (RRS), Quality of Life Scale (QoLS)	Students who completed the program reported fewer depressive and melancholic symptoms, higher quality of life, and less perceived stress at the end of the training.

Author (year, country)	Objective	Sample and groups	Age	Type of intervention	Duration	Technique used	Evaluated outcome	Measuring instrument	Results
Neto et al. (2020) Brasil	Evaluate the effectiveness of teaching mindfulness techniques on mental health and quality of life.	141 Medicine students, two groups	19	Course	120 min sessions, 6 weeks	Mindfulness	Mental health, quality of life	Quality of life (WHOQOL-Bref), stress, anxiety, and depression (DASS21), and FFMQ indices	Measures of FFMQ, quality of life, and mental health did not significantly improve in the intervention group when compared to the control group.
Moore et al. (2020) Australia	Determine the effectiveness of an online mindfulness training program on the perceived stress and self-compassion of rural students.	46 Medicine students, two groups	27	Brief online mindfulness training program (MTP)	8 weeks	Mindfulness	Perceived stress, self-pity.	PSS, Self-Compassion Scale (SCS), Compassion Scale (CS)	There was a statistically significant reduction in perceived stress levels and a significant increase in self-compassion at the 4-month follow-up.
Gómez et al. (2021) México	Determine the effectiveness of a holistic intervention in improving self-assessment of their quality of life and fatigue.	110 Health Science students, two groups	25	Workshop	4 weeks	The holistic approach to well-being	Quality of Life, Chronic Fatigue	WHOQOL-BREF, Multidimensional Fatigue Inventory (MFI-20)	A significant improvement was observed in the dimensions related to quality of life and prolonged fatigue of the workshop participants.
Gupta et al. (2021) India	Evaluate the effectiveness of mantra meditation on baseline stress levels.	30 Medicine students, two groups	21	Workshop	20 min sessions, 3 weeks	Mantra Meditation	Stress	Perceived stress, autonomic function tests (HRV and GSR)	The mantra meditation program is effective in controlling stress in medical students with moderate or high stress
Rong et al. (2021) China	Evaluate the effectiveness of a mindfulness intervention in improving the mental health and empathy of medical students.	146 Medicine students, two groups	21	Course	12 weeks	Mindfulness	Self-efficacy, quality of life, depression, fatigue and empathy	General Self-Efficacy Scale (GSE), Medical Outcomes Study Short Form 8 (SF-8), PHQ-9, Maslach Burnout Inventory (MBI), and Jefferson Scale of Empathy-Health Care Provider (JSE-HPS)	The intervention group showed statistically significantly better scores on all scales, except for the depression rate, which was fundamentally lower.
Alhawatmeh et al. (2022) Jordania	Examine the effects of meditation on mindfulness, perceived stress, serum cortisol, and serum C-reactive proteins (CRP) in nursing students.	108 Nursing students, two groups	>18	Workshop	30 min sessions, 8 weeks	Mindfulness	Mindfulness, perceived stress, serum cortisol, and serum C-reactive proteins	MAAS, PSS, ELISA method for blood testing for biomedical markers	Mindfulness meditation was effective in decreasing serum cortisol levels and perceived stress. Also, CRP decreased and mindfulness increased, although the results did not reach statistically significant levels.

Author (year, country)	Objective	Sample and groups	Age	Type of intervention	Duration	Technique used	Evaluated outcome	Measuring instrument	Results
Repo et al. (2022) Finlandia	Evaluate the effects of mindfulness meditation on stress and psychological well-being of students.	102 Health Science students, three groups	>18	Virtual workshop vs in-person workshop	30 min sessions, 8 weeks	Mindfulness	Stress, psychological well-being	Clinical outcomes on routine evaluation outcome measure (CORE-OM), cortisol levels measured from hair samples	Mindfulness meditation can mitigate students' psychological distress, but only if they continue practicing meditation at least twice a week
Fazia et al. (2023) Italia	To evaluate the effectiveness of a mindfulness-based intervention in reducing anxiety, emotional distress, and stress levels	362 Medicine students, two groups	19–52	Workshop	5 weeks	Mindfulness	Anxiety, emotional discomfort and stress	PSS, state anxiety (STAIX-1), WEMWBS, mind wandering (MW-S), PANAS, emotional regulation (DERS), resilience (RS-14), and attention control (ACS-C and ACS-D)	The intervention was effective in reducing perceived stress, the tendency to mind wander and general distress, improving mental well-being, the ability to maintain attention, emotional regulation, and resilience.

