Effects of mindfulness-based interventions on alexithymia: a systematic review

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ABSTRACT

Question Alexithymia has been found to be modifiable through treatment, with associated clinical benefits. Recent studies have begun to test the potential of mindfulness-based interventions to reduce alexithymia, using skills-based, group training to improve non-judgemental, present-moment awareness. The objective of this review therefore was to conduct a systematic synthesis to assess the current state of knowledge about the effect of mindfulness-based interventions on alexithymia to inform clinical practice.

Study selection and analysis We carried out a systematic review of the literature and found four randomised controlled trials of the effect of mindfulness-based interventions on alexithymia, with a combined total of 460 participants.

Findings A random-effects meta-analysis, combining study endpoint data, showed a statistically significant effect of mindfulness-based treatment on alexithymia (Toronto Alexithymia Scale) compared with the control group (mean difference $=-5.28$, $95\%$CI $=-9.28$ to $-1.28$, $p=0.010$). Subgroup analysis was conducted to investigate sources of heterogeneity ($I^2=52\%$). Heterogeneity was reduced when the meta-analysis was restricted to interventions of a similar duration (3 months or less).

Conclusions Findings from our study should be replicated in further research with larger samples; however, the results indicate that mindfulness-based interventions may be an effective treatment in reducing alexithymia.

BACKGROUND

Alexithymia is a trait characterised by difficulties in identifying and communicating emotions, and by an externally orientated thinking style, arising from a deficiency in the neural processing of emotions. Prevalence rates range from 7% to 13% in community samples, but can be several times higher in clinical samples. Alexithymia has been found to be associated with psychological disorders, such as anxiety, depression and general psychopathological distress, and with maladaptive behaviours including alcohol dependence, eating disorders and self-harm. The presence of alexithymia can present a barrier to psychotherapeutic treatment, because the inability of the patient to communicate emotions may induce a negative reaction in the therapist.

There has been a debate as to whether alexithymia is a state-dependent response to trauma or depression or a stable personality trait. The growing consensus is that alexithymia is a trait with relative, rather than absolute, stability, which means that it can be modified through treatment, but that differences between individuals remain largely the same over time. A further consideration is whether any reduction in alexithymia as a result of treatment has any effect on the individual’s health or well-being. There is some indicative evidence that decreases in alexithymia may be beneficial: one study found that reduced alexithymia following therapy was significantly associated with a reduction in cardiac events in patients with coronary heart disease and a second study reported an association between reduced alexithymia and improvements in interpersonal problems. Taken together, this evidence suggests both that it is possible to reduce alexithymia through treatment and also that a reduction in alexithymia may be of positive benefit to the individual. Identifying effective treatment for alexithymia is therefore an important area for further investigation.

A systematic review assessing changes in alexithymia found that studies involving psychological interventions that targeted alexithymic symptoms directly were more likely to report significant reductions in alexithymia than those studies where the intervention was not specifically designed for alexithymia. The interventions that resulted in significant falls in alexithymia tended to use skills-based training designed to increase awareness of bodily sensations and associated emotions. In addition, they often involved group therapy, which may allow alexithymic participants to observe and mirror the way others describe their feelings and experiences. These elements are core to mindfulness-based training courses, such as mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive therapy, in which participants are taught to pay attention to whatever is happening in the present moment, through exercises designed to increase awareness of bodily sensation and non-judgmental observation of thoughts and feelings. Mindfulness-based training has been found to be effective against depression, anxiety and stress in clinical samples and against psychological distress in community samples. Although mindfulness and alexithymia have been shown to be related constructs, with high alexithymia significantly correlated with low levels of mindfulness, Cameron et al.’s 2014 review did not identify any study that explicitly tested mindfulness-based interventions on alexithymia. However, a small number of studies published since Cameron et al.’s 2014 review in 2014 indicate that mindfulness-based training might be also effective in reducing alexithymia, possibly through the mechanism of enhanced neural processing associated with the identification of bodily sensations, termed interoception.

OBJECTIVE

We therefore aimed to carry out a systematic review and meta-analysis of randomised controlled trials (RCTs) of mindfulness-based interventions to provide a quantitative assessment of the effect of mindfulness-based training on alexithymia.

STUDY SELECTION AND ANALYSIS

The protocol for this systematic review was registered on PROSPERO (CRD42017071924).

