J Behav Med (2014) 37:127–134
DOI 10.1007/s10865-012-9466-5

Immediate effects of a brief mindfulness-based body scan on patients with chronic pain

Michael Ussher · Amy Spatz · Claire Copland · Andrew Nicolaou · Abbey Cargill · Nina Amini-Tabrizi · Lance M. McCracken

Received: August 3, 2012 / Accepted: October 24, 2012 / Published online: November 6, 2012

Abstract Mindfulness-based stress reduction (MBSR) has benefits for those with chronic pain. MBSR typically entails an intensive 8-week intervention. The effects of very brief mindfulness interventions are unknown. Among those with chronic pain, the immediate effects of a 10 min mindfulness-based body scan were compared with a control intervention. Fifty-five adult outpatients were randomly assigned to either: (1) mindfulness-based body scan (n = 27) or (2) a reading about natural history (control group, n = 28), provided via a 10 min audio-recording. Interventions were delivered twice across 24 h; once in the clinic and once in participants' 'normal' environment. Immediately before and after listening to the recording, participants rated pain severity, pain related distress, perceived ability for daily activities, perceived likelihood of pain interfering with social relations, and mindfulness. In the clinic, there was a significant reduction in ratings for pain related distress and for pain interfering with social relations for the body scan group compared with the control group ($p = 0.005$; $p = 0.036$, respectively). In the normal environment none of the ratings were significantly different between the groups. These data suggest that, in a clinic setting, a brief body scan has immediate benefits for those experiencing chronic pain. These benefits need to be confirmed in the field.

Keywords Chronic pain · Mindfulness · Body scan · Intervention · Distress

M. Ussher (✉) · A. Spatz · A. Cargill · N. Amini-Tabrizi
Division of Population Health Sciences and Education, St George's University of London, Cranmer Terrace, London SW17 0RE, UK
e-mail: mussher@sgul.ac.uk

C. Copland · A. Nicolaou
Chronic Pain Service, St George's Hospital, London, UK

L. M. McCracken
Psychology Department, Institute of Psychiatry, Kings College London, London, UK

Introduction

In the UK, around 13 % of adults report chronic pain (Breivik et al., 2006). This presents a major problem in terms of both psychosocial impact and economic costs (Breivik et al., 2006; Institute of Medicine, 2011). Mindfulness-based stress reduction (MBSR) is effective for the management of chronic pain (Grossman et al., 2004). This approach teaches mindfulness meditation to challenge habitual patterns of cognitive reactivity which increase distress and exacerbate pain (Grossman et al., 2004; Kabat-Zinn, 1990). Mindfulness has been described as part of a third wave in cognitive-behavioural therapies (Hayes, 2004) and it aims to empower patients to engage in active coping through encouraging awareness of the present, in which, often difficult, thoughts, feelings and sensations are acknowledged and accepted without judgement (Kabat-Zinn, 1990; Shapiro & Schwartz, 1999).

Current MBSR programmes are intensive, typically entailing an 8 week group programme delivered by a trained specialist (Carmody & Baer, 2009). While these programmes are effective and highly valued, not all patients will be interested in, or have the resources or time to attend such intensive programmes. Additionally, increasing the hours spent attending a traditional MBSR programme, beyond the standard hours, does not tend to reduce reports of distress (Carmody & Baer, 2009). In contrast, the amount of 'home-based' practice of mindfulness is associated with

increased mindfulness and well-being (Carmody & Baer, 2008; Lau et al., 2006). Brief interventions (e.g., body scans) may be more readily used by individuals in their own environment, at a lower cost and with little training, and they are consistent with the self-management model of care for chronic illness (Bodenheimer, 1999; Von Korff et al., 2002).

Body scans are a key component of mindfulness meditation; they involve being directed to focus attention on the present moment through observing the breath, and bodily sensations, while becoming aware of, and accepting without judgement, any thoughts and feelings which arise. MBSR routinely employs brief body scans (Kabat-Zinn, 1990), lasting anything from 5 to 30 min.

