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Review Article

Mindfulness meditation for workplace wellness: An evidence map

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Abstract.

BACKGROUND: Mindfulness interventions aim to foster greater attention and awareness of present moment experiences. Uptake of mindfulness programs in the workplace has grown as organizations look to support employee health, wellbeing, and performance.

OBJECTIVE: In support of evidence-based decision making in workplace contexts, we created an evidence map summarizing physical and mental health, cognitive, affective, and interpersonal outcomes from systematic reviews of randomized controlled trials (RCTs) of mindfulness interventions.

METHODS: We searched nine electronic databases to July 2017, dually-screened all reviews, and consulted topic experts to identify systematic reviews on mindfulness interventions. The distribution of evidence is presented as an evidence map in a bubble plot.

RESULTS: In total, 175 systematic reviews met inclusion criteria. Reviews included a variety of mindfulness-based interventions. The largest review included 109 randomized controlled trials. The majority of these addressed general health, psychological conditions, chronic illness, pain, and substance use. Twenty-six systematic reviews assessed studies conducted in workplace settings and with healthcare professionals, educators, and caregivers. The evidence map shows the prevalence of research by the primary area of focus. An outline of promising applications of mindfulness interventions is included.

CONCLUSIONS: The evidence map provides an overview of existing mindfulness research. It shows the body of available evidence to inform policy and organizational decision-making supporting employee wellbeing in work contexts.

Keywords: Systematic review, organizational behavior, complementary and integrative health

1. Introduction

Increased use of the complementary integrative health practice called “mindfulness meditation” is evident in occupational health. Based on ancient Eastern meditation practices, mindfulness is a

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non-religious practice that facilitates an attentional stance of detached observation. It is characterized by paying attention to the present moment with openness, curiosity, and acceptance [1, 2]. Psychologists and medical providers have turned to mindfulness for therapeutic use and created manualized protocols to treat a myriad of clinical conditions such as stress and chronic pain. Non-clinical populations are using these protocols to support wellness. The most commonly used ones are described in Table 1 [1].

Organizations are adopting approaches such as mindfulness to improve workplace functioning and support optimal performance of employees [3]. Prominent companies such as Google, Aetna, and General Mills are offering employees mindfulness training to improve their effectiveness [4] and thirteen percent of U.S. workers report engaging in mindfulness-enhancing practices [5]. Empirical research on the effectiveness of mindfulness in the workplace has accelerated [6–8]. Emerging literature in organizational psychology and management suggests that mindfulness is linked to better workplace functioning [9] and recent findings from research on human service professionals suggest that cultivating resilience and mindfulness may assist in preventing psychological distress burnout and secondary traumatic stress [10]. By far the largest base of evidence is found in disciplines such as biomedicine and health, evaluating physical, mental, cognitive, affective, and interpersonal outcomes.

1.1. Objective

The aim of this evidence mapping study is to present an overview of mindfulness intervention research and summarize the vast body of findings on health and wellness for evidence-based decision-making in workplace contexts.

2. Methods

Evidence maps are umbrella reviews that are based on a systematic search of a broad research field [11]. Systematic reviews search multiple sources, screen studies against inclusion and exclusion criteria, and summarize results across studies, often aggregating data in meta-analyses. To give a broad indication of the effectiveness of mindfulness interventions, we used the results reported across randomized controlled trials (RCTs) as they provide the most rigorous research design for intervention assessment.

