

Nurturing the Present: A Comprehensive Exploration of Mindfulness-Based Interventions and Their Impact on Mental and Physical Health

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ABSTRACT

Over the past few decades, mindfulness-based interventions (MBIs) have gained considerable attention for their potential benefits in mental and physical health domains. Initially rooted in Buddhist traditions, mindfulness has been adapted into various therapeutic approaches, most notably mindfulness-based stress reduction and mindfulness-based cognitive therapy. These interventions integrate Eastern mindfulness practices into Western psychological frameworks and have yielded promising results in treating a wide range of clinical conditions, including depression, anxiety, chronic pain, and substance abuse. Despite their popularity, the evidence base for MBIs is still evolving, largely due to methodological limitations in existing studies. Recent well-designed randomized controlled trials have reported the efficacy of MBIs in improving mental health outcomes, such as reducing relapse rates in depression and alleviating symptoms of anxiety. Furthermore, MBIs are currently being incorporated into diverse settings, including workplaces, schools, and even prisons, indicating their broad applicability. This narrative review aims to provide a comprehensive overview of the current state of research on MBIs, highlighting their theoretical foundations, clinical applications, and the potential mechanisms through which they exert their effects on psychological and physical well-being.

Keywords: Mindfulness, mental health, psychiatry.

ÖZ

Şimdiyi Beslemek: Farkındalık Temelli Müdahaleler ve Bunların Ruhsal ve Fiziksel Sağlık Üzerindeki Etkilerinin Kapsamlı Bir Araştırması

Son yıllarda hem zihinsel hem de fiziksel sağlık alanlarındaki potansiyel faydaları nedeniyle dikkati çeken farkındalık temelli müdahaleler, başlangıçta Budist geleneklere dayanan farkındalık kavramının çeşitli terapötik yaklaşımlara uyarlanmasıyla ortaya çıktı. Özellikle Farkındalık Temelli Stres Azaltma (MBSR) ve Farkındalık Temelli Bilişsel Terapi (MBCT) bu yaklaşımlar arasında öne çıkmaktadır. Bu müdahaleler, Doğu'nun farkındalık uygulamalarını Batı'nın psikolojik çerçeveleriyle birleştirerek depresyon, anksiyete, kronik ağrı ve madde bağımlılığı gibi birçok klinik durumun tedavisinde umut verici sonuçlar gösterdi. Popülerliklerine rağmen, farkındalık temelli müdahaleler için kanıt tabanı hala gelişmektedir ve bu durum, mevcut çalışmalarındaki metodolojik sınırlamalardan kaynaklanmaktadır. Son zamanlarda iyi tasarlanmış randomize kontrollü çalışmalar, farkındalık temelli müdahalelerin depresyon nüks oranlarını azaltmak ve anksiyete belirtilerini hafifletmek gibi zihinsel sağlık sonuçlarını iyileştirmedeki etkinliğini ortaya koymuştur. Ayrıca, bu müdahaleler artık iş yerleri, okullar ve hatta hapisaneler gibi çeşitli ortamlarda uygulanmakta ve geniş bir kullanım alanı bulmaktadır. Bu derleme, farkındalık temelli müdahaleler hakkındaki mevcut araştırma durumunu kapsamlı bir şekilde gözden geçirerek, bu müdahalelerin teorik temellerini, klinik uygulamalarını ve psikolojik ve fiziksel iyilik hali üzerindeki etkilerini nasıl gösterdiklerini açıklamayı amaçlamaktadır.

Anahtar Kelimeler: Farkındalık, ruh sağlığı, psikiyatri.



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INTRODUCTION

Buddhist traditions initially delved into the concept of mindfulness, which is a broad philosophical term unfamiliar to most modern readers (Xu et al, 2016). Those new to mindfulness meditation practices or interventions can try a simple exercise: Close your eyes for about a minute and focus on the sensations of breathing through your nostrils. Feel the air passing through your nose and the expansion in your lungs (Piet & Hougaard, 2011). There is no need for any special action; just continuously observe these sensations with curiosity and interest. Even a 1-minute mindfulness exercise like this can show how our minds tend to wander. For example, you may find yourself recalling a conversation with friends, experience attention drifting, or feel an urge to consciously control your breathing (Khouri et al, 2013). Furthermore, even in such a brief exercise, a wide range of experiences and emotional responses, such as relaxation or agitation, often emerge. Formal mindfulness training exercises, such as learning to attentively focus on breathing, form the foundation of many mindfulness interventions (Kabat-Zinn, 1982).

Interest in mindfulness interventions has surged over the past 30 years. This surge is largely fueled by scientific reports and media coverage highlighting the potential benefits of mindfulness interventions for a wide spectrum of outcomes, from mental and physical health to cognitive, emotional, and interpersonal effects (Hofmann et al, 2010). Mindfulness has rapidly gained traction in Western psychology research and practices, thanks to the success of standardized interventions, such as mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive therapy (MBCT) (Hofmann & Hayes, 2019). These interventions integrate the essence of Eastern mindfulness practices into Western cognitive-behavioral frameworks. Despite their popularity, the evidence base for these interventions is still in development, partly due to the prevalence of cross-sectional studies and other methodological limitations in the existing literature. Recognizing these gaps, researchers have increasingly employed more rigorous methodologies to extract meaningful conclusions from the available studies (Hinton et al, 2013).