Search strategy

Electronic databases (PsycINFO, Medline, Web of Science and Cochrane CENTRAL) were searched from inception until 25 September 2017, using the following terms: ‘affective symptoms’ (MeSH) OR ‘alexithymia’ AND mindful* AND (intervention* OR random* OR ‘clinical trial’* OR training*). No restrictions were applied regarding language or date of publication, but we considered only articles published in peer-reviewed journals that increase the quality of the included studies. Abstracts were screened independently by two reviewers and disagreements were solved via
discussion with a third member of the review team. The same two reviewers independently extracted the data from the included studies.

**Study selection**

We included only RCTs of any duration comparing mindfulness-based interventions with any control condition (pharmacological or psychological intervention, wait-list, treatment as usual), in which alexithymia was measured in both the experimental and control groups, using a validated measure. To be included, mindfulness training had to be a component or the whole of the intervention. No exclusion criteria were set regarding age, diagnosis or other participant demographics.

**Outcomes**

The primary outcome was the severity of alexithymia symptoms at study endpoint. We also carried out secondary analyses of severity of alexithymia symptoms within 3 months. We decided to choose this time point because it is common to the included studies and is closest to the standard length of an MBSR programme. Additional analyses at other time points were conducted where the study period exceeded 3 months.

**Data extraction**

Data from the studies were extracted using a standardised form. Extracted information included study sample characteristics, details of the intervention (such as duration, activities undertaken and method of delivery and number), severity of symptoms and timings of measurement.

**Risk of bias assessment**

The risk of bias was assessed using the Cochrane tool as reported in the Cochrane handbook. Risk of bias assessment was carried out independently by two reviewers and any disagreement resolved through consensus or by discussion with another member of the review team.

**Statistical analysis**

As our outcomes were continuous, we calculated the pooled mean difference (MD) with corresponding 95% CIs, as appropriate. We considered a p value of less than 0.05 and a 95% CI that does not cross the line of no effect as statistically significant. The standardised mean difference (SMD) was also calculated as a measure of the effect size. In accordance with the study protocol, we used a random-effects model because it has the highest generalisability for empirical examination of summary effect measures in meta-analyses. However, as recommended by the Cochrane Handbook for Systematic Reviews of Interventions when concerned about the influence of small study effects on the results of a meta-analysis with between-study heterogeneity, we examined the robustness by comparing the fixed-effect model and the random-effects model. We reported any material differences between the models. In the case that a study included multiple intervention cohorts, we decided to combine the outcome data from all the intervention cohorts, using the method recommended by Higgins and Green. We planned to conduct subgroup analyses if there were large differences between the interventions or between participant characteristics. All analyses were carried out using RevMan V.5.3.

**FINDINGS**

In total, 116 articles were retrieved from the database search, which resulted in 59 individual studies after duplicates were removed (Figure 1). After screening, a total of four studies met the criteria, all published...
for only one-sixth of the total intervention. A sensitivity analysis was conducted on the primary outcome of mean alexithymia at study endpoint, excluding Viding et al.38 This exclusion increased the heterogeneity of the model, but it remained significant ($I^2=65\%$, $MD=-4.99, 95\%CI -9.84$ to $-0.13$, $p=0.04, 389$ participants).

Finally, for comparison purposes, a fixed-effects meta-analysis was carried out on the primary outcome of the mean difference in TAS20 scores between the experimental and control groups at study endpoint (figure 4). This resulted in a significant model ($MD=-4.00, 95\%CI -6.00$ to $-1.99$, $p<0.0001, I^2=52\%, 435$ participants).

CONCLUSIONS AND CLINICAL IMPLICATIONS

This systematic review and meta-analysis examined the effect of mindfulness-based interventions on alexithymia. The combined results from the four RCTs found in the literature indicate that mindfulness-based interventions significantly reduce alexithymia, compared with a control condition, at the end of the study period. It is not clear if the observed effect can last beyond 9 months (ie, the length of the longest intervention in the included trials).

Nature of the intervention

The studies differed in the length of the intervention offered, with Bornemann and Singer35, 36 9-month programme considerably longer than the interventions tested in the other studies and also the conventional length of a MBRS programme. However, excluding Bornemann and Singer36 from the meta-analysis of outcomes at 3-months, on the grounds that the intervention was not complete for most participants at that point, produced a significant effect of mindfulness-based training, suggesting that it is the content of the intervention rather than its length that is important for alexithymia. This is in line with non-randomised evidence, which suggests that even a short intervention can have a positive effect. Byrne et al37 tested a 2-week mindfulness-based intervention on a group of sex offenders in prison and found that alexithymia decreased significantly in the intervention group compared with the control group over the short period of the intervention.