2.1. Data sources and searches

We searched AMED (Allied and Complementary Medicine database), Campbell Collaboration database, CDSR (Cochrane Database of Systematic Reviews), CINAHL, DARE (Database of Abstracts of Reviews of Effects), PsycINFO, PubMed, Scopus, and the Web of Science to identify English-language

Table 1
Interventions based on Mindfulness Meditation

Name	Description
Mindfulness-Based Stress Reduction (MBSR)	In addition to mindfulness meditation, MBSR involves teaching of body scan or yoga to encourage open non-judgmental observation and acceptance of painful or unpleasant sensation, negative thoughts, or emotions instead of cognitively appraising them, and increasing anticipatory anxiety, avoidance, or other maladaptive patterns.
Mindfulness-Based Cognitive Therapy (MBCT)	In addition to mindfulness meditation, MBCT encourages acceptant non-judgmental observation of negative thoughts and emotions instead of their cognitive appraisal triggering ruminative negative thoughts, and habitual emotional reactivity.
Mindfulness-Based Relapse Prevention (MBRP)	In addition to mindfulness meditation, MBRP teaches relapse prevention skills, and non-judgmental, open and acceptant observation of cravings. It aims to decouple the negative thoughts and emotions that are associated with cravings, and relapse.
Mindfulness Training for Smoking (MTS)	In addition to mindfulness meditation, MTS provides targeted training in how to apply mindfulness to specific determinants of a particular condition, for example used for smoking cessation.
Mindfulness-Oriented Recovery Enhancement (MORE)	In addition to mindfulness meditation, MORE teaches neutral, open, and acceptant observation of painful sensations. It also incorporates positive psychology, and behavioral techniques directed towards neuroscientific underpinnings of addiction.

systematic reviews focusing on mindfulness interventions from database inception to July 2017. Additionally, we screened published reviews of reviews and consulted with topic experts. This research builds on a larger project to inform evidence-based decision making at the US Department of Veterans Affairs [12]. The project was supported by an expert panel.

2.2. Study selection

To be included in the evidence map, publications had to meet the following four criteria. First, they had to be **systematic reviews** of mindfulness interventions summarizing primary research. We included publications that self-identified as a “systematic review,” documented the search sources, and accounted for identified studies. Reviews including community dwelling participants using mindfulness for any health-related indication were eligible. Reviews of adults or unspecified age groups were included; reviews exclusively focusing on children, adolescents, or elderly participants were excluded. In addition, broad reviews not specific to mindfulness were eligible if the term “**mindfulness**” was part of the search strategy and reviews with search strategies that did not specify any intervention (*e.g.*, focused on a patient population) and that identified mindfulness studies were also included. Reviews that included mindfulness studies but did not systematically search for these (*e.g.*, by reviewing “meditation” interventions where only those mindfulness studies were found that used the descriptive term “meditation”) were excluded. Third, **health and wellbeing** measures, including physical, mental, cognitive, and affective outcomes were eligible. We included clinical conditions or wellness outcomes that affect working adults (*e.g.*, diabetes or depression) but we excluded psychosis or intellectual disability-focused reviews. Frequency of use, cost, study design features, intervention features, or physiological or mechanistic outcomes (*e.g.*, neurobiological changes) were also excluded. We included **English-language** reviews regardless of language of included studies and publication date.

Two literature reviewers independently screened the search results. Citations deemed potentially relevant by at least one reviewer were obtained as full text. Full text publications were screened against the inclusion criteria by both independent reviewers; disagreements were resolved through discussion. We

documented reasons for exclusion and recorded the literature flow in an electronic database.

2.3. Data abstraction and critical appraisal

A content expert and experienced systematic reviewer extracted the review topic, number of included mindfulness RCTs, the comparator, and the results using a pilot tested data extraction form. We documented the format type of mindfulness intervention used, differentiating structured programs such as Mindfulness Based Stress Reduction (MBSR) or Mindfulness Based Cognitive Therapy (MBCT), and other mindfulness-based intervention approaches. We abstracted the author-reported results using the documented metrics such as standardized mean differences (SMD) together with the 95% confidence interval (CI). To address the validity of the systematic review, we extracted whether the review was published by an organization known for their expertise and high quality systematic reviews (*e.g.*, Cochrane reviews).

2.4. Data synthesis and analysis

The evidence base was distilled into a broad visual overview using the format of a bubble plot. We used five dimensions to display information: the x-axis; y-axis; and the number, size, and color of the bubbles.