Recent reviews of well-designed randomized controlled trials (RCTs) comparing mindfulness treatments, mainly MBSR and MBCT, to active control conditions have reported that these interventions are effective for a diverse range of outcomes across various populations. These include clinical disorders and symptoms, such as anxiety, risk of depression relapse, current depressive symptoms, stress, chronic pain, life quality, and psychological or emotional distress (Gu et al, 2015). Previous studies have demonstrated that mindfulness practices can influence various elements of mental health

issues, including altering cognitive distortions, managing emotional imbalances, and improving how individuals interact with others (Curtiss et al, 2017). Beyond clinical settings, mindfulness interventions are increasingly being integrated into workplaces, schools, military settings, and prisons. The scientific community has met this growing interest with a range of responses, from skepticism to enthusiasm (Curtiss et al, 2017).

Aside from treatments specifically centered on mindfulness, key aspects of mindfulness have been integrated into other major therapy approaches, such as Dialectical Behavior Therapy (DBT) and Acceptance and Commitment Therapy (ACT) (Creswell, 2017). Moreover, mindfulness has been increasingly explored within the context CBT for emotional disorders. The use of mindfulness in these treatment protocols differs from that for MBSR and MBCT as it is a component of these interventions rather than the core skill. These treatments include other therapeutic elements, making it difficult to attribute therapeutic effects solely to mindfulness skills (Bullis et al, 2014). Despite these differences, mindfulness-based interventions (MBIs) are highly compatible with the predominant cognitive-behavioral psychotherapy used today. CBT serves as a theoretical framework for treatment rather than a rigid set of procedures. Mindfulness and acceptance strategies align with the general principles of CBT by targeting core processes, such as enhanced emotional awareness and regulation, cognitive flexibility, and goal-oriented behaviors (Boswell et al, 2014).

This narrative review aims to provide a comprehensive overview of the current state of MBI research, highlighting their theoretical foundations, clinical applications, and the potential mechanisms through which they exert their effects on psychological and physical well-being.

From Mental Wandering to Conscious Awareness: The Power of Mindfulness

The comprehensive theoretical proposition of MBIs suggests that individuals can become less reactive and more thoughtful toward unpleasant internal phenomena through mindfulness practices, leading to positive psychological outcomes. Mindfulness is defined as a mental state achieved through nonjudgmental awareness of the present moment. This includes being mindful of sensations, thoughts, physical states, consciousness, and the surrounding environment (Allen et al, 2006; Kabat-Zinn, 1982).

Mindfulness is defined as the process of attentively and openly focusing on the experience of the present moment. This sharply contrasts with the experience of many individuals, where the default mode of attention is often inattention. Even

when we manage to concentrate on our immediate internal experiences, this focus is frequently clouded by self-critical, provocative, or anxious thoughts and feelings, which we typically try to push away (Killingsworth & Gilbert, 2010).

A previous study has demonstrated that our minds wander approximately 47% of the time, and this mind wandering predicts subsequent unhappiness (Killingsworth & Gilbert, 2010). Conversely, the capacity for mindfulness has been associated with a higher state of well-being in daily life (Brown & Ryan, 2003). These findings collectively indicate that achieving mindfulness is challenging but ultimately beneficial. This skill is characterized as a “desirable difficulty” that demands the expenditure of mental resources yet results in greater cognitive flexibility, insight, and self-regulation abilities (Kang et al, 2013).

In 2004, Bishop and his team identified two key aspects of mindfulness: the first is the ability to regulate one’s attention, and the second is an attitude of curiosity, openness, and acceptance toward the experiences of the present moment (Bishop et al, 2004). The attended experience of the present moment can manifest in many ways, including bodily sensations, emotional responses, mental images, mental dialogues, and perceptual experiences (e.g., sounds). Scholars have described this monitoring feature of mindfulness as “attentive awareness” or “vigilant awareness against any presenting experience” (Bodhi, 2011; Brown et al, 2007). Second, many contemporary conceptualizations of mindfulness assert that adopting an open or accepting attitude toward one’s experience is critical. This open and accepting attitude consists of attentively orienting toward the experience with curiosity, detachment, and nonreactivity. Notably, this accepting attitude toward the experience is not a passive submission to one’s current state but involves inviting experiences, even challenging ones (Quaglia et al, 2015).

Types of Mindfulness Interventions

The MBSR program, developed by Jon Kabat-Zinn in the early 1980s, has emerged as the most popular application as an empirical treatment method for intervening in psychological distress. This treatment is an 8-week program and is aimed at reducing stress by improving people’s awareness skills through regular meditation practices (Kabat-Zinn, 1982).

For a significant part of the course, participants focused on their bodily sensations through various mind–body meditation practices. In addition, group classes helped participants integrate these mindfulness techniques into their daily lives, ultimately leading to more harmonious coping with stressors (Ludwig & Kabat-Zinn, 2008). The MBSR program, initially developed to treat individuals

suffering from chronic pain, has since been applied to a wide range of people for both general medical conditions and mental illnesses. As a result of these practices, high levels of compliance, tolerance, program completion, and patient satisfaction have been observed (Baer, 2003).

