



Effects of mindfulness exercises as stand-alone intervention on symptoms of anxiety and depression: Systematic review and meta-analysis



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ABSTRACT

Mindfulness-based interventions (MBIs) are currently well established in psychotherapy with meta-analyses demonstrating their efficacy. In these multifaceted interventions, the concrete performance of mindfulness exercises is typically integrated in a larger therapeutic framework. Thus, it is unclear whether stand-alone mindfulness exercises (SAMs) without such a framework are beneficial, as well. Therefore, we conducted a systematic review and meta-analysis regarding the effects of SAMs on symptoms of anxiety and depression. Systematic searching of electronic databases resulted in 18 eligible studies ($n = 1150$) for meta-analyses. After exclusion of one outlier SAMs had small to medium effects on anxiety ($SMD = 0.39$; $CI: 0.22, 0.56$; $PI: 0.07, 0.70$; $p < .001$, $I^2 = 18.90\%$) and on depression ($SMD = 0.41$; $CI: 0.19, 0.64$; $PI: -0.05, 0.88$; $p < .001$; $I^2 = 33.43\%$), when compared with controls. Summary effect estimates decreased, but remained significant when corrected for potential publication bias. This is the first meta-analysis to show that the mere, regular performance of mindfulness exercises is beneficial, even without being integrated in larger therapeutic frameworks.

Mindfulness can be defined as a specific form of attention that is (1) focused on the present moment, (2) intentional, and (3) non-judgmental (Kabat-Zinn, 1990). Having its origins in an Eastern Buddhist tradition that is over 2500 years old, it is currently well established in cognitive-behavioral therapy (CBT) and most prominently applied in structured, manualized group settings, like mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1990) or mindfulness-based cognitive therapy (MBCT; Segal, Williams, & Teasdale, 2002). In these interventions, participants intensively practice mindfulness both during group sessions and by means of daily homework. Additionally, the eight sessions are supplemented with specific contents regarding coping with stress or depressive symptoms.

The efficacy of mindfulness-based interventions (MBIs) is sufficiently confirmed with meta-analyses demonstrating moderate to strong effect sizes for the reduction of anxiety and depression (Hofmann, Sawyer, Witt, & Oh, 2010; Khoury, Sharma, Rush, & Fournier, 2015; Khoury et al., 2013). These findings are of particular importance, as anxiety and depression are the two most frequent mental health problems (Somers, Goldner, Waraich, & Hsu, 2006; Waraich, Goldner, Somers, & Hsu, 2004). With a life time prevalence of 20% for

anxiety and 30% for depression, these mental problems cause high economic costs (Fluckiger, Del Re, Munder, Heer, & Wampold, 2014). Furthermore an analysis of disease burden shows that depression and anxiety together account for 55.1% of all disability-adjusted life years attributable to mental and substance disorders (Whiteford et al., 2013).

Mindfulness is theoretically assumed to be the central change mechanism of MBIs (Kabat-Zinn, 1982; Segal et al., 2002). However, MBIs comprise several other components, including psychoeducation and group-related factors, such as group cohesion and social support (Chiesa & Serretti, 2011; Toneatto & Nguyen, 2007; Williams et al., 2014). Additionally, mindfulness itself is not only cultivated by performance of mindfulness exercises, but also by a teacher introducing the concept and encouraging participants to reflect on experiences generated during the practice of mindfulness (*inquiry*). Due to this intertwining, it remains unclear whether mindfulness exercises are beneficial as a stand-alone intervention. In the present systematic review and meta-analysis, we define stand-alone mindfulness exercises (SAMs) as the isolated, regular performance of mindfulness exercises. In a prototypical SAM intervention, individuals merely practice a specific mindfulness exercise (e.g. bodyscan) over a certain time span. Thus, by

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contrast with manualized mindfulness interventions, SAMs do not include additional components such as psychoeducation and group related factors.

From mediation analyses and dismantling studies, there are contradictory findings regarding potential effects of SAMs. On the one hand, mediation analyses moderately support the theory that an increase in participants' dispositional mindfulness accounts for the beneficial effects of MBIs (Gu, Strauss, Bond, & Cavanagh, 2015; van der Velden et al., 2015). Hence, one could assume that SAMs are also capable of increasing mindfulness, which, in turn, should result in a reduction of anxiety and depression. On the other hand, dismantling studies did not find significant differences between MBCT and a structurally matched active control group, thereby questioning the contribution of the mindfulness component (Shallcross et al., 2015; Williams et al., 2014). In view of this rather inconclusive evidence, further research is needed to clarify the effects of SAMs. This is especially because of mediation analyses and dismantling studies not directly targeting SAMs: While mediation analyses do not test whether observed increases in mindfulness are due to the performance of mindfulness exercises, dismantling studies examine the mindfulness component in the context of already working treatment conditions.