Topic (number of bubbles): We used the topics reported by the review authors to categorize the reviews. Reviews focused on outcomes or clinical indications. All identified systematic reviews were allocated to a single content area and did not enter the bubble plot multiple times. **Literature size** (y-axis): We used the number of included RCTs in the largest review on a topic area as the research volume estimate. The plot includes systematic reviews that have explicitly searched for RCTs but did not find any on the topic. Reviews vary in their inclusion criteria but a well-established research design, such as an RCT, is likely to be included in all reviews and provides a broad estimate of the research volume. **Effect** (x-axis): The evidence map provides a very broad indication of the effectiveness of mindfulness interventions per the outcomes reported in RCTs (differentiating evidence of potentially no effect, unclear evidence, and evidence of a potential positive effect). Most emphasis was given to the largest review (which should provide the most complete literature synthesis), Cochrane reviews (given their methodological rigor), or reports from agencies specializing

in unbiased systematic reviews such as Agency for Healthcare Research and Quality (AHRQ) reports. **Systematic reviews** (bubble size): We used the size of the bubble to document the number of reviews on the topic. **Workplace setting** (color): We highlighted evidence exclusively addressing workplace interventions and employee wellness (i.e., social workers, healthcare providers).

The evidence base was summarized in a narrative synthesis. All included systematic reviews are included in the reference section to provide more information for the interested reader.

3. Results

The search identified 1,024 citations. Title and abstract screening yielded 320 publications which we obtained as full text. We identified 175 unique systematic reviews meeting the inclusion criteria [13–187].

The distribution of evidence is shown in Fig. 1. The y-axis shows that many research studies have evaluated mindfulness interventions. The largest review, that included research studies evaluating mindfulness interventions and that reported on health outcomes (**health-all**), included 109 RCTs [21].

The large number of bubbles demonstrates that mindfulness approaches have been applied in a variety of individual applications, addressing different participant groups, clinical indications, or health outcomes. The evidence map differentiated 39 topic areas to document the available research. The number of systematic reviews per topic area ranged from a single review to 18 identified systematic reviews published on the topic.

The evidence map aims to give a broad indication of the effectiveness of the interventions. The map documents that a large proportion of the existing evidence base is unclear with respect to the effectiveness of the interventions. Reviews either included only a single study without replication of results, reported conflicting results across studies or did not provide summary estimates across studies, while reviews sometimes came to different conclusions.

3.1. Mindfulness interventions in work contexts

We identified 28 reviews that addressed the health and wellness of healthcare professionals, social workers, informal caregivers, educators, or general work populations.

Twelve systematic reviews focused on outcomes for **healthcare professionals** [64, 76, 83, 109, 110, 113, 114, 121, 132, 155, 159, 177]. The largest review included 17 RCTs [155], reported positive results, and suggested that MBSR and mindfulness meditation are effective in reducing nurses' state anxiety (SMD -0.78 ; CI -1.39 to -0.18 ; 6 RCTs) and depression (SMD -0.51 ; CI -0.78 to -0.18 , 4 RCTs) but not trait anxiety (SMD -0.67 ; -1.52 , 0.18 ; 3 RCTs) or stress (SMD -0.34 ; CI -2.67 , 1.99 ; 5 RCTs) [155]. A second review reported reduced stress (SMD -0.54 ; CI -0.85 , -0.24 ; 3 RCTs) but no statistically significant effect for anxiety, depression, or burnout [109]. A review on compassion fatigue identified only one relevant RCT [177] and a review on stress management in medical education did not identify any relevant RCTs [64]. The remaining reviews did not provide intervention effect estimates, reported no summary for mindfulness interventions, or did not report effects for RCTs specifically [76, 83, 110, 113, 114, 121, 132, 159].