Researchers have also adapted the core principles of the MBSR program into modified protocols to treat specific populations and outcomes. These adaptations include MBCT for depression, mindfulness-based relapse prevention (MBRP) for substance addiction, mindfulness-based relationship enhancement for improving relationship functionality, and mindfulness-based programs for promoting healthy eating habits, among others (Bowen, Witkiewitz, et al, 2014; Carson et al, 2004; Mason et al, 2016).

The most extensively researched adaptation is MBCT, which was developed by John Teasdale, Zindel Segal, and Mark Williams to prevent the relapse of major depression (Teasdale et al, 2000). Several well-designed RCTs have demonstrated the effectiveness of MBCT in decreasing relapse rates among individuals with major depression. Furthermore, studies investigating individual moderators of treatment outcomes suggest that MBCT is particularly effective in preventing relapse among high-risk individuals (Shahar et al, 2010).

MBSR and MBCT are comprehensive treatment programs that require significant time and training investments from both patients and therapists. In addition to these established methods, mindfulness practices have been innovatively applied in various therapeutic contexts (Cohen et al, 2017).

Retreats and Residential Programs—Mindfulness meditation retreats, lasting anywhere from a day to 3 months, are a favored method of delivering mindfulness therapy. Although diverse in format and target audience, and despite limited research on their long-term impact, these retreats provide a cost-effective means of providing concentrated and controlled mindfulness experiences. Recent studies have indicated that they may positively influence stress, anxiety, and overall psychosocial well-being and health (Rosenberg et al, 2015).

Brief Mindfulness Interventions—Researchers have condensed the MBSR protocol into shorter 2–3-week courses. While not as extensively investigated as the standard 8-week versions, preliminary data suggest that these brief interventions could positively impact various symptoms, such as compassion and working memory (Lim et al, 2015). The effectiveness of these condensed versions in substantially reducing clinical anxiety or depression remains to be explored, and their potential benefits in a shorter timeframe warrant further examination (Mrazek et al, 2013).

Another burgeoning adaptation of standard MBIs is the shorter 3–4-day lab-based mindfulness training. These tightly controlled sessions, typically led by trained meditation instructors for 20–30 min, require little to no practice outside the lab. Despite their brief nature, studies have shown that they can immediately impact psychological and neuroendocrine responses to social stress and perceived pain (Creswell, 2017). The significant outcomes achieved after just a few days of training are promising, indicating that these brief interventions might influence anxiety or depression symptoms, which merits future investigation. These truncated mindfulness interventions also offer greater research flexibility, allowing for more efficacy- and mechanism-focused trials (Zeidan et al, 2011).

Internet and Smartphone MBIs—A recent trend in mindfulness literature is the surge of Internet- and app-based MBIs (Boettcher et al, 2014). Ranging from detailed 8-week programs mirroring the MBSR protocol to less-structured 2–3-week self-guided interventions, these digital approaches are relatively new. Despite this, a recent meta-analysis of 15 RCTs found that compared with control or waitlist conditions, these technology-delivered MBIs significantly benefit anxiety, depression, and mindfulness (Spijkerman et al, 2016). While the effectiveness of online MBIs compared with face-to-face methods remains untested, these initial results are encouraging and highlight the need for more extensive research in this area (Cavanagh et al, 2013).

Traditional and Mindfulness-Based CBT: A Harmony of Divergent Approaches

There are many common features between mindfulness-based treatments and classical Beckian CBT. Both aim to alleviate psychological distress through cognitive and behavioral exercises that desensitize conditioned fear responses. For this purpose, MBIs focus on sustained attention, whereas traditional CBT employs exposure-based methods to break the conditioned response. Both approaches encourage viewing internal phenomena as transient and devoid of inherent value (Hofmann, 2008; Longmore & Worrell, 2007). MBIs promote simple observation, whereas CBT challenges metacognitions regarding these phenomena. In addition, both involve relaxation and improved self-regulation, though the specific components responsible for these effects are uncertain (Baer, 2003).

However, significant differences exist. Traditional CBT focuses on changing maladaptive cognitions by offering cognitive restructuring, as opposed to the principle of MBIs of not engaging with cognitive and emotional processes. CBT is goal-oriented, with clients setting and working toward specific treatment goals. Contrarily, MBIs cultivate nonstriving, despite

similar treatment-seeking reasons. Despite these differences, both approaches ultimately change one's perspective on internal phenomena, reducing the impact of maladaptive cognitions, emotions, and behaviors (Ellis, 1980).

Mindfulness as a Component of CBT

Originally, mindfulness was a component of broader interventions, such as DBT and ACT, but later, mindfulness-specific interventions also became popular. These therapies, addressing various clinical populations and symptoms, have demonstrated that mindfulness training is a beneficial element. The roles of mindfulness in DBT and ACT are particularly noteworthy (Baer, 2003; Hayes et al, 2011).

