

Studies on the impact of meditation on mental health: A critical review

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Summary

The aim of this paper is to contribute to the increased understanding of research methods on meditation as a tool for preventing and improving mental health by addressing the key challenges that research faces.

Different definitions of meditation have been analyzed, and the complexity of the phenomenon, as well as the problems in conceptualization, have been highlighted. It has been emphasized that comparing the results of research is complicated by the fact that meditation encompasses a wide range of practices that differ in techniques, goals, and expected outcomes. A solution to this problem is the operationalization of the type of meditation being investigated and the standardization of protocols.

In addition to this, meditators represent a diverse group of individuals who differ in experience, motivation, and characteristics. Therefore, it is essential to track the characteristics of the participants closely and, when conducting quantitative research, stratify the sample according to relevant characteristics.

Repeated measurements do not always yield the same results, which is attributed to numerous methodological shortcomings and a lack of a theoretical framework. The successful outcomes of meditation are often determined in various ways, so it is necessary to define measurable outcomes that are specific to the research goals.

Given the difficulty of quantifying the subjective experiences resulting from meditation practice, it is beneficial to combine qualitative and quantitative measurements.

Due to the complexity of the meditation phenomenon, research should be interdisciplinary, incorporating knowledge and insights from psychology, philosophy, anthropology, neuroscience, biology, sociology, and comparative studies of cultures and religions.

More high-quality, qualitative, and interdisciplinary research is needed to understand better the process of meditation and its impact on mental processes, personality, and behavior; and subsequently to improve its application in the field of mental health.

Keywords: *meditation, application, research, mental health, critical review.*

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INTRODUCTION

According to the World Health Organization (WHO), mental health is a state of mental well-being that enables people to cope with life stresses, realize their abilities, learn well, work well, and contribute to their community (WHO, Mental Health). Conversely, the same source (WHO, Mental disorders) reports that in 2019, 1 in every eight people, or 970 million people worldwide, were living with a mental disorder, with anxiety and depression being the most common. Mental health is essential from both individual and societal perspectives. It is an undeniable fact that there is no health without mental health based on the complex salutogenic processes (Jakovljević, 2016). Therefore, the question of the impact of meditation practice on mental health is significant because meditation directly improves not only mental but also physical health. It is estimated that there are currently 200-500 million meditators worldwide. This equates to 3.4% to 8.5% of the world's population that is currently meditating, considering only those aged 15 and above (Earthweb, 2024).

Meditation is an ancient mental practice, linked to religious and non-religious traditions and systems in various cultures, which has been formally practiced for over 2,000 years. In the modern era, most people who practice meditation do so to relieve stress and enhance their mental well-being (West, 2016), making meditation an area of interest for the scientific community due to its potential benefits for mental health and cognitive function improvement.

At present, meditation is applied in psychiatry, medicine, health protection and prevention, neuroscience, psychotherapy, counseling, education, the military, corporations, sports, and rehabilitation of prisoners... Studies have reported numerous positive effects of meditation on mental functioning, emotional responses, behaviour, physiological reactions, health, personality traits, adaptive and other potentials, such as creativity (Popadić, 2016).

In light of the above, it is significant to conduct a critical review of studies on the application of meditation in the field of mental health. In view of the increasing

interest in meditation as a potentially beneficial intervention for a wide range of conditions, it is necessary to develop a deeper understanding of how it affects people and what its long-term implications are for mental health and cognitive functions.

THEORETICAL FRAMEWORK

The American Psychological Association (APA) and renowned psychologist, meditation researcher, and meditator Deane Shapiro (Shapiro, 1982) define meditation as a collection of techniques whose common denominator is the conscious attempt to focus attention in a non-analytical manner while maintaining a neutral stance. This means that the meditator does not engage in discursive thoughts or rumination.