Discussion

It is well known that health sciences students face many stressful situations during their academic and professional training because university programs involve extremely demanding and stressful clinical care (Abu Bakar et al., 2021; Henderson, 2021). Therefore, this systematic review aimed to evaluate the effectiveness of meditation-based interventions on psychological well-being and associated factors in health sciences students.

It was discovered that all studies included in this review found positive effects of meditation-based interventions on the psychological well-being of health sciences students. Although, three studies did not find statistically significant effects (Alhawatmeh et al., 2022; Neto et al., 2020; Oblitas et al., 2019). Thus, our findings are consistent with some reviews, whose results indicated that there was a non-significant impact of mindfulness meditation on depression, anxiety (trait), emotional regulation, mindfulness, affect, blood pressure, and university students' well-being Alrashdi et al., 2023; Dawson et al., 2020).

It appears that practicing mindfulness and other forms of meditation can enhance psychological and social functioning as well as emotional regulation, which can lead to a more outlook attitude towards life and increased psychological well-being (Fazia et al., 2023). According to Chattu et al. (2020), Shirahatti et al. (2014), and Waters et al. (2015), this may have a favorable effect on students' academic performance in the short- and medium-term as well as their professional performance in the long-term.

In line with previous research (Alrashdi et al., 2023; Dawson et al., 2020; Ungar et al., 2022), a variety of didactic approaches were employed, including workshops, guided lessons, and courses with in-person and virtual practice exercises using interactive tools and online communication through communication platforms and social networks. Also coinciding with previous reviews (Alrashdi et al., 2023; Dawson et al., 2020), the included studies found no association between the length of sessions, the modality of the interventions, and the subpopulations of students and their effectiveness. The effectiveness of meditation appears to be independent of the modality and duration of the intervention (Alrashdi et al., 2023; Dawson et al., 2020; Ungar et al., 2022).

The results of this systematic review are in line with previous research on meditation-based interventions and their benefits for healthy medical students (Da Silva et al., 2023; Hathaisaard et al., 2022; Yogeswaran & El Morr, 2021), Dentistry (Abu Bakar et al., 2021; Alzahem et al., 2014), Nursing (van der Riet et al., 2018) and health science students in general (Balasooriya Lekamge et al., 2022; Escobar-Domingo et al., 2021; McConville et al., 2017.

Our findings also coincide with the results of previous studies that evaluated interventions aimed at healthy university students from different majors (Alrashdi et al., 2023; Chiodelli et al., 2022; Dawson et al., 2020; Delgado et al., 2023; Gál et al., 2021; González-Valero et al., 2019; López et al., 2021.

According to the research, there is enough empirical evidence to support the use of mindfulness-based interventions, particularly those that involve practicing present-moment awareness without passing judgment, as a preventive measure for the management of a range of negative emotions and disorders. mental, given that non-clinical settings provide the evidence (Alvarado-García et al., 2019; Da Silva et al., 2023; Henderson, 2021; McConville et al., 2017; Querstret et al., 2020). Its high effectiveness may be due to mindfulness increases the ability to reduce stress levels and symptoms of depression and anxiety. Also, mindfulness meditation, predominant in the present review, has been suggested to increase students' empathy (Gál et al., 2021; Malheiros et al., 2023; van der Riet et al., 2018). Likewise, it improves the self-perception of indicators of psychological well-being, such as perceived stress, self-acceptance, positive relationships, self-regulation, mastery of the environment, purpose in life, and personal growth of students (Ryff, 1989).