Dialectical Behavior Therapy (DBT)

DBT was originally developed by Marsha Linehan for the treatment of borderline personality disorder. This method is essentially based on the idea that there are opposing forces at the same time in the essence of life and that realizing this will lead us to a useful point. In DBT, mindfulness skills are taught to help clients understand the basis of acceptance and change. In DBT, mindfulness skills, similar to those in MBSR, focus on nonjudgmental observation of internal events. However, the way these skills are taught in DBT significantly varies. Unlike MBSR, which recommends a specific amount of meditation practice, DBT includes mindfulness training as one of the many skills taught in a weekly skills group over the course of a year (Baer, 2003; Linehan, 2018). Patients learn mindfulness through various exercises, not just through meditation, as in MBSR. These exercises include visualization practices, breathing-focused exercises, and various other exercises that encourage the practice of mindfulness during daily tasks, such as showering or doing the dishes. Clients can choose which mindfulness exercises they prefer and when to practice them, allowing them to benefit from mindfulness training regardless of the type and severity of their complaints (Linehan, 2018).

Acceptance and Commitment Therapy (ACT)

ACT, an updated approach to outpatient psychotherapy based on the principles of behavior analysis, was developed by Steve Hayes. ACT does not mainly include meditation practices and rarely uses the term "mindfulness" in its treatment protocol. However, the core strategies of ACT are highly related to mindfulness skills. For example, a central tenet of ACT is "self-observation," in which clients learn to simply accept internal phenomena without focusing too much on them, evaluating and judging them, or trying to change them. It attempts to show clients that they are not just their distressing thoughts and feelings (Baer, 2003; Hayes & Wilson, 1994).

Mindfulness Intervention Mechanisms: Psychological Impact

Considerable research has focused on self-reported mindfulness, measured through questionnaires, as a primary psychological mechanism for change. For instance, studies have demonstrated that MBSR increases self-reported mindfulness more effectively than active present-centered group therapy programs that do not include a mindfulness component. These enhancements in self-reported mindfulness have been associated with decreased posttraumatic stress disorder symptoms among veterans (Polusny et al, 2015). Nonetheless, these encouraging findings are tempered by the reality that approximately 50% of mindfulness intervention studies do not report a significant increase in self-reported mindfulness post-intervention (37 out of 72 trials in a recent meta-analysis showed no increase) (Visted et al, 2018).

Mindfulness interventions improve one's ability to more objectively observe moment-to-moment experiences and constitute an important psychological mechanism of change. This metacognitive awareness teaches us to look at our internal experiences from the outside (Bernstein, 2015) and helps us be more effective in how to respond to thoughts, feelings, or behaviors (Golubickis et al, 2016). Previous studies on these processes reported that MBCT increased metacognitive awareness in patients recovering from depression (Teasdale et al, 2002). Other studies have demonstrated that MBSR mediates the reduction of symptoms in patients with anxiety with the opposite progression (Hoge et al, 2014) and that MBCT-related reductions in symptoms occur in people with depressive symptoms and at risk of recurrence of depression (Bieling et al, 2012). Other proposed psychological and behavioral mechanisms to explain the effects of mindfulness interventions in RCTs include processes such as acceptance, emotion regulation skills (Lindsay & Creswell, 2015), exposure, reduction of repetitive thoughts, or alterations in the aspects of one's self-concept (Golubickis et al, 2016).

Neurobiological Mechanisms

He employed various structural and functional neuroimaging techniques to evaluate the concrete effects of mindfulness interventions on the brain. Mindfulness meditation practices have been shown to be effective in various brain regions, such as insula, putamen, somatosensory cortex, anterior cingulate cortex, and prefrontal cortex (Tomasino & Fabbro, 2016). Some studies have suggested that mindfulness interventions lead to an increase in gray matter density in the hippocampus (Hölzel et al, 2011). Despite these advances, little is known about how mindfulness interventions are neurally linked to outcomes.

In their study, Hölzel et al. (2013) associated changes in the brain with emotional consequences (Hölzel et al, 2013) and showed that there was a decrease in symptoms and prefrontal cortex activity

with MBSR interventions in patients diagnosed with generalized anxiety disorder (AD). An RCT conducted on unemployed stressed individuals revealed that after MBIs, the connection between the stable mood network and the dorsolateral prefrontal cortex, which regulates stress, increased, whereas the connection between the amygdala and subgenual anterior cingulate cortex, which has stress-related functional connections, weakened (Taren et al, 2015). Zeidan et al. (2011, 2015) (Zeidan et al, 2011, 2015) demonstrated that a short mindfulness intervention of 20 min per day over 4 days reduced both intensity and unpleasantness ratings for painful thermal stimuli applied to the shin. Furthermore, they reported that the neural mechanisms underlying these mindfulness-related pain reduction effects differed from those driving neural mechanisms of placebo conditioning effects in pain reduction. Together, these initial studies suggest that it is possible to identify potential brain mechanisms that could be associated with the effects of mindfulness interventions, but the literature is still quite insufficient.

Chronic Pain

Chronic pain is a widespread public health issue that significantly affects physical disability, mental state, and quality of life, as highlighted by the Institute of Medicine Advanced Pain Research Committee (2011) and Kawai et al. (2017) (Kawai et al, 2017). Over the past two decades, opioids have been frequently used to treat chronic pain. However, their long-term effectiveness is limited, and they are commonly associated with serious drug dependency issues (Boudreau et al, 2009; Dowell et al, 2016). The high prevalence and persistent nature of chronic pain, combined with the negative consequences of drug dependency, have spurred interest in alternative or complementary treatment plans (Chiesa & Serretti, 2011).