Walsh and Shapiro (2006) consider meditation to be a group of self-regulatory procedures aimed at training attention and awareness to improve mental well-being and achieve a higher degree of voluntary control over cognitive processes, as well as the development of specific skills and states such as peace, clarity, and concentration. Do Hun Kang (2012) believes that meditation can be conceptualized as a family of complex practices for exercising the regulation of not only attention but also emotions; practices that have been developed with different goals. Ornstein (1976) argues that the term “meditation” refers to a thoughtful activity aimed at achieving a specific goal, such as reaching “emptiness” or “Nirvana,” or a “state of empty consciousness” – *Nicht-Geistes* (Ibid., p. 116).

Regardless of whether they originate from a religious or non-religious context, meditations are most often divided into two broad categories: concentrative meditations and mindfulness meditations (Goleman, 1988; West, 1990). Eastern authors (Rao, et al., 2008) also mention a third group of meditations – guided meditations. However, they inconsistently apply the classification principle: guided meditations are both concentrative and mindful in this way. Numerous meditations cannot be classified into any of the groups mentioned above: combined meditations, imaginative meditations, meditations for increasing spiritual strength, dynamic meditations, shikan-taza, koans, and contemplative meditations (Vlajkov, 2013).

Procedures characterized as *meditative* are increasingly being applied in health-related fields, but they are not operationally defined, which prevents these procedures from being used in a standardized manner (Cardoso et al., 2016). To overcome this deficiency and enable the use of meditation, Cardoso (Cardoso et al., 2004) suggests that a procedure be defined as meditation if it meets

the following requirements: that it is a specific technique (clearly defined), that it leads to muscle relaxation (at some point in the process), that it leads to “logical relaxation”, that it is a self-induced state, and that it includes the skill of focusing on oneself. However, this operational definition does not apply to all meditative techniques because not all meditations lead to muscle relaxation nor include the skill of focusing on oneself, such as the *Shikan-taza* technique, where the meditator’s task is to sit motionless and upright for hours.

Most definitions mention the characteristics of meditation as a process of cultivating focused attention and maintaining detached awareness — the position of a neutral observer — but this also does not encompass the characteristics of all meditative techniques. One characteristic that is also a feature of meditative practice and is not mentioned in the definitions is that meditation is “a conscious perceptual, cognitive, or perceptual-cognitive activity that fully engages the subject performing it” (Vlajkov, 1990, p. 170).

According to Schmidt and Walach (Schmidt & Walach, 2014), meditation research poses a challenge to prevailing scientific paradigms as it relies on respecting personal experience, which was undervalued or dismissed in science until the end of the 20th century. Meditation, on the one hand, is a process of exploring consciousness, and on the other hand, it is also an object of exploration. It is undeniable that it needs to be unambiguously defined. The problem is that meditation, as an object of research is constantly changing. Schmidt and Walach emphasize that the problem is further complicated by the fact that meditation is not a single process but a set of different processes, so some authors find a solution in developing a four-dimensional modular descriptive system of meditation, based on behavioral and mental concepts of Western psychology: attention regulation, motivation, attitude, and practical context.

In the 1990s, a type of meditation emerged in Western awareness that originates from the Buddhist tradition, called *Vipassana* meditation. This meditation was introduced by Jon Kabat-Zinn (Kabat-Zinn, 1991, 1994) under the name *Mindfulness-Based Stress Reduction*, which is now considered part of cognitive therapy. In the meantime, it has become globally known and widely applied, to the extent that today the terms *meditation* and *mindfulness* are often equated. *Mindfulness* is a cognitive and experiential *process*, observing and accepting one’s own experience without judgment.

The field of meditation as a phenomenon, as well as the definition of the concept of *meditation*, currently eludes clear and independent classificatory categories. The determinations of this concept cannot fully encompass the wide range of existing meditative techniques.