Mechanisms

The intervention tested by Bornemann and Singer35 gives an opportunity to deconstruct the elements of a mindfulness-based intervention since it was explicitly divided into three modules covering awareness of the present moment and particularly of bodily sensations (Presence), accepting difficult emotions with loving kindness (Affect) and observing thoughts and learning reappraisal skills (Perspective). The authors found that a significant decrease in alexithymia was attributable only to the Presence and Affect modules, and not to the Perspective module. The mindfulness-based class that formed part of the intervention tested in Viding et al38 would appear to be similar in content to the Presence module in Bornemann and Singer’s35 study, as it was focused on breathing and awareness of the body, thoughts and feelings. Taken together, these studies may indicate that increased awareness of present experience, particularly awareness of bodily sensations, may be one mechanism by which alexithymia is reduced. Alexithymia (awareness of emotional experience) has been found to be strongly related to interoception (awareness of bodily experience)40 and improvement in alexithymia symptoms has been associated with increased heartbeat perception accuracy.35 Furthermore, Santannecci et al37 reported a significant correlation between the decrease in alexithymia and an increase in right insula thickness, an area of the brain, which is involved in both emotional and bodily awareness.41 Interestingly, however, Bornemann and Singer36 found that the significant correlation between the decrease in alexithymia and increased heartbeat awareness was only observed among those who had taken part in the Presence training module and not among those who had taken the Affect training module. The authors conclude that the significant decrease in
Table 1  Results of systematic review of literature on the effect of mindfulness-based interventions on alexithymia

<table>
<thead>
<tr>
<th>Author and study type</th>
<th>Population (N)</th>
<th>Age and sex</th>
<th>Intervention</th>
<th>Control</th>
<th>Measures</th>
<th>Time measurements taken</th>
<th>Results</th>
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<tbody>
<tr>
<td>Bomemann and Singer</td>
<td>RCT</td>
<td>Volunteers from the general public in Germany in good health and with no prior meditation experience. People with TAS20 scores of &gt;60 were excluded. n=318</td>
<td>Three mental training modules, each 3 months long, involving a 3-day silent retreat, 12 weeks of weekly 2-hour group sessions and 30 min of daily practice. The Presence module was about directing attention to the present moment, the Affect module about approaching difficult emotions with acceptance and the Perspective module about metacognition, observing thoughts and reframing experiences. There were three intervention groups: groups 1 and 2 did all three modules over 9 months but in a different order, group 3 did just the Affect module for 3 months.</td>
<td>No training</td>
<td>TAS20 and subscales</td>
<td>Before the intervention and at 3, 6 and 9 months (after each module)</td>
<td>Alexithymia decreased more in the intervention groups than the control group from T0 to T3 (p=0.002), d=0.2. The effect at T3 was significant for all TAS subscales. Past hoc tests showed that the decreases in TAS scores were caused by the Presence and Perspicuity modules but not the Perspective module.</td>
</tr>
<tr>
<td>de la Fuente Arias et al.</td>
<td>RCT</td>
<td>Students from the University of Almeria with no experience of meditation or yoga n=46</td>
<td>10 weekly 1.5-hour mindfulness/meditation training sessions adapted from the MBSR programme, combined with individual practice.</td>
<td>Wait-list</td>
<td>TAS20 and subscales</td>
<td>Before and after the intervention</td>
<td>Pre/post tests show significant changes in TAS20 in the intervention group (DF=0.01, DDF=0.01 and Total TAS=0.01). The size of the change was 20% decrease in DIF (d=0.32) and DDF (d=0.39) 22.2% in EOT (d=0.95) and 20.6% in total TAS (d=0.47). The control groups TAS20 did not change significantly. The difference in TAS20 scores between the groups was not significant at baseline (p=0.321) or post intervention (t=0.60, p=0.552). The correlation was significant for those who had taken the Presence training but not for those who had taken the Affect training.</td>
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<td>Santamachi et al.</td>
<td>RCT and MRI study</td>
<td>Right-handed members of the public in Italy, with no prior meditation or mindfulness experience and in good physical and mental health n=48</td>
<td>8-week MBSR programme involving weekly 2.5-hour group sessions and daily individual practice.</td>
<td>Wait-list</td>
<td>TAS20</td>
<td>Before and after the intervention</td>
<td>There was a significantly greater decrease in the intervention group compared with the control group in total TAS (p=0.007), DIF, DDF and Total TAS (p≤0.001) at 6 months relative to baseline. There was a significant decrease in exhaustion and self-reported health (p≤0.001) in the intervention group compared with the control group, but not in terms of coherence.</td>
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<tr>
<td>Viding et al.</td>
<td>RCT</td>
<td>Adult women attending any of 4 healthcare centres in Sweden with burnout/exhaustion symptoms, excluding individuals with drug or alcohol abuse or severe depression n=48</td>
<td>A package of six cultural activities, including mindfulness (focused on breathing, body awareness and awareness of thoughts and feelings), dance, theatre, film and drawing, each delivered in two 90-min sessions.</td>
<td>Standard care including physiotherapy</td>
<td>TAS20 and subscales</td>
<td>Baseline, 3 months (the length of the programme) and 6 months (follow-up)</td>
<td>There was a significantly greater decrease in the intervention group compared with the control group in total TAS (p=0.007), DIF, DDF and Total TAS (p≤0.001) at 6 months relative to baseline. There was a significant decrease in exhaustion and self-reported health (p≤0.001) in the intervention group compared with the control group, but not in terms of coherence.</td>
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<td>MAAS, Mindful Attention Awareness Scale; MBSR, Mindfulness-Based Stress Reduction; RCT, randomised controlled trial; TAS20, 20-item Toronto Alexithymia Scale; DIF, Difficulty Identifying Feelings subscale of the TAS20; DDF, Difficulty Describing Feelings subscale of the TAS20; EOT, Externally Oriented Thinking subscale of the TAS20.</td>
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Alexithymia observed among participants in the Presence module may be attributable to an increase in interoception, but that reduction in alexithymia in participants in the Affect module, which focused on the acceptance of difficult emotions, may be attributable to a different mechanism.

