Review

Mindfulness-based interventions for psychiatric disorders: A systematic review and meta-analysis

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HIGHLIGHTS

- We examined the relative efficacy of mindfulness-based interventions on clinical symptoms of psychiatric disorders.
- 142 randomized clinical trials were included (N = 12,005 participants). Control conditions were coded on a five-tier system.
- At post-treatment, mindfulness interventions were equivalent to evidence-based treatments and superior to other comparisons.
- At follow-up, mindfulness interventions were equivalent to minimal and evidence-based treatments and superior to others.
- The most consistent evidence for mindfulness-based interventions was seen for depression, pain, smoking, and addictions.

ARTICLE INFO

ABSTRACT

Despite widespread scientific and popular interest in mindfulness-based interventions, questions regarding the empirical status of these treatments remain. We sought to examine the efficacy of mindfulness-based interventions for clinical populations on disorder-specific symptoms. To address the question of relative efficacy, we coded the strength of the comparison group into five categories: no treatment, minimal treatment, non-specific active control, specific active control, and evidence-based treatment. A total of 142 non-overlapping samples and 12,005 participants were included. At post-treatment, mindfulness-based interventions were superior to no treatment ($d = 0.55$), minimal treatment ($d = 0.37$), non-specific active controls ($d = 0.35$), and specific active controls ($d = 0.23$). Mindfulness conditions did not differ from evidence-based treatments ($d = -0.004$). At follow-up, mindfulness-based interventions were superior to no treatment conditions ($d = 0.50$), non-specific active controls ($d = 0.52$), and specific active controls ($d = 0.29$). Mindfulness conditions did not differ from minimal treatment conditions ($d = 0.38$) and evidence-based treatments ($d = 0.09$). Effects on specific disorder subgroups showed the most consistent evidence in support of mindfulness for depression, pain conditions, smoking, and addictive disorders. Results support the notion that mindfulness-based interventions hold promise as evidence-based treatments.

1. Introduction

Mindfulness-based interventions have experienced a marked increase in scientific and popular interest in the past two decades. Recent commentaries have, however, raised questions regarding the evidence base for this family of therapies. Farias, Wikholm, and Delmonte (2016) voiced several concerns, particularly the use of non-active control conditions (i.e., waitlist controls) in randomized clinical trials (RCTs) of mindfulness therapies along with a lack of specificity regarding outcomes that these treatments may or may not impact. Others have questioned the degree to which selective reporting of results may introduce systematic bias into the literature, thereby overstating the

efficacy of mindfulness-based interventions (Coronado-Montoya et al., 2016).

One recent meta-analysis estimated the effects of meditation-based interventions (including mindfulness as well as other meditative techniques) compared to active control conditions that, analogous to placebos in pharmaceutical trials, provide non-specific treatment ingredients (e.g., expectancy; Goyal et al., 2014). While mindfulness meditation programs showed effects on anxiety, depression, and pain when compared with non-specific treatment controls, there was no evidence that these treatments were superior to specific active controls (i.e., other active treatments).

The current meta-analysis was intended to further interrogate the findings of Goyal et al. (2014). We conducted a comprehensive meta-analysis of RCTs examining the effects of mindfulness-based interventions on disorder-specific symptoms across psychiatric populations. Rather than restrict our sample to certain types of comparison conditions, we aimed to evaluate empirically the degree to which outcomes are influenced by the characteristics of the control group. A more nuanced comparison to type of control condition may provide clinicians important information regarding when a mindfulness intervention should be favored compared to other known interventions. While other comprehensive meta-analyses have suggested that mindfulness-based interventions can impact clinical outcomes (e.g., anxiety, depression; Khoury et al., 2013), and several meta-analyses have examined the evidence for specific psychiatric conditions (e.g., Attention Deficit and Hyperactivity Disorder [ADHD]; Cairncross & Miller, 2016), no published comprehensive meta-analytic review has examined effects on disorder-specific symptoms across psychiatric conditions. Our study sought to examine: (1) the degree to which mindfulness-based interventions compare with a variety of control conditions, including treatments with established efficacy (i.e., evidence-based treatments); (2) for which specific disorders mindfulness-based interventions appear most efficacious, and (3) potential sources of bias.