We identified seven reviews of mindfulness interventions for informal or family **caregivers** [101, 108, 118, 135, 136, 161, 176]; three of these focused exclusively on MBSR and MBCT [101, 108, 136]. A meta-analysis showed positive effects post-intervention for stress (Hedges g 0.57 ; CI 0.23 , 0.92 ; 3 RCTs) and depression (Hedges' g -0.62 ; CI -0.97 , -0.27 ; 3 RCTs) [136]. The other reviews did not present summary effects [116, 132, 156, 169].

Three reviews were found on **educators** and they summarized a mix of MBSR and other mindfulness interventions. The largest review with 12 RCTs found unclear results of an effect of mindfulness on anxiety, depression, stress and burnout [112]. A second review showed unclear evidence for teacher functioning [171] and the third described positive results for teacher well-being and performance but did not provide a summary estimate [167].

Four reviews addressed general **workplace** populations [145, 164, 168, 170]. The largest included nine RCTs evaluating interventions on office staff, healthcare professionals, and teachers and found positive effects on distress but did not report effect estimates for RCT data [145]. Another review focused on job burnout and reported that the majority of the studies showed positive results but did not report an effect estimate [168]. A third review included people who work in manufacturing, healthcare, offices, and schools found mixed results for stress, burnout, and general mental health [170]. A fourth evaluated brief mental health and well-being interventions in