THE APPLICATION OF MEDITATION IN THE FIELD OF MENTAL HEALTH

Hari Sharma (Sharma, 2015) compares the results of numerous studies and concludes that meditation eliminates accumulated stress, increases energy levels, reduces anxiety, depression, pain, improves memory, efficiency in performing activities, lowers blood pressure and slows down heart rate, slows metabolism and breathing, improves oxygen utilization, leads to thickening of gray matter in the cerebral cortex, reduces excessive sympathetic stimulation, can reduce unhealthy habits such as smoking, reduces the risk of heart attack and stroke, alleviates symptoms present in epilepsy, PMS, menopause, autoimmune diseases, anxiety disorders, and emotional disorders in general. The results indicate that meditation can have a positive impact on both physical and mental health, emphasizing its importance as a complementary practice in maintaining overall well-being.

The use of mindfulness meditation in preventing relapse among addicts showed that meditation increased the level of awareness and reduced negative mood, thus decreasing the risk of relapse (Temme et al., 2012).

Clinical application of meditation in the treatment of children and adolescents with ADHD who had insomnia and behavioral problems showed improvements in sleep quality and behavioral manifestations of ADHD (Zaccari et al., 2021).

There is moderately strong evidence that meditation significantly improves sleep quality and can be effective in treating certain aspects of sleep disorders in adults, which should be further investigated in future studies (Rusch et al., 2019). The potential of meditation as a non-pharmacological intervention for addressing sleep-related issues and improving overall well-being has been highlighted by this finding.

A meta-analysis of English-language databases on the relationship between meditation and headaches found that meditation reduces the intensity of pain and the frequency of headaches (Gu et al., 2018). The analysis of the effects of different forms of meditation reveals that the Mindfulness-Based Stress Reduction program has a significant impact on reducing pain intensity. Clinicians in the analyzed studies consider meditation to be a quality complementary and alternative medical option for headaches.

A systematic review of the literature on the application of meditation in the treatment of eating disorders shows promising results. However, the quality of the studies varies, and the sample sizes are small. Further research

is needed to explore the potential of implementing meditation-based interventions in this area (Wanden-Berghe et al., 2010).

In meta-analyses of the effects of meditation in the psychotherapy of depression, studies on Mindfulness-Based Interventions have been most prevalent so far. However, other Buddhist meditations, including the Four Immeasurable Meditations (FIM), have been recently applied and researched. These meditations aim to cultivate four prosocial attitudes: friendliness towards others, compassion (a desire for others to cease suffering), joy in the success of others, and equanimity (a wisdom-based peace regarding the fate of others). Positive emotions were noticeable after several weeks of use, they became more pronounced in daily life (Jing et al., 2020). FIM cultivates a positive attitude towards oneself and others while mitigating negative attitudes towards oneself and others. These effects are directly opposite to depressive symptoms, such as lack of satisfaction and negative attitudes towards oneself; therefore, Jing and colleagues consider FIM to have promising prospects in the treatment of depression. The results of current research support FIM as an effective intervention for reducing symptoms of depression but that additional studies with more rigorous research designs, including control groups, are needed.

Studies on the effectiveness of Compassion-Based Interventions (CBI) and Loving-Kindness Meditation (LKM) are scarce. Researchers (Graser & Stangier, 2018) report that CBI is effective in treating psychotic disorders, affective disorders with psychotic features, severe depressive disorders, and eating disorders, and shows positive results in patients with a history of suicide attempts, while LKM is effective in treating chronic pain.

In an integrative, non-pharmacological treatment for patients with a dual diagnosis – schizophrenia and pathological gambling – cognitive-behavioural therapy was applied in the first part of the 20-week treatment, followed by mindfulness awareness training (meditation-based therapy). Patients showed significant improvement in all examined variables: severity of psychiatric symptoms, severity of pathological gambling symptoms, psycho-social functioning, and *dispositional mindfulness* – the ability to enter a mindful state of consciousness. Positive effects were maintained even after three months. Meditation-based therapy helped subjects gain distance from impulsive impulses and intrusive thoughts (Shonin et al., 2014).

In recent studies on the effects of meditation on brain function, a general slowdown of brain activity has been demonstrated, and alpha and theta brain waves have been observed in participants most sensitive to meditative practice (Cahn & Polich, 2013). Meditation leads to

structural changes in the brain, specifically the thickening of the brain cortex stimulated by meditation and the shrinking of regions not stimulated (Kang et al., 2012).