2. Method

2.1. Eligibility criteria

We included all RCTs of mindfulness-based interventions for adult patients with psychiatric diagnoses for which there are evidence-based treatments per the American Psychological Association's (APA, 2017) Division 12 (Society of Clinical Psychology; see Supplemental materials Table 1a). To be eligible, samples had to have either a formal diagnosis or elevated symptoms of a given disorder (i.e., above a given cut-off on a symptom inventory, e.g., score greater than five on the Pittsburgh Sleep Quality Index, score > 13 on the Beck Depression Inventory – II; Asl & Barahmand, 2014; Beck, Steer, & Brown, 1996; Black, O'Reilly, Olmstead, Breen, & Irwin, 2015; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). Samples receiving treatment within a facility focused on a specific disorder (e.g., substance abuse treatment) were included. Elevated stress levels alone were not considered to reflect a clinical condition.

To qualify, interventions had to have mindfulness meditation as a core component with home meditation practice as a treatment ingredient. While interventions combining mindfulness with other modalities (e.g., mindfulness and cognitive techniques as in Mindfulness-Based Cognitive Therapy [MBCT]; Segal, Williams, & Teasdale, 2002) were included, therapies emphasizing the attitudinal stance of mindfulness (rather than the formal practice of mindfulness meditation) were excluded (e.g., Acceptance and Commitment Therapy [ACT], Dialectical Behavior Therapy [DBT]; Hayes, Strosahl, & Wilson, 1999; Linehan, 1993). Other forms of meditation (e.g., mantram repetition) were excluded. Interventions had to be delivered in real time (i.e., not provided exclusively through video instruction or smartphone app) and had to include more than one session (to allow for home meditation practice). Studies were also excluded for the following reasons: (1) not

published in a peer-reviewed journal in English; (2) not a peer-reviewed article; (3) data unavailable to compute standardized effect sizes; (4) no disorder-specific (i.e., targeted) outcomes reported; (5) data redundant with other included studies; (6) no non-mindfulness-based intervention or condition included.

2.2. Information sources

This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Standards (Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009). We searched the four databases (PubMed, PsycInfo, Scopus, Web of Science) and a publically available comprehensive repository of mindfulness studies (Black, 2012). Citations from recent meta-analyses and systematic reviews were also reviewed. Citations were included from the first available date (i.e., 1966) until January 2nd, 2017.

2.3. Search

We used the search terms "mindfulness" and "random*". When a database allowed, we restricted our search to clinical trials.

2.4. Study selection

Titles and/or abstracts of potential studies were independently coded by the first author and a second co-author. Disagreements were discussed with the senior author until a consensus was reached.

2.5. Data collection process

Standardized spreadsheets were developed for coding both study-level and effect size-level data. Doctoral-level coders were trained by the first author through coding an initial sample of studies ($k = 10$) in order to achieve reliability. Data were extracted independently by the first author and a second co-author. Disagreements were discussed with the senior author. Inter-rater reliabilities were in the good to excellent range (i.e., Ks and ICCs > 0.60; Cicchetti, 1994). When sufficient data for computing standardized effect sizes were unavailable, study authors were contacted.

2.6. Data items

Along with data necessary for computing standardized effect sizes, the following data were extracted: (1) publication year; (2) disorder; (3) intent-to-treat (ITT) sample size; (4) whether an ITT analysis was reported; (5) whether a non-self-report measure was included; (6) sample demographics (mean age, percentage female, percentage non-Caucasian race, percentage with some college education); (7) country of origin; (8) standardized mindfulness intervention on which mindfulness condition was based; (9) whether treatment time was matched between mindfulness and control condition; (10) quality of the control condition. Quality of the control condition was assessed based on a five-tier system with non-overlapping categories. These included: (1) no treatment (in which the control condition received no intervention beyond that which was provided to the treatment condition); (2) minimal treatment (very brief or minimal intensity interventions, e.g., five- to 10-min individual counseling sessions for smoking cessation; Vidrine et al., 2016); (3) non-specific active control (active conditions in which no mechanism of change or clear rationale for treatment was provided, e.g., discussing air travel, shopping, and past residences; Helmes & Ward, 2017); (4) specific active control (contained specific therapeutic mechanisms, has a theoretical/treatment rationale, e.g., Intensive Short-Term Dynamic Psychotherapy; Chavooshi, Mohammadkhani, & Dolatshahee, 2016; Wampold et al., 1997); (5) evidence-based treatment (EBT, e.g., cognitive-behavioral therapy for insomnia; Garland et al., 2014). Comparison treatments were coded as