MBIs are increasingly popular as a self-management technique for chronic pain, showing great potential. MBCT, which has gained increasing attention in recent years, integrates key elements from CBT and MBSR. It targets the cognitive mechanisms of how individuals respond to experiences (Bishop et al, 2004; Daniel, 2013; Teasdale et al, 2000).

Current evidence on the efficacy of MBCT in chronic pain is limited. While findings in existing literature indicate significant effects of other MBIs on depression (Hilton et al, 2017; Veehof et al, 2016), some studies reported that the goal of these interventions is not to reduce or eliminate pain intensity but to increase pain acceptance (Veehof et al, 2016). Interestingly, this review found no statistically significant improvements in pain relief in the short or long term. However, preliminary evidence suggests that meditation can influence pain cognition (Zeidan et al, 2011) and report higher self-reported cognitive pain interventions, which are significantly associated with higher levels of daily life activities (Talaei-Khoei et al, 2017).

A randomized clinical trial examining the effects of MBCT in women with postmastectomy pain syndrome found sustained reductions in pain intensity over 6 months in patients practicing mindfulness compared with those on a waitlist control condition (Johannsen et al, 2016). Conversely, a more recent RCT comparing the efficacy of group MBSR in patients with breast cancer and chronic neuropathic pain to a waitlist control condition concluded negatively. The trial did not find significant benefits of group MBSR for chronic neuropathic pain management (Shergill et al, 2022). Discerning the direct role of mindfulness in modulating pain intensity in patients with severe chronic pain forms such as cancer is challenging, considering the presence of numerous confounding factors, including the effects of opioids, antidepressants, antiepileptic drugs, and other analgesics (including side/unwanted effects).

In another recent study, Jones et al. (2023) examined four different mindfulness training descriptions among 452 participants with chronic low back pain. They found that only specific characteristics, such as self-efficacy/control and acceptability, were positively related to the intentions to adopt mindfulness training (Jones & Drummond, 2023).

Despite its limitations, current evidence suggests that MBCT can be efficaciously short-term in addressing depressive mood and enhancing mindfulness in patients with chronic pain. Considering the high prevalence of chronic pain often co-occurring with depression, along with the adverse consequences of pain medication dependence, the convenience, low cost, and rarity of adverse effects make mindfulness a viable self-management option for chronic pain, particularly in patients with depression.

Immunity

Recently, research on how MBIs affect human biomarkers has become increasingly popular. Despite this interest, studies investigating the effect of mindfulness meditation on biological processes, a fundamental process of disease development, are still lacking (van Genderen et al, 2011). This issue has become particularly important considering the impact and mechanism of the immune system on mental and physical health (Carlstedt et al, 1997; Celli et al, 2012).

Inflammatory proteins, produced by immune cells, act as communicators in immune system activity. These proteins circulate in the body, exerting either proinflammatory (such as the liver-derived C-reactive protein [CRP]) or anti-inflammatory effects (such as the cell-derived IL-10 cytokine). Essential for systemic defense and immune cell differentiation, these proteins can, however, contribute to increased disease risk, poor recovery, and mortality when their levels are chronically and irregularly elevated (Celli et al, 2012). Among the 20 studies we examined, 9 measured a range of inflammatory cytokines,

including IL-6, IL-8, IL-10, tumor necrosis factor (TNF)- α , sTNF-RII receptor agonist, IFN- γ , and CRP. Five studies analyzed the circulating levels of IL-6 (Bower et al, 2015; Creswell et al, 2012; Jedel et al, 2014; Malarkey et al, 2013; Oken et al, 2010), with one additional study investigating its stimulated levels in blood (Zautra et al, 2008). One particular study found a reduction in IL-6 levels in breast cancer patients after a 6-week MAP course, in comparison with a control group (Bower et al, 2015). Three studies focused on IL-8 and IL-10 (Barrett et al, 2012; Jedel et al, 2014; Rosenkranz et al, 2013), with one showing an increase in IL-8 in the nasal secretions of subjects after an 8-week MBSR course. Two other studies (Barrett et al, 2012; Jedel et al, 2014) reported an increase in IL-10 levels after MBSR in patients with ulcerative colitis who experienced exacerbations. Four studies evaluated TNF- α and found a trend toward decreased TNF- α production after MBSR in individuals (Bower et al, 2015; Elsenbruch et al, 2005; Oken et al, 2010; Rosenkranz et al, 2013). In addition, three studies investigated IFN levels, with one demonstrating an increase in IFN- γ in patients with breast cancer after a 6-week MAP intervention. Another study reported a high IFN- γ /IL-4 ratio in breast cancer survivors receiving MBSR. Lastly, six studies measured CRP, with three indicating a decrease in CRP levels in various contexts post-MBSR (Bower et al, 2015; Hayney et al, 2014; Lengacher et al, 2013).