Research on the effects of Transcendental Meditation (TM) practice on basic EEG patterns of brain waves (outside of meditation) and anxiety (Tomljenović et al., 2016) confirmed the influence on certain basic EEG patterns of brain waves and the state of anxiety. Most changes were detected in the occipital and temporal regions, and fewer in the central and frontal areas. Anxiety decreased after TM practice.

The results of a ten-week stress reduction and relaxation program based on meditation showed significant pain reduction in participants and a decrease in negative self-image (Kabat-Zinn et al., 1985). Additionally, pain-related activity inhibition was interrupted, mood swings were reduced, and complete psychological symptomatology, including anxiety and depression, was reduced. The dose of pain medication was also reduced, while overall activity and self-esteem increased.

Fan et al. (2024) conducted a systematic review of fMRI studies (functional magnetic resonance imaging), which showed that meditation activates the insula, anterior cingulate cortex, and orbitofrontal cortex—positively associated with pain relief—while activity in regions such as the amygdala and medial prefrontal cortex is negatively associated with pain relief.

Golshan and Mickleburgh (Golshan & Mickleburgh, 2025) reviewed fMRI studies on the impact of meditation on three key layers of pain processing: sensory, cognitive, and emotional, in both acute and chronic pain conditions, detailing the most prevalent brain regions involved in pain management through meditation techniques. The researchers emphasized the importance of the practitioner's level of expertise. Most fMRI evidence for focused attention techniques has been derived from studies involving experienced meditators subjected to acute pain induction. The authors suggest that open monitoring techniques may be more practical and accessible for managing chronic pain in beginners, as they facilitate acceptance, reduce emotional stress associated with pain, and promote coping strategies even without extensive prior training.

Tsang et al. (2025) conducted a meta-analysis of data on impulsive behavior, autonomic, and neurophysiological responses, highlighting that mindfulness meditation is an effective intervention for reducing human impulsivity. They noted that fMRI studies have shown mindfulness to be associated with significant activation in key frontal cortical regions.

Treves et al. (2025) studied the dynamic brain states underlying advanced concentration absorption meditation by using fMRI data. They found that the identified

brain states changed significantly during advanced meditation, reflecting changes in attention, sensory awareness, and narrative self-referential processing.

CRITICAL EVALUATIONS

Regarding the examination of the neural correlates of meditation, fMRI studies have revealed the involvement of specific brain regions and functional connections in focused attention (FA), typically associated with cognitive processes (Lieberman et al., 2025). fMRI presents challenges and limitations in studying FA, emphasizing the limited temporal resolution for tracking changes in brain activity, the artificial meditative environment (e.g., loud repetitive sounds and the restrictive lying position), and the high costs that limit longitudinal studies.

Although the results of relevant studies are promising, significant methodological limitations call into question their reliability and the effectiveness of applying meditation. Most studies were conducted on small samples of subjects and were often non-randomized, which can lead to bias and limited generalization of findings. To overcome these challenges, more rigorous longitudinal studies with larger and more diverse samples are needed, applying standardized meditation protocols (Gard et al., 2014).

Some studies indicate that meditation is moderately effective in reducing symptoms of depression, anxiety, and pain, but not effective in reducing stress and improving quality of life (Van Dam et al., 2018). Some studies also suggest that meditation is contraindicated in cases of psychosis, bipolar disorder, post-traumatic stress disorder, and depression because there is a risk of depersonalization, emergence of suicidal thoughts, unhealthy emotions, and flashbacks. More detailed studies on the usefulness of meditation for specific mental and physical disorders are needed since this intervention has proven helpful for some individuals but not for others. Multidisciplinary teams should be included in meditation research.