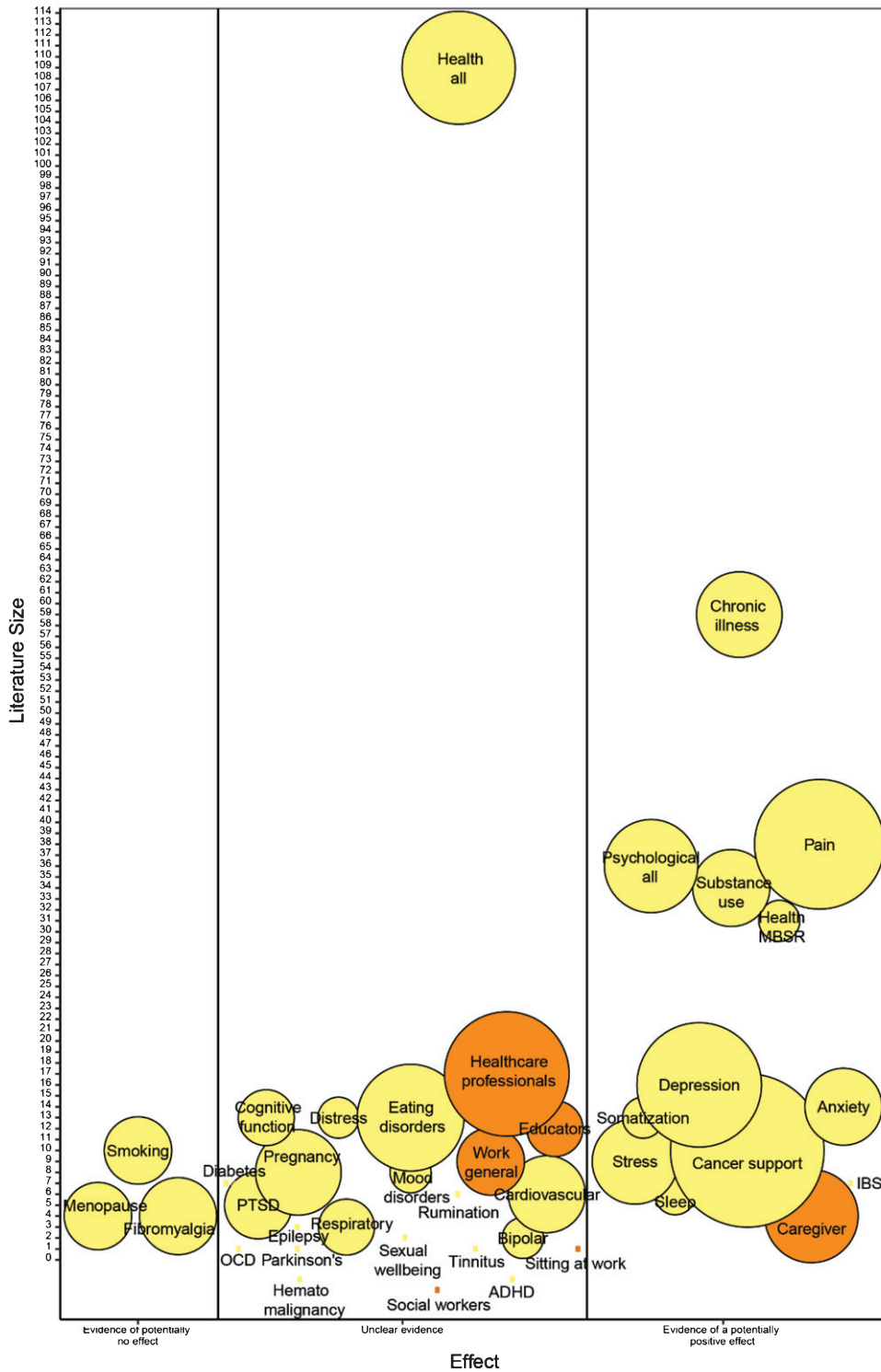


Fig. 1. Mindfulness Meditation for Workplace Wellness.

organizational settings; the review did not stratify effects by intervention but identified one mindfulness meditation study [164].

We identified a Cochrane review dedicated to identifying workplace interventions for reducing **sitting** at work [175]. The review reported that mindfulness training did not reduce workplace sitting time but the result was based on only one study. One review focused exclusively on **social workers** but did not identify any relevant RCTs [146].

3.2. *Most promising areas in health and wellness*

Six systematic reviews addressed mindfulness interventions in **chronic illness** [42, 46, 117, 151, 182, 188]. The largest included 59 RCTs and did not present summary estimates but concluded there is partial evidence for mindfulness-based interventions to provide short-term benefits across a wide range of lifestyle medicine-relevant populations and study outcomes [182]. A review of chronic somatic diseases reported positive effects for psychological distress (SMD 0.32; CI 0.13, 0.50; 3 RCTs), depression (SMD 0.26; CI 0.18, 0.34; 6 RCTs), and anxiety (SMD 0.47; CI 0.11, 0.83; 4 RCTs) comparing MBSR to waitlist and support groups [46]. The remaining reviews did not provide summary effect estimates for mindfulness-based interventions. Many reviews addressed **pain** [28, 30, 40, 81, 88, 130, 149, 152, 156, 165, 179, 184, 186]. The largest review included 38 RCTs on various mindfulness interventions including MBCT, MBSR, and others [130] and found low-quality evidence that mindfulness meditation is associated with a small decrease in pain compared with treatment as usual, passive controls, or education/support groups (SMD, 0.32; 95% CI, 0.09, 0.54; 30 RCTs) and moderate-quality evidence for quality of life from mindfulness meditation as compared with treatment as usual, support groups, education, stress management, and waitlist controls (SMD, 0.49; 95% CI, 0.22, 0.76; 16 RCTs). Similarly, an earlier review reported positive pooled effects (MD -0.96; CI -1.64, -0.34); 4 RCTs) [152] while two other older reviews found no statistically significant effects for pain intensity, pain acceptance, or perceived pain control [88, 186]. Our searches identified five reviews of various mindfulness interventions for **substance use** [25, 50, 73, 134, 173]. The largest review included 34 RCTs [134]. Interventions evaluated in the review included Mindfulness-Based Relapse Prevention (MBRP), Mindfulness-Oriented Recovery Enhancement (MORE), and mindfulness

treatment. The effects of mindfulness interventions compared to psychotherapeutic treatment and inactive controls were positive for substance use measures (Cohen's d -0.33; CI -0.49, -0.17; 6 RCTs) and craving (Cohen's d -0.68; CI -1.11, -0.25; 9 RCTs).

