Efficacy of mindfulness-based interventions on depressive symptoms among people with mental disorders: a meta-analysis
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CRD summary
This review found that mindfulness-based interventions could improve depressive symptoms in adults with mental health disorders. Exposure-based cognitive therapy, mindfulness-based stress reduction, and acceptance-based behavioural therapy, had the largest effects. The variation across the studies means that the authors' conclusions should be interpreted with caution.

Authors' objectives
To evaluate the efficacy of mindfulness interventions for depressive symptoms, in patients with various mental disorders.

Searching
Scopus, CINAHL, PubMed, Science Direct, Web of Science, and PsycINFO were searched to 2011, for relevant studies in English; search terms were reported. DAI, Current Controlled Trials, and ClinicalTrials.gov were searched for unpublished studies, and the reference lists of original articles and meta-analyses were searched for additional studies. Relevant journals were handsearched.

Study selection
Eligible for inclusion were prospective studies that examined the efficacy of mindfulness interventions, for depressive symptoms, in patients aged between 18 and 65 years, who were diagnosed with mental disorders. Eligible studies had to measure depressive symptoms using standardised patient-completed questionnaires or clinician-rated checklists. Any controls had to be treatment as usual, medication, other types of psychotherapy or complementary therapy. Sufficient data had to be provided for the calculation of effect sizes. Studies that used internet-based approaches, or samples without separate results for adults, were excluded from the review.

The included studies were conducted in the USA, the UK, Australia, Canada, Germany, Korea, Belgium, Switzerland or Ireland. The patients in most studies presented with major depressive disorder, bipolar disorder or both, or anxiety disorders; some studies enrolled child-abuse survivors, or patients with multiple mental disorders, various mental and physical health problems, attention-deficit hyperactivity disorder, hypochondriasis, or binge-eating disorders. Depressive symptoms were assessed using a range of scales, including the Beck Depression Inventory, and the Hamilton Rating Scale for Depression. The interventions included cognitive therapy, stress reduction, meditation-based intervention, dialectical behaviour therapy, mindfulness training therapy, exposure-based cognitive therapy, and acceptance-based behaviour therapy. The number of treatment sessions ranged from seven to 24, and the total intervention ranged from six to 30 hours. A range of therapists in psychiatry or psychology, or occupational therapists or students, administered the interventions. The comparators were usual care, scores before intervention, antidepressant medication, education and medication, or cognitive-behavioural therapy, where stated.

Two reviewers selected the studies; any disagreements between selections were resolved by discussion.

Assessment of study quality
Methodological quality was assessed by two reviewers, using an 11-item quality rating index, for clarity of research objectives, descriptions of inclusion and exclusion criteria, power calculations, clear definition of measurements and interventions, randomisation, double-blinding, statistical analyses, and the reporting of withdrawals, dropouts and adverse events. Any discrepancies between assessments were resolved by discussion.

Data extraction
The data were extracted by two independent reviewers to calculate effect sizes, which were the standardised mean differences between the intervention and control groups, before and after intervention. Effect sizes of 0.2 were defined as small, those between 0.2 and 0.5 were moderate, and those over 0.5 were large. Any differences between the two sets...
of extracted data were resolved by discussion.

**Methods of synthesis**

Pooled effect sizes and 95% confidence intervals, for the summary estimates, were calculated using a fixed-effect model. Statistical heterogeneity was assessed using Cochran's Q and I²; and if it was moderate to high, the results were combined using a random-effects model.

Sensitivity analyses were performed to evaluate the effects of studies with different research designs, on the results. Correlation analyses were conducted to examine the relationship between the effect size and moderator variables. The potential for publication bias was evaluated by visual appraisal of funnel plots, and using fail-safe N, file-drawer analysis, and Duval's trim-and-fill method.

**Results of the review**

Thirty-nine studies (n=1,847) were included in the review. Eight were randomised controlled trials, six were stratified randomised controlled trials, five were non-randomised trials, and 20 were studies with a single-group design. Quality scores ranged from 2 to 9, with a mean of 5.69. Randomisation was used in 11 studies, and 16 had at least one control group. Five studies were double blind.