Thomas Mars and Hilary Abbey (Mars & Abbey, 2010) emphasize that there are no specific, reliable, and valid measures for examining meditation, and that the most commonly used traditional psychological measurement instruments are inadequate for assessing the effects of its application. They define meditation as a state of consciousness in which the subject maintains focus on a mental, inner, or outer experience and as the quality of an attention process without judgment and evaluation. The application of meditation is key to achieving deep cognitive and behavioral changes in patients. There are

ambiguities related to the precise measurement and assessment of the meditative experience because the exact components are unknown, and there is no consensus on the underlying psychological processes that lead to specific changes in attitudes, emotions, and behavior. Problems with the objective scientific study of consciousness have been known for a long time, as well as difficulties in integrating the historical and cultural heritage of meditation into the modern scientific paradigm. The methodological problem of distinguishing meditation as a construct that can be defined, a psychological process, and measurable results remains unresolved. The difference between formal and informal meditation practice is also unclear. Longitudinal studies and *follow-up* of experienced meditators are lacking. A serious drawback is that most studies do not include references from the East, where meditation originated and developed.

Mars and Abbey (2010) consider the use of meditation in a clinical context problematic because, as a secularized construct, it loses elements (cultural and historical roots) vital to its effects. The relationship between the experience of meditation and the practice of specific meditative techniques is unclear. Furthermore, a meditative state can be achieved outside of formal meditative practice, for example, in athletes or artists, through focused attention without judgment, resulting in complete absorption in the present moment. To enhance the level of scientific knowledge in this area, the authors recommend refining the methodology and employing specific measures for assessing meditation, as well as conducting long-term follow-up studies with a sample that encompasses a broader demographic range. They also propose that future meditation studies integrate both quantitative and qualitative data in their research design.

Christopoulou and Pavlopoulos (2024) conducted an intercultural study of the social representation of meditation among Greek and Indian participants, both with and without meditation experience. Qualitative research methods were used, including interviews and thematic analysis. They identified four main themes: the creation of meaning in meditation, meditation teachers, outcomes of meditation, and mechanisms of meditation. Their findings revealed more similarities than differences in the social representations of meditation among participants. This indicates the presence of universal elements, which likely reflect fundamental aspects of human functioning that transcend cultural boundaries.

An analytical study on meditation in the East and West concluded that there are significant differences between Western and Eastern approaches and contexts of meditation (Schmidt, 2011). In his assessment, it is more appropriate to view the heterogeneous, mostly secular,

practices in the West as a newly emerging culture of mindfulness that did not previously exist.

Wu & Chentsova-Dutton (2025) studied how meditation is perceived in Eastern and Western science, it is emphasized that in Eastern science, meditation is more often seen as a traditional spiritual discipline without a focus on empirical evidence, while in the West, there is a strong focus on neuroscience and psychological benefits. When it comes to validating the practice, in the East, inner experience is considered relevant, whereas in the West, results based on empirical evidence and peer-reviewed studies are given importance. Additionally, the expectations of meditators differ: Eastern meditators expect long-term transformation and are not attached to specific outcomes, whereas Western meditators expect measurable results, such as reduced stress, improved sleep, or enhanced attention.

In the pursuit of finding non-pharmacological, less risky treatments for depression with different mechanisms of action, Jain et al. (2015) analyzed the effectiveness of meditative therapies in depression treatment. They noticed methodological shortcomings, including significant heterogeneity in applied techniques and research designs. After conducting a meta-analysis of clinical literature on meditative techniques used for therapeutic purposes, they note that it is difficult to conclude the effects because, on the one hand, different meditative therapies use the same type of meditation. On the other hand, there is a broad category of meditative techniques, including focused attention, *open monitoring*, and meditation with or without movement. Researchers do not take into account that different meditative practices involve different neural bases, so it is unclear whether meditative therapies based on a particular form of meditation also have common neural mechanisms of action. Neglecting the differences between meditative techniques can impact the reporting of errors in reviewing their effects. They emphasize that it is important to know at what stage of depression meditative techniques were applied. In the acute phase, patients lack the concentration needed for meditation, so its effect is weaker, while in remission, they meditate better and achieve better effects. Other shortcomings of studies on the application of meditative techniques include: small number of subjects, the procedure was conducted only in one place, there are often no follow-up studies, some studies were short-term—six weeks or less, therapists' expectations affect the effects of therapeutic interventions, subjects' expectations were not considered, heterogeneity of meditative practice, and different underlying neural mechanisms.