We identified seven systematic reviews that addressed psychological wellbeing (**psychological-all**) [13, 75, 77, 80, 84, 95, 96]. The largest review included 36 RCTs and was based on an AHRQ report on meditation programs for psychological stress and wellbeing, which classified MBSR, MBCT, Vipassana, Zen, and other mindfulness meditation as mindfulness-based [13, 189]. The review reported positive effects for anxiety (Cohen's d 0.38; CI 0.12, 0.64; at 8 weeks; 0.22; CI 0.02, 0.43; at 3–6 months; 8 RCTs total), depression (0.30; CI -0.00, 0.59; at 8 weeks; 0.23; CI 0.05, 0.42 at 3–6 months; 10 RCTs total); and pain (0.33; CI, 0.03 to 0.62; 4 RCTs) compared to control interventions matched in time and attention [13]. The AHRQ report also showed a positive effect on negative affect (general anxiety, stress/distress, and depression outcomes combined; SMD -0.34; CI -0.53, -0.14; 10 RCTs). Data on stress/distress varied by comparator, and the pooled results for the mental health related quality of life, positive affect, and sleep were negative, and there was insufficient evidence for positive mood. Another large review with 17 RCTs reported an effect size of Cohen's d 0.396 (CI 0.19, 0.61; 17 RCTs) across all psychological outcomes compared, primarily, to waitlist [77]. The review considered 48 different psychological variables and reported positive pooled effects for stress (SMD 0.792; CI 0.371, 1.123; 4 RCTs), distress (SMD 0.547; CI 0.193, 0.901; 6 RCTs), depression (SMD 0.512; CI 0.164, 0.861; 5 RCTs), and anxiety (SMD 0.435; CI 0.141, 0.729; 3 RCTs). It concluded that MBSR compared to waitlist is effective across a broad range of psychological outcomes but comparisons with other forms of treatment are less favorable. The Campbell Collaboration review on MBSR also reported positive results for individual as well as combined mental health outcomes (SMD 0.53; CI 0.46, 0.61; 26 RCTs), measures of personal development (SMD 0.50; CI 0.35, 0.66; 12 RCTs), and quality of life (SMD 0.57; CI 0.17, 0.96; 4 RCTs) [79]. The review also addressed other health benefits (**health-MBSR**) and included 31 RCTs [79]. The review included training programs based on the protocol elements specified by Kabat-Zinn (body-scan exercises, mental exercises focusing attention on breathing, physical exercises focusing on the awareness of bodily sensations, and

the practice of being fully aware during everyday activities). It reported positive effects for the combined outcome mental health (SMD 0.53; CI -0.43, 0.64; 26 RCTs) and somatic health (SMD 0.31; CI 0.10, 0.52; 10 RCTs) compared to waitlist and usual care. The review concluded that MBSR has a moderate and consistent effect on many measures of mental health for a wide range of target groups and appears to improve elements of personal development such as empathy and coping, enhances mindfulness and quality of life, and improves some aspects of somatic health. The review also noted that there is a lack of data on social function, work ability, and long-term effects.