Transcription factors in immune cells, such as nuclear factor-kappa B (NF- κ B), modulate the production of genes linked to immune response and external cell proteins. NF- κ B, for instance, activates gene expression by binding to DNA in the cell nucleus upon activation (Rohleder, 2014). It is a precursor to increased proinflammatory cytokine levels in the blood and plays a key role in coordinating the inflammatory response. Some models in psychoneuroimmunology propose that NF- κ B activity is a critical pathway connecting psychological stress in the central nervous system to peripheral immune system dysregulation (Karin, 2006). Studies have shown that acute psychological stress activates NF- κ B in PBMCs. Three studies measured NF- κ B levels in PBMCs, demonstrating a reduction after MBIs. Two studies, one involving older adults living alone and another involving patients with breast cancer, showed a relative decrease in NF- κ B expression after MBSR and MAPs, compared with controls (Bower et al, 2015; Creswell et al, 2012). A third study found a decrease in activated NF- κ B p65 in older adults with insomnia undergoing MAPs, although this decrease was also significant in a control group practicing active sleep hygiene (Black et al, 2015).

The number of immune cells, belonging to both innate (such as neutrophils) and adaptive (T, B, and NK cells) subgroups, was quantified in five studies (Barrett et al, 2012; Creswell et al, 2012; Gonzalez-Garcia et al, 2014; Lengacher et al, 2013; SeyedAlinaghi et al, 2012). In one of these studies that focused

on elderly adults experiencing acute respiratory illness, no significant change in neutrophils (obtained from nasal wash mucus) was observed after an MBSR-derived intervention (Barrett et al, 2012). The other four studies, which counted lymphocytes in the blood, each found changes in T lymphocyte cell counts (including CD4+ T cells, CD4+/CD8+ ratio, Th1/Th2 helper T cells) and/or activation (percentage of active T cells) after mindfulness meditation in samples diagnosed with a disease (such as HIV or breast cancer), compared with controls. Three of these studies were specifically conducted with individuals diagnosed with HIV. Meanwhile, the counts of B lymphocytes and NK cells did not show significant changes post-intervention in patients with breast cancer (Creswell et al, 2012; Gonzalez-Garcia et al, 2014; SeyedAlinaghi et al, 2012).

Research in the area of telomere length and telomerase activity includes several notable studies. Among them, two focused on telomere length measurement, with one revealing a potential reduction in telomere shortening in patients with breast cancer after an MBSR-derived program, compared with controls (Carlstedt et al, 1997; Lengacher et al, 2014). This effect was more marked when data from both mindfulness meditation and supportive group therapy were combined, enhancing the statistical significance. Furthermore, all three studies examining telomerase activity reported a potential increase after mindfulness meditation across various groups, including meditation retreat attendees, overweight or obese women, and patients with breast cancer (Daubenmier et al, 2012; Jacobs et al, 2011; Lengacher et al, 2014). Notably, one study found that this increase in telomerase activity was particularly significant among those who strictly followed the program (Daubenmier et al, 2012).

In terms of antibody measurements, three studies were conducted, two of which evaluated antibody response to the flu vaccine (Davidson et al, 2003; Hayney et al, 2014; Moynihan et al, 2013). One study reported that corporate employees who underwent MBSR exhibited a significantly higher increase in hemagglutination inhibition influenza antibody titers over a period of 4–8 weeks, compared with controls (Davidson et al, 2003). However, the second study, which involved older adults, did not find significant changes in serum influenza antibody or nasal IgA levels (Hayney et al, 2014). A separate study on older adults observed that after receiving keyhole limpet hemocyanin, there was a considerable initial increase in IgG levels post-MBSR intervention, but this increase was less pronounced at the 24-week follow-up (Moynihan et al, 2013).

Major Depressive Disorder

According to the World Health Organization, in 2020, major depressive disorder (MDD) affected over 264 million people and is currently the leading cause of disability worldwide (Bull

et al, 2020). Over 60% of individuals worldwide who attempt suicide struggle with MDD. Depression can manifest as a single-episode, recurring, or chronic illness. By 2030, MDD is predicted to become the most common cause of disability globally (Nock et al, 2009).

Major depression is widespread, and in most affected individuals, it follows a recurring course with an increasing probability of relapse with each episode: 50% after one episode and between 70% and 90% after two and three episodes, respectively (van der Velden et al, 2015). Depression arises from a complex interaction of social, psychological, and biological factors. Effective treatments exist for moderate and severe depression, including medications and psychosocial interventions. One of the most commonly used psychosocial interventions is MBI (Bull et al, 2020).

MBCT is specifically designed for individuals in recovery from depression who are at a high risk of recurrence and have previously experienced multiple depressive episodes (Segal et al, 2018). In this patient group, mindfulness is recommended by the United Kingdom's National Institute for Health and Clinical Excellence (Liberati, 2009).

MBCT has been proven not only to treat the acute symptoms of depression but also to substantially reduce MDD recurrence (Teasdale et al, 2000; Williams et al, 2014). Previous studies have shown that MBCT is effective in preventing relapse for up to 60 weeks when compared with maintenance antidepressants or usual treatment (Kuyken et al, 2016). Unlike other psychotherapies, MBCT is based on intensive mental training that starts with focused, continuous attention practices and extends to practices encouraging increased openness and acceptance of all experiences, whether positive, negative, or neutral. Comprehensive depression treatments should also include interventions for reducing suicide risk (Segal et al, 2018). It remains unclear whether MBCT reduces suicide risk compared with traditional treatments (Zhang et al, 2022).