Taken together, there is a research gap concerning the effects of isolated mindfulness exercises that are not integrated in a structured intervention. Therefore, the aim of the present systematic review and meta-analysis is to systematically aggregate the evidence regarding the reduction of symptoms of anxiety and depression through SAMs. We specifically focus on symptoms of anxiety and depression as this parallels meta-analyses of manualized MBIs (Hofmann et al., 2010; Khoury et al., 2013, 2015) thereby maximizing comparability. A meta-analysis of SAMs is highly relevant, both from a conceptual and a practical perspective. Conceptually, the results can foster our understanding of mindfulness exercises as one specific component of MBIs. Studying one specific component in greater detail is in line with recommendations to increase the public health impact of research on MBIs (Dimidjian & Segal, 2015). From a practical perspective, the study of SAMs can deliver ideas concerning the implementation of mindfulness exercises as a single component into routine therapy: If SAMs exhibit effects on symptoms of anxiety and depression, the two most common mental health problems (Fluckiger et al., 2014), mindfulness exercises could be considered a form of a brief, mostly self-guided, intervention that can be recommended to patients or non-clinical populations. In the present systematic review and meta-analysis, we hypothesize that SAMs have small to medium effects on the reduction of anxiety and depression when compared with controls.

1. Methods

1.1. Eligibility criteria

The systematic review and meta-analysis were designed and conducted according to the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA; Moher, Liberati, Tetzlaff, & Altman, 2009) statement. Inclusion criteria were specified in advance and documented in a protocol at PROSPERO (https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=33441).

1.1.1. Intervention

Only studies investigating the effect of SAMs were reviewed. To be eligible, interventions had to meet the following inclusion criteria: (a) The intervention exclusively consists of the repeated performance of mindfulness exercises (e.g. bodyscan, breathing space). Interventions incorporating a brief introduction to the concept of mindfulness or the particular exercise were included only if a clear focus is given to the performance of mindfulness exercises. (b) Following Bishop et al. (2004) operational definition of mindfulness, exercises were considered mindful if they (1) involved self-regulation of attention on immediate

experience, and (2) emphasized an attitude of curiosity, openness and acceptance. Exercises were permitted to vary over the course of the intervention (e.g., participants were given an audio CD with various mindfulness exercises). Regarding treatment modality both face-to-face (exercise guided by a clinician) and online interventions (via downloadable audiotapes) were included. We specifically excluded: (a) Manualized interventions that go beyond the mere performance of mindfulness exercises by incorporating additional (unspecific) components (e.g., group discussions, psychoeducation). Hence, established mindfulness interventions (e.g., MBSR, MBCT) or other psychotherapeutic approaches relying on mindfulness (e.g., DBT, ACT) were not included in the scope of this review. (b) Interventions incorporating compassion-focused approaches (e.g., loving kindness meditation). These approaches are considered to be promising mindfulness-related psychotherapeutic techniques, but do not fit the rather narrow operational definition of mindfulness we pursued in the present examination.

1.1.2. Comparator

To be eligible, studies had to compare SAMs to a control condition.

1.1.3. Outcome

Studies had to contain a validated, continuous clinical measure of anxiety and/or depression and provide data before and after the intervention.

1.1.4. Participants

Participants had to be at least 18 years old. Both non-clinical and clinical samples were eligible.

1.1.5. Study design

Controlled trials; both inactive and active control conditions were included.

1.2. Search strategy

PsycINFO and PubMed were searched on February 24, 2016, using the following, pre-defined search terms. PsycINFO: (mindful* or meditat* or bodyscan or breathing space) AND (brief or short* or exercise or training or session-introducing or intervention or time-limited or single or internet or low-intensity or audio* or induc* or condition or smartphone). PubMed: (mindful*[tiab] or meditat*[tiab] or bodyscan [tiab] or breathing space [tiab] or mindfulness[MeSH] or meditation [MeSH]) AND (brief[tiab] or short*[tiab] or exercise[tiab] or training [tiab] or session-introducing[tiab] or intervention[tiab] or time-limited [tiab] or single[tiab] or internet[tiab] or low-intensity[tiab] or audio*[tiab] or induc*[tiab] or condition[tiab] or smartphone[tiab] or Psychotherapy, Brief[MeSH]). Studies had to be published after 1980 and written in English or German. On August 17, 2017, the search was updated by entering the same search terms again. Additionally, reference lists of selected studies were inspected.

1.3. Study selection

After removal of duplicates, the first author (PB) screened titles and abstracts. Only clearly non-eligible studies (e.g. theoretical papers, study protocols) were excluded at this stage. The first (PB) and second (SP) authors then assessed full texts of the remaining studies and independently judged their eligibility based on the aforementioned inclusion criteria. Disagreement was resolved by discussion including the last author (JM). Finally, authors of eligible studies were contacted when studies did not provide sufficient data for effect size calculation.

1.4. Coding procedures

A data extraction sheet was developed by the last author (JM), and the first (PB) and second (SP) authors independently collected the

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