Additionally, studies on health sciences students have shown that meditation increases resilience (Fazia et al., 2023). According to several studies (De Araujo et al., 2020; Moore et al., 2020; Rong et al., 2021), the interventions seemed to increase students' self-awareness, self-acceptance, and coping skills, which enhanced their capacity to handle the difficulties that health sciences students frequently face in both their personal and academic lives.

However, students must continue to meditate on their own at least twice a week for the long-term effects to be stable (Hathaisaard et al., 2022; Repo et al., 2022). Furthermore, time and practice are required to perceive improvements in psychological well-being (Da Silva et al., 2023). Therefore, one of

the goals of interventions should be to help students form the habit of meditation as a way to ward against psychological and socioemotional issues and to enhance their psychological well-being.

The lack of consistency in the interventions evaluated regarding the samples, programs, meditation techniques, outcomes, and measurement scales made it impossible to identify the most effective meditation technique. Furthermore, systematic comparisons between different types of meditation practices are very limited. A single study (Repo et al., 2022) contrasted in-person and virtual meditation workshops. Therefore, future contrastive studies controlling the same variables are needed to obtain conclusive results (Waters et al., 2015).

Although the proposed objective was achieved, the present review had some limitations. First, few randomized controlled experimental studies were found. This is because a large part of the interventions to improve psychological well-being published to date use pre-experimental pretest-posttest designs without a control group, due to the ethical impossibility of leaving a group of students without the intervention under evaluation, which would potentially have a positive impact. Likewise, in the field of Nursing, qualitative and mixed studies are usually carried out. Therefore, it is likely that the included studies do not comprehensively represent the use of meditation with health sciences students. Secondly, there is variability in the characteristics of the samples, the sample sizes, the characteristics of the intervention, the outcomes evaluated, and the instruments used to evaluate psychological well-being. These variations could have generated heterogeneous results, which prevent the possibility of generalization. Finally, the sample size of most studies was relatively small, which may limit generalization from the findings.

Conclusions

In general, this systematic review offers compelling evidence that mindfulness-based meditation programs, especially when implemented in non-clinical academic contexts, have a positive impact on psychological well-being and associated factors, perceived and objective, of health sciences students. However, the results should be interpreted and generalized with caution due to the small number of studies included in the review and the variability and limitations of the interventions evaluated.

Unlike conventional meditation, defined as the state of consciousness in which the individual suppresses environmental stimuli from their thinking so that the mind concentrates and produces a state of relaxation (Wolkin, 2015), the mindfulness technique involves taking awareness of the present moment to accept it without judging (Alvarado-García et al., 2019; Da Silva et al., 2023). Both modalities serve to manage a variety of negative emotions and mental disorders (Alvarado-García et al., 2019; Da Silva et al., 2023; Henderson, 2021; McConville et al., 2017; Querstret et al., 2020). However, mindfulness is more effective due to its ability to reduce stress levels and symptoms of depression and anxiety and increase students' empathy (Gál et al., 2021; Malheiros et al., 2023; van der Riet et al., 2018).

Coinciding with previous reviews, this work has important implications for research and university education in health sciences careers (Balasooriya Lekamge et al., 2022; Chiodelli et al., 2022; Da Silva et al., 2023; O 'Driscoll et al., 2017; Yogeswaran & El Morr, 2021). On the one hand, it is necessary to carry out more controlled and standardized clinical trials, which overcome the limitations of this review and those previously published, which can provide robust evidence on the effectiveness of meditation-based interventions. Nevertheless, it would be convenient to incorporate meditation practices into routine, curricular, and extracurricular university activities. Regular meditation practice, regardless of style, can be an effective preventive measure to enhance the psychological and general well-being of health sciences students.

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