It might be assumed that another mechanism by which alexithymia is reduced following mindfulness-based training is an increase in trait mindfulness. In fact, the only one of the four studies included in this review to measure trait mindfulness reported no significant change in mindfulness as a result of the intervention, a surprising finding that runs counter to other evidence. The authors attribute this result to the use of the MAAS. The items in the MAAS focus on the respondent’s ability to pay attention to what is happening in the present moment (eg, “I drive places on automatic pilot and then wonder why I went there”) rather than the emotional and non-judgemental aspect of mindfulness captured in other measures.

This conception of mindfulness, which places little emphasis on identifying or describing feelings, might explain the lower correlations between the MAAS and the TAS20 than between the TAS20 and other measures. This conception of mindfulness, which places little emphasis on identifying or describing feelings, might explain the lower correlations between the MAAS and the TAS20 than between the TAS20 and other measures.

**Comparison with other interventions**

One question that arises from the results of this review is how a combined intervention might be attributable to an increase in interoception, but that reduction in alexithymia in participants in the Affect module, which focused on the acceptance of difficult emotions, may be attributable to a different mechanism.

Comparison with other interventions

One question that arises from the results of this review is how a combined mean difference of five points on the TAS20 scale between intervention and control groups post mindfulness-based training compares with the effect of other types of intervention on alexithymia. There is some evidence from uncontrolled pre-post studies to support the use of other therapies in treating alexithymia, including cognitive behavioural therapy (CBT), psychiatric group therapy and voice movement therapy.

An RCT comparing the effect of a psychoeducation and cognitive restructuring programme for patients with cancer with standard medical care resulted in a much greater difference in mean TAS20 between the groups after treatment than found in the current meta-analysis (MD = −17.29, CI = −22.52 to −12.06). However, the difference was due in large part to a significant increase in TAS20 in the control group, which may be a specific feature of the oncological population or, as the authors suggest, may have been a secondary effect of the increase in anxiety associated with illness.

**Clinical implications**

This review has identified a statistically significant effect of mindfulness-based interventions on alexithymia. It is worth noting that in all the studies, the baseline level of alexithymia was relatively low and below the clinical threshold. It is possible that the effect of a mindfulness-based intervention might be still greater in clinical populations where baseline alexithymia may be higher

Bornemann and Singer observed larger falls in TAS20 scores among those who had higher alexithymia at baseline than those with low alexithymia.

