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## Do mindfulness-based interventions reduce pain intensity? A critical review of the literature

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### CRD summary

The authors concluded that mindfulness-based interventions reduced the intensity of chronic pain. This reflects the evidence presented, but the preponderance of low-quality studies, and some concerns about the review methods, suggest that the reliability of this conclusion is unclear.

### Authors' objectives

To evaluate the effect of mindfulness-based interventions on pain intensity.

### Searching

PubMed and PsycINFO were searched, for English-language studies, from 1960 to December 2010. Search terms were reported. The reference lists of retrieved articles and relevant reviews were scanned for additional articles.

### Study selection

Eligible for inclusion were studies of standardised mindfulness-based interventions, delivered to people aged 18 years or older. Studies had to assess pain intensity, using standardised scales, with uni-dimensional ratings, and have data for at least 10 participants in the treatment group. Standardised interventions were defined as those with a minimum of six hourly sessions, or those that followed a basic protocol for treatment. Experimental studies of laboratory-induced pain, unpublished dissertations, and conference proceedings, were excluded.

Controlled and uncontrolled studies were included. Most studies were of patients with chronic pain, and various diagnoses. Other studies did not limit inclusion to patients with pain. The mean age of participants was 48 years (mean age range 30.4 to 85 years) and most participants were women. The interventions were acceptance and commitment therapy, mindfulness-based stress reduction, a specific mindfulness-based pain management programme, or mindfulness meditation and emotion regulation therapy (or variants of these). Control groups (where applicable) were on a waiting list, or received support, relaxation, and stretching exercises; treatment as usual; cognitive-behavioural stress reduction; or cognitive-behavioural therapy. Most studies used numeric or visual analogue scales to assess pain intensity.

Two reviewers independently selected studies. Disagreements were resolved by discussion with a third reviewer.

### Assessment of study quality

Study quality was assessed on six criteria as follows: sequence generation; allocation concealment; blinding of assessors; incomplete outcome data; statistical power; and whether there were at least three weeks between assessments before and after treatment. Studies that met at least five criteria were considered to be high quality; between three and five criteria were medium quality; and two or fewer were low quality.

Two independent reviewers assessed study quality. Disagreements were resolved by discussion.

### Data extraction

For controlled studies, the data were extracted to calculate effect sizes (Cohen's *d*; where 0.2 was small, 0.5 was medium, and 0.8 was large). These were corrected for small-sample bias using Hedges' *g*.

For uncontrolled studies, the data were extracted to calculate group mean percentage changes from before to after intervention, in pain intensity (10% to 20% was considered a small change, 20% to 50% was moderate, and above 50% was substantial). Statistical significance was reported as probabilities.

The authors did not state how many reviewers extracted the data.

### Methods of synthesis

A narrative synthesis was presented.

## Results of the review

Sixteen studies (1,404 participants; range 14 to 228) were included in the review. One study was considered to be high quality, two were medium, and 13 were low. The main flaws were inadequate handling of missing data, and lack of randomisation. Attrition ranged from 2% to 49%, but was less than 20% in most studies, where reported.

Controlled studies: Six of the eight studies showed that mindfulness-based interventions were superior to control (mean percentage change 11.8 to 49.4). Positive effects were maintained over three months to three years (three studies). Medium effect sizes were found with interventions, compared with inactive controls (three low-quality studies). Compared with active controls, two of three studies found significant effects in favour of mindfulness-based stress reduction (one medium-quality, large effect; one low-quality, moderate effect). One of two studies comparing interventions with cognitive-behavioural therapy, found a significant reduction in pain intensity with the mindfulness-based intervention (low-quality study); the other found no significant difference (high-quality study).

Uncontrolled studies: In three studies (one medium, two low quality) of participants with chronic pain, acceptance and commitment therapy was associated with statistically significant reductions in pain intensity (mean percentage change 13 to 17). This effect was maintained over three months. Pain was reduced by 8% for participants with fibromyalgia, following a mindfulness-based intervention, in another study, but the statistical significance was unclear. The remaining four studies (all low quality and not limited to participants with pain) did not demonstrate a benefit from mindfulness-based interventions.

## Authors' conclusions

The findings suggested that mindfulness-based interventions reduced the intensity of chronic pain.

## CRD commentary

The review question was clear. The inclusion criteria were specified for the outcomes. For study design, participants, and interventions, they were broad, with consequent variability in the included studies. Some studies did not focus primarily on reducing pain intensity, and so did not relate directly to the research question. Two appropriate databases were searched, but the restriction to published English-language studies may mean that relevant studies were missed. Relevant unpublished studies were excluded, increasing the possibility of publication bias.

Most of the review process was carried out with attempts to minimise error and bias, but this was unclear for data extraction. The study details were provided. Some relevant quality assessment criteria were applied, and the results were clearly used in reporting the study findings. The authors drew attention to several limitations to their review, and appropriate research was proposed.

Their conclusion reflects the evidence presented, but the preponderance of low-quality studies, and some concerns about the review methods, suggest that the reliability of this conclusion is unclear.

## Implications of the review for practice and research

Practice: The authors did not state any implications for practice.

Research: The authors stated that further research was needed to evaluate the mechanism for reducing pain intensity; to determine which aspects of mindfulness-based interventions were effective; and to examine other moderating factors. The possible benefit of mindfulness-based interventions for patients with fibromyalgia should be explored. Future studies should report the clinical significance of their findings and the long-term follow-up of both intervention and control groups. They should include intention-to-treat, as well as complete-case, analysis or use appropriate statistical methods to address the potential impact of patient drop-outs on the results.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.