The literature contains numerous studies supporting the beneficial effects of mindfulness awareness in patients with MDD on depression and suicidal thoughts. For example, the results of nine studies that used the Beck Depression Inventory-II (Barnhofer et al, 2009; Crane et al, 2008; Hargus et al, 2010; Hepburn et al, 2009; Williams et al, 2014) and the Hamilton Depression Rating Scale (Hargus et al, 2010; Piet & Hougaard, 2011; Xu et al, 2016; Zhang et al, 2022) can be cited.

MBCT teaches individuals to be more aware of their thoughts and feelings, accepting them as mental activities rather than labeling them as right or wrong statements (i.e., it is nonjudgmental). Such meditation practices shift attention from repetitive thoughts to the present moment, improving

the relationship between thoughts and feelings, providing a broader perspective, and thus differentiating emotional processes from negative thoughts. Regular MBCT practice can reduce rumination, thereby lowering the risk of depressive relapse (Crane et al, 2008; Teasdale et al, 2000).

Some studies have demonstrated that regular MBCT practice increases cortical thickness in somatosensory system areas, positively correlating with increased body awareness (Braboszcz et al, 2010). Significant improvements in suicide ideation scores were observed in three studies using the Recurrent Suicide Ideation Signature Interview. Although these literature findings are promising, more extensive research is needed for conclusive evidence (Barnhofer et al, 2009).

Anxiety Disorder

AD is characterized by excessive and uncontrollable worries and is associated with other ADs, depression, and a range of physical health issues (Shihata et al, 2017). Pharmacotherapy is often the first treatment option (Mennin et al, 2004). However, it is associated with a relatively high rate of relapse and uncertain long-term effects after discontinuation of the medication, emphasizing the need for psychological treatments (Fava et al, 2004; Roy-Byrne et al, 2005).

Researchers have conducted meta-analyses on various face-to-face and online MBIs to improve anxiety symptoms in specific populations (Kang & Myung, 2022; Zhang et al, 2022; Zhou et al, 2020; Zhu et al, 2022). For example, Lin and Lin found that MBIs significantly improved anxiety in patients with cancer (Lin et al, 2022). Similarly, Spijkerman and Bohlmeijer found that online MBIs had a negligible effect on anxiety (Spijkerman et al, 2016). In addition, Witarto et al. Found that online MBIs could improve the severity level of anxiety in adults during the COVID-19 pandemic (Witarto et al, 2022).

In another study investigating the effect of MBCT on AD, significant improvements were reported in pathological worries, stress, quality of life, and other residual symptoms post-treatment. However, the effect size of the improvement in pathological worries was reportedly very small (Craigie et al, 2008). Again, more extensive studies are warranted for definitive conclusions.

Substance Abuse

Substance abuse is a widespread global public health issue. In 2013, approximately 250 million people worldwide used illegal drugs, with 27 million identified as problematic users (United Nations Office of Drugs and Crime (2015). 2015 World Drug Report Finds Drug Use Stable, Access to Drug & HIV Treatment Still Low, n.d.). Over the past 5 years, the prevalence of illegal drug use has increased globally (United Nations Office of Drugs

and Crime (2015). 2015 World Drug Report Finds Drug Use Stable, Access to Drug & HIV Treatment Still Low, n.d.). Despite various evidence-based treatments for substance abuse issues, outcomes remain insufficient, with relapse rates of up to 60% in the year following treatment (Maisto et al, 2003; Witkiewitz & Masyn, 2008). Consequently, there is a need for cost-effective treatments that reduce substance use and prevent relapse.

Mindfulness training is recognized as a promising treatment for substance abuse (Chiesa & Serretti, 2014; Katz & Toner, 2013; Zgierska et al, 2009). Researchers have evaluated how mindfulness practices can alter the risk mechanisms underlying addictive behaviors, intense cravings, and relapse. These practices can enhance an individual's metacognitive awareness related to intense cravings, substance-seeking, and use as well as improve attention to triggers and impulses, thereby interrupting the cycle of cognitive, emotional, and psychophysiological mechanisms through learned positive coping strategies (Garland, Manusov, et al, 2014; Witkiewitz et al, 2014). In addition, mindfulness can facilitate the disengagement of attention from substance-related cues and reduce attentional bias toward them (Garland, Froeliger, et al, 2014b). Moreover, it enables individuals to not react to stress or impulses to use substances by enhancing metacognitive awareness of the present moment experience (Garland, 2014). This awareness can increase nonreactivity to unwanted thoughts and psychoactive substance use impulses, thereby preventing the intensification of cognitions that could promote relapse after suppression (Garland et al, 2016; Garland, Manusov, et al, 2014; Tiffany & Conklin, 2000). Mindfulness practices, including mindful breathing and body scan exercises, help individuals become less sensitive to distressing events that often lead to substance abuse. By focusing on breathing or other positive stimuli, these practices can redirect attention away from triggers (Garland, Froeliger, et al, 2014b; Witkiewitz et al, 2014). Mindfulness training is also effective in managing stress and reducing the use of substances as a response to stress (Garland, Froeliger, et al, 2014a; Kabat-Zinn & Hanh, 2009). Neurobiological research shows that mindfulness can change brain functions and thought processes related to fixation and reactions to substance-related cues, thereby decreasing the likelihood of intense cravings and the risk of relapse (Garland, Froeliger, et al, 2014a; Hölzel et al, 2011).