Alexithymia has been described as a transdiagnostic factor associated with a range of disorders. Using mindfulness-based training to reduce alexithymia might therefore be a means of improving the efficacy of subsequent condition-specific treatments. An increased awareness of, and ability to talk about, emotions might, for example, enable better engagement with psychotherapy.

More evidence is needed to establish whether a reduction in alexithymia is directly and causally related to improvements in health. The studies reviewed here reported significant improvements post intervention in some measures of psychological health (eg, worry, anxiety and depression; exhaustion and self-reported health) but not others (eg, sense of coherence). Where improvements were observed, it is not possible to say whether they are related to the changes in alexithymia or merely concurrent. Further research is needed, particularly to test the implications of a decrease in alexithymia on psychological health.

As far as non-clinical populations are concerned, mindfulness-based interventions may be effective in reducing alexithymia as a preventative measure. One advantage of mindfulness-based interventions is that they can be delivered in community settings and are becoming increasingly popular as a means of reducing non-clinical levels of stress. High alexithymia per se is unlikely to be an explicit reason someone might seek treatment but is rather a comorbid, and potentially causal, feature of many other presenting behaviours or psychological features.

Community-based, universal interventions, therefore, may...
be a means of preventing future problems by improving alexithymic symptoms.

**Limitations**

There were several limitations in this review. First, the conclusions are based on a combined sample size of just 460 participants. We focused only on RCTs, excluding other, non-randomised and uncontrolled trials of the effect of mindfulness-based interventions on alexithymia. Although this limited the number of included studies to four, it meant that the conclusions were based on the highest quality evidence available. Second, the heterogeneity between the studies was found to be moderate to high. We conducted sensitivity analysis to assess whether this was due to the differences in either the content or the length of the interventions. The results showed that heterogeneity was higher when studies with interventions of different lengths were combined. It should be noted, however, that the only study that tested an intervention of over

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**Figure 3**  Random-effects meta-analysis of mean and standardised mean difference in alexithymia at study end and at different time points.
Figure 4 Fixed-effects meta-analysis of mean difference of alexithymia at study endpoint.

3 months’ duration accounted for nearly 70% of the combined sample. The observed heterogeneity, therefore, may be due to the inclusion of studies with small sample sizes in the meta-analysis. Future RCTs with larger samples could usefully explore further whether the content or the duration of an intervention affects the outcome.

A third limitation is the absence of an active control group. A meta-analysis of mindfulness-based therapy found no significant difference in outcomes between mindfulness therapy and other therapeutic interventions such as CBT. None of the studies in the current review included an active control group, which would have allowed the effect of mindfulness-based interventions to be compared with other types of active treatment. However, Bornemann and Singer found that two of their training modules resulted in reduced alexithymia, while the third, which focused on observing thoughts and learning reappraisal skills, did not. This finding appears to suggest the reduction in alexithymia is attributable to the content of that particular training module, rather than other aspects of the intervention such as the method of delivery.

Finally, while two of the interventions were based on the MBSR programme, two tested bespoke interventions, which may limit the conclusions that can be drawn for clinical practice. In one of these studies mindfulness training comprised only one-sixth of the intervention, and therefore it is not possible to attribute the effect of the intervention to the mindfulness component with any certainty. To address this limitation, we conducted subgroup analysis excluding this study and found that the model remained significant, although the heterogeneity increased.

CONCLUSIONS
Participation in mindfulness-based interventions led to significantly lower alexithymia at the study end compared with a control group. The literature on which these conclusions are based is limited, and further RCTs with larger clinical and non-clinical samples and longer follow-up are required. However, the findings indicate that mindfulness-based interventions may be an effective means of reducing alexithymia.

Compliance with ethical standards
Research involving human or animal participants: This article does not contain any studies with human participants or animals performed by any of the authors.

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Contributors
HN designed the study and wrote the protocol with input from LM, AO and MC. Literature searches were carried out by HN. HN, LM, AO and MC screened abstracts against inclusion criteria. HN and LM conducted data extraction and risk of bias assessment. HN conducted the statistical analysis. HN wrote the first draft of the manuscript. LM, AO and MC reviewed subsequent drafts. All authors have contributed to and have approved the final manuscript.

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Competing interests
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Patient consent
Not required.

REFERENCES