Van Dam et al. (2018) assess that initial studies on the effectiveness of meditation contained much misinformation and were not methodologically correct. Their most

significant comments are that inconsistencies in defining meditation and methodological problems in research and interpretation of results obtained were noticed in the papers. Meditation includes various mental functions (attention, awareness, memory, discernment), but these different functions are rarely represented in studies. A clearly stated type of meditation being investigated and precise instructions for performing meditative practice are lacking. The technique of learning to enter a meditative state of consciousness is not always the same. It happens that a specific, investigative definition of meditation is not consistent with the research design. Furthermore, studies often overlook that subjects practiced meditation of varying intensity and duration, and it is not determined what it means to be a *beginner* or an *advanced meditator*.

Gu J et al. (2015) found that most of the reviewed meditation studies had several key methodological flaws that hindered firm conclusions. For example, only few studies had an active control group, meaning the effects could be attributed not only to meditation but also to non-specific factors. Another issue was that although the temporal sequence of mediators and outcomes is crucial for establishing the effects of meditation, most studies did not conduct analyses that considered temporality, thus weakening conclusions about causality.

CONCLUSION

This article aims to contribute to the advancement of knowledge on how to research meditation as a tool for preventing and improving mental health by addressing key challenges in meditation research. It was pointed out that relevant studies have numerous conceptual and methodological problems. There are also difficulties due to the nature of control and comparison in mindfulness and other meditation research. Frequently, the concepts being examined, interventions, and trainings lack adequate definition. Furthermore, in quantitative studies, confirmed correlations between the examined phenomena indicate a connection but not necessarily a cause-and-effect relationship.

The criticisms primarily address the suitability of existing methods in meditation research as a mental state rather than questioning the effectiveness of meditative interventions. Methodologically speaking, difficulties with the operational definition of the content of concepts and measuring phenomena such as mental state or personality traits pose a significant challenge because the definition

of the examined concept influences the way the investigated phenomenon is measured and how the research design is set up.

It has been pointed out that meditation encompasses a wide range of practices which differ in techniques, goals, and outcomes, making it difficult to compare results. A clear operationalization of the type of meditation being researched and standardization of protocols are necessary to address this issue.

Measuring subjective experiences, such as meditation, can be challenging to quantify. Therefore, it is helpful to combine qualitative (interviews, diaries...) and quantitative measurements (EEG, biomarkers...).

Meditators constitute a heterogeneous group, varying in experience, motivation, and personal attributes. It is therefore essential to closely account for individual characteristics and, in quantitative studies, to stratify samples by relevant factors. Moreover, cultural attitudes toward meditation differ markedly, particularly between Western and Eastern contexts.

Successful meditation outcomes are often defined in various ways, depending on the research area – from stress and anxiety reduction to achieving spiritual enlightenment. It is crucial to define measurable outcomes specific to the research objectives. Comparative studies on the long-term effects of different meditation techniques and psychotherapies on mental health are lacking.

The observed limitations in scientific understanding of meditation necessitate the use of qualitative research designs more widely, not just in meditation research but also in studying other mental phenomena and processes. This enables a deeper understanding of the examined phenomenon. One such approach is based on the phenomenological method, which focuses on exploring phenomena in accordance with their existence in human experience.

Due to the complexity of the meditation phenomenon, researches should be interdisciplinary, incorporating knowledge and insights from psychology, philosophy, anthropology, neuroscience, biology, sociology, comparative studies of cultures and religions. For the same reason, it would be beneficial to include interdisciplinary sciences such as biochemistry, biophysics, and biomedicine.

Ethical considerations: Does this study include human subjects? NO

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