Various MBIs have been thoroughly investigated for their effectiveness in substance abuse treatment. These include Vipassana Meditation (VM) courses (Bowen et al, 2006), MBSR (Davis et al, 2007), MBRP (Bowen et al, 2009), Mindfulness-Oriented Recovery Enhancement (Garland et al, 2016; Garland, Manusov, et al, 2014), modified mindfulness training for smoking cessation (Davis et al., 2014), and treatments that combine mindfulness training with therapeutic community approaches.

These treatments have been examined for their impact on increasing abstinence, reducing substance abuse, cravings, and negative consequences of substance misuse. Moreover, they have been assessed for secondary benefits, such as improved emotional and behavioral functioning, psychosocial well-being, and treatment adherence (Chiesa & Serretti, 2014).

VM, which is deeply rooted in Buddhist tradition, involves a standard 10-day group course of extensive silent meditation, teaching participants to accept thoughts without reacting and to be more aware of experiences such as cravings. This increased mindfulness can help distance oneself from compulsive thought patterns (Bowen et al, 2006). VM has been demonstrated to reduce recidivism, psychiatric symptoms, and hostility (Walton et al, 2014), and its effectiveness in reducing substance abuse has been investigated in adults within the criminal justice system (Bowen et al, 2006).

MBRP combines formal mindfulness practices, motivational interviewing, and cognitive therapy for relapse prevention. It draws from two established mindfulness interventions, namely, MBSR, which integrates mindfulness meditation with cognitive therapy to address stress and mental distress, and MBCT, which is designed to prevent relapse into major depressive episodes. MBRP includes structured 8-week group sessions and daily home practices and has been adapted to cater to diverse client populations with varying issues on substance abuse (Bowen, Chawla, et al, 2014).

MORE is a structured treatment that merges formal mindfulness training, elements of “third-wave” CBT, and principles of positive psychology. Initially developed for alcohol dependency, MORE has also been applied to prescription opioid misuse, chronic pain, and psychiatric distress. It typically involves 10-week group sessions and homework assignments, with strategies derived from behavioral science and neuroscience to modify maladaptive coping mechanisms and automatic habits associated with addictive behaviors (Garland, Froeliger, et al, 2014b).

Psychosis

Annually, 15 in every 100,000 people worldwide go through their initial episode of psychosis (McGrath et al, 2008). These episodes are distinguished by symptom clusters that impair function due to changes in perception, thinking, emotion, and behavior (Larson et al, 2010). Psychosis typically begins between the ages of 15 and 25, significantly hindering an individual’s progress in social, academic, and career development (Kessler et al, 2007).

In the last decade, there has been a growing focus by medical professionals and researchers on the effectiveness of MBIs in the treatment of psychotic disorders, including schizophrenia spectrum disorders, bipolar disorder, and psychosis induced by

substances (Shonin et al, 2014). Several RCTs evaluating MBIs for those with psychotic disorders have been conducted, with meta-analyses of these trials yielding encouraging outcomes (Burhan & Karadere, 2021). When compared with conventional care, MBIs have proven to be statistically and clinically beneficial in lessening symptoms of psychosis both after the intervention and during follow-up periods as well as enhancing various other psychosocial factors (Jansen et al, 2020; Liu et al, 2021; Louise et al, 2018; Yip et al, 2022). MBIs target the crucial recovery aspects of accepting the illness and detaching from illness experiences in psychosis (Windell & Norman, 2013). This approach can decrease the distress and dysfunction associated with the positive symptoms of psychosis without directly confronting or interrogating the beliefs underlying psychosis (Dannahy et al, 2011). In addition, MBIs are particularly effective in managing issues such as social isolation, stress in personal relationships, and feelings of anxiety and depression among those with severe mental health conditions (Davis & Kurzban, 2012). A recent systematic review demonstrated the potential of MBIs as a promising intervention for individuals in the early stages of psychosis, considering aspects such as feasibility (i.e., recruitment, retention, engagement), acceptability (i.e., patient satisfaction), and possible clinical advantages (i.e., reduction in psychotic symptoms) (Li et al, 2021). Nevertheless, there is a clear need for RCTs explicitly designed to evaluate the impact of MBIs on both immediate and long-term clinical outcomes in individuals in the early phases of psychotic illness.

CONCLUSION

Mindfulness and acceptance-based interventions, including DBT, ACT, MBSR, and MBCT, represent the “third wave” in the evolution of cognitive-behavioral therapies. Research has shown that these therapies can effectively alleviate symptoms of both physical conditions, such as chronic pain, and mental health issues, such as depression and anxiety. While numerous studies and publications have investigated these topics, the present study aimed to present a concise and clear review, thereby facilitating easier access to this information for clinical application.

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