We identified 12 systematic reviews focusing on **depression** [32, 35, 37, 51, 56, 66, 70, 74, 85, 87, 106, 119] and the largest included 16 RCTs [119]. Their meta-analysis estimated the effect of MBCT in a group format compared to waitlist or no treatment, and this pooled analyses produced large effects for depression (SMD -0.76; CI -0.95, -0.56; 16 RCTs) [119]. The Campbell Collaboration review on MBSR supported the positive findings (SMD 0.54; CI 0.35, 0.74; 9 RCTs) [79]. Further, an AHRQ report on mindfulness meditation programs reported positive effects for depression (SMD 0.30; CI 0.00, 0.59; at 8 weeks; 0.23; CI 0.05, 0.42 at 3–6 months; 10 RCTs) [13]. We identified 18 systematic reviews that addressed the role of mindfulness interventions in cancer care (**cancer support**) [18, 20, 29, 31, 34, 36, 39, 45, 55, 58, 60, 62, 94, 103, 120, 143, 147, 169, 190]. The largest review included ten RCTs and reported that compared to usual care, significant post-intervention effects of MBSR or MBCT were found for health-related quality of life (SMD 0.21; CI 0.04, .39), fatigue (SMD -0.28; CI -0.43, -0.14), sleep (SMD -0.23; CI -0.40, -0.05), stress (SMD -0.33; CI -0.61, -0.05), anxiety (SMD -.28; CI -0.39, -0.16), and depression (SMD -0.34; CI -0.46, -0.21). Effects were maintained for six months for anxiety and depression but average effects were all below the threshold of minimal clinically important differences. Two other reviews reported positive effects for mental health outcomes (Cohen's *d* 0.37; CI 0.10, 0.64; 4 RCTs) and quality of life (SMD 0.32; CI 0.06, 0.57; 2 RCTs) [20, 55]. The other reviews did not provide summary effects for RCT data on mindfulness interventions. We identified six systematic review addressing **stress** [26, 27, 52, 100, 104, 148]; the largest one focused on undergraduate students and included nine RCTs [100]. The second largest review reported a summary effect estimate, indicat-

ing a medium effect for perceived stress (Hedges *g* 0.432; CI 0.202, 0.662; 8 RCTs) [104].

Positive effects were also found across studies and reviews for **somatization**, **anxiety**, irritable bowel syndrome (**IBS**), sleep, and, as discussed above, **caregivers**, but the areas have a smaller evidence base, both in terms of primary research and published reviews.

4. Conclusion

The evidence map provides a broad overview of the available research evidence on mindfulness interventions. These findings support and extend the current efforts underway to apply mindfulness interventions in work contexts to enhance employee health, wellness, and performance [3, 9, 191]. Most research is related to general overviews of health benefits. Evidence of potential positive effects is documented for the topic areas chronic illness, pain, substance use, depression, anxiety, perceived stress, somatization, cancer support, and IBS. Mindfulness interventions appear to have general benefits for a range of psychological variables and research shows effects of MBSR on a variety of health outcomes and positive effects on caregivers have been documented. Mindfulness interventions have been applied to a large range of clinical indications but many areas are still based on only a small number of robust research studies.

The evidence summarizing workplace mindfulness interventions focused on groups of professionals and healthcare providers in particular. Systematic reviews of RCTs conducted in work contexts show promise for healthcare providers, nurses, and medical students but require further research for more definitive evidence statements. Positive effects are documented for caregiver burden in caregivers. These findings echo evidence from the organizational science literature [192]. Findings of effects of mindfulness interventions for educators were mixed. Additionally, barriers of feasibility and sustainability of interventions for healthcare professionals may exist, requiring further exploration [193, 194].

The evidence map has several limitations. First, the map only provides a broad overview and is not designed to provide detailed and definitive information on the effectiveness of interventions. Interested stakeholders should review the identified systematic reviews of interest to obtain a more detailed summary. Furthermore, the evidence suggests differential effects of MBSR, MBCT, and other

mindfulness-based interventions, and definitions of “mindfulness-based” varied widely in the studies contributing to the research field. Effects of interventions are likely to vary by intervention characteristics and the comparator and the available research is based on a large spectrum of interventions. Interventions included reviews contributing to the evidence map were offered by healthcare professionals in a clinical context and it is unclear how easily the approaches will translate to work context applications (e.g., a mindfulness meditation course for employees to support wellbeing or work performance). Finally, this evidence map was designed to support wellbeing in the workplace and excluded interventions for clinical indications such as psychosis; more information on topics outside the scope of work can be found in an earlier clinically-oriented research report [12].

This evidence map provides a very broad overview of the evidence base indicating areas in which research has been conducted. The results can be used to help workplace setting stakeholders interpret the state of the evidence. The map aims to inform policy and organizational decision making in support of employee wellbeing in work contexts.

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Conflict of interest

None of the authors have any conflict of interest to declare.

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