**Intervention versus usual care:** There were statistically significant improvements in depressive symptoms for patients receiving mindfulness-based interventions, compared with usual care (ES 0.53, 95% CI 0.39 to 0.67; I²=44.47%; 11 studies; 19 comparisons). In a sensitivity analysis without the non-randomised controlled trials, the results remained statistically significant with a decreased effect size (ES 0.39, 95% CI 0.23 to 0.55). There was no evidence of publication bias.

**Within-group comparisons:** The mean differences, from 28 studies (76 within-group comparisons), in depressive symptom scores, between before and after mindfulness-based interventions, were pooled. The average effect size was 1.05 (95% CI 0.85 to 1.26; I²=87.11%). The funnel plot for publication bias showed asymmetry, but the result of the fail-safe N was 8,273, indicating that publication bias was unlikely. Subgroup analyses, by type of intervention, produced average-to-large effect sizes. The largest were: exposure-based cognitive therapy (ES 2.09, 95% CI 1.63 to 2.54; I²=0; two comparisons), mindfulness-based stress reduction (ES 1.92, 95% CI 1.01 to 2.83; I²=96.52%; 16 comparisons), and acceptance-based behavioural therapy (ES 1.33, 95% CI 0.91 to 1.74; I²=54.96%, four comparisons). The highest number of comparisons was for mindfulness-based cognitive therapy with an effect size of 0.58 (95% CI 0.49 to 0.68; I²=50.75%; 39 comparisons).

**Types of intervention:** One randomised controlled trial, of mindfulness-based stress reduction therapy versus cognitive-behavioural group therapy, showed no statistically significant difference between treatments, with improvements in depressive symptoms for both. The cognitive-behavioural group therapy was associated with significant reductions in the core symptoms of social anxiety disorder, and reductions in remission and response rates.

The correlation analyses showed that the effect size was significantly associated with the total hours of intervention (r=0.29; p=0.005), but not with quality assessment scores, sample sizes, reliability of measurements, research design, and types and numbers of intervention sessions.

**Authors' conclusions**

Mindfulness-based interventions were effective, in alleviating the symptoms of depression, in adults with mental health disorders. Exposure-based cognitive therapy, mindfulness-based stress reduction, and acceptance-based behavioural therapy, had the largest effects.

**CRD commentary**

The review addressed a clear question, and the criteria for the inclusion of studies were defined. A range of appropriate databases was searched for relevant studies and attempts were made to identify unpublished studies. The restriction to studies published in English means that there was a risk of language bias. Steps were taken to minimise reviewer error and bias, at each stage of the review process. Methodological quality was assessed and the studies were of medium-to-low quality.

A range of study designs was included and moderate-to-high heterogeneity was present in most of the analyses. This
means that the decision to combine the results in a meta-analysis might not have been justified. Subgroup and other analyses were conducted to explore the sources of heterogeneity, and to determine the interventions with the largest effects; heterogeneity remained statistically significant for many of the analyses by intervention type. The authors acknowledged that the studies were all conducted in developed countries. They also acknowledged some limitations to their review, such as the medium-to-poor quality of the studies, the lack of information on control groups, and the potential for selection bias, as most studies had non-probability sampling designs.

The interventions might have had an effect on depressive symptoms, but the possibly inappropriate combination of study results and substantial heterogeneity across the studies, mean that the authors’ conclusions on effect sizes should be interpreted with caution.

**Implications of the review for practice and research**

**Practice**: The authors stated that mindfulness-based interventions could be used with pharmacological or other therapies, but patient preferences, satisfaction, sociocultural context and health practice in the setting should be considered.

**Research**: The authors stated that well-designed randomised controlled trials were required, with more follow-up sessions, to determine the long-term effects of the interventions, and to examine the role of mindfulness-based interventions in preventing future episodes of depression. These trials should control for extraneous variables, such as psychiatric diagnoses, severity of mental disorder, and concomitant treatments.

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