In the general population, brief mindfulness meditation (20 min duration) has been shown to reduced sensitivity to experimentally induced pain (Zeidan et al., 2010). While, in other areas where discomfort and difficult feelings need to be managed brief body scans have been shown to have an immediate beneficial effect, without the need for a full MBSR programme. For example, among abstinent smokers, a 10 min body scan reduces cigarette cravings and mood related withdrawal symptoms (Cropley et al., 2007; Ussher et al., 2009).

To our knowledge, no study has investigated the immediate impact of a brief body scan on those with chronic pain. The current study, therefore, assessed whether, relative to a control intervention, a 10 min body scan reduces ratings of pain, distress and perceived interference of pain in social relations, and increases ratings for perceived ability for daily activities and of mindfulness among those diagnosed with chronic pain.

Methods

Participants

Potential participants were patients attending an outpatient pain clinic in south west London, across a five-month period ending October 2011, aged at least 18 years, diagnosed with chronic pain and able to understand spoken or written English. To test the intervention among those to whom mindfulness interventions were novel, those who had attended any mindfulness-based programmes or had been referred to these programmes were excluded. Those attending their first appointment at the clinic were also excluded as they were likely to undergo changes to their medication which could confound the results of the experiment. Potential participants were screened for inclusion by their usual clinician and eligible individuals were given a patient information sheet. A researcher telephoned all eligible patients who had expressed an interest in the study and arranged an initial appointment at the clinic. All participants gave written informed consent. The study was approved by the local Research Ethics Committee.

Design and interventions

An experimental randomised-controlled study was conducted. Participants were randomised by a computer generated list of random numbers, using block randomisation, to one of two groups: (1) The treatment group followed a 10 min audio-recording of a mindfulness-based body scan, adapted from a guide used previously with smokers (Ussher et al., 2009). We chose a body scan, rather than other common mindfulness techniques, such as sitting meditations or walking meditations, as body scans are often used as an accessible entry point to mindfulness meditation (Kabat-Zinn, 1990). This recording guided the patient to focus on specific bodily and breathing sensations, encouraging non-judgemental acceptance of thoughts and feelings experienced in the moment. Patients' attention was guided to specific body parts in turn. The instructions asked participants to acknowledge all sensations without attempting to change them (a form of practising mindful acceptance). (2) The control group listened to a 10 min audio-recording of a reading of a natural history text which has previously been found to be acceptable to patients when used as a control condition in comparison with a body scan (Cropley et al., 2007; Ussher et al., 2009). Participants were given the option of listening to the audio while sitting or lying. They were informed that the "aim of the study is to find out how your mood and sensations of pain change after listening to a 10 min audio-guide". They were not told that the aim of the study was compare the effects of mindfulness intervention versus a control intervention.

As there is no previous work testing the immediate effects of a brief mindfulness intervention among this patient group, it was not possible to perform a power calculation. However, a similar study demonstrating the immediate effect of a 10 min body scan on measures of smoking cravings, stress and tension, allocated 15–20 participants to each group (Cropley et al., 2007; Ussher et al., 2009). Therefore, adopting a conservative approach, in the present study the aim was to recruit approximately 30 patients to each group.

Procedure

Both groups followed the same procedure. First, they were asked to follow the audio-recording, using earphones, on a single occasion at the clinic. Immediately before and immediately following the recording participants com-

pleted a brief questionnaire (see below). Secondly, during the 24-h period after leaving the clinic, participants were asked to listen to their recording, as used in the clinic, on one occasion when they experienced high levels of pain or distress. They were instructed to sit or lay down, while listening to the recording, consistent with the position they had adopted in the clinic. Participants were loaned an MP3 player and earphones. Immediately before and after listening to the recording, they were asked to complete the same brief questionnaire as administered in the clinic, and then to post the questionnaires and MP3 player back to the clinic. Participants completing all stages of the study were compensated with a £15 shopping voucher.

Measures

Measures at baseline only

Pain history was collated through perusal of patients' notes and consultation with clinicians. This included diagnosis, duration of pain, use of pain medication and any changes in these medications in the seven days preceding entry to the study. The 20-item Philadelphia Mindfulness Scale (PHLMS, Cardaciotto et al., 2008) was administered to assess trait-like qualities of acceptance (10 items) and awareness (10 items) that are manifest in daily life. The PHLMS asks respondents to indicate how often they have had various mindful experiences in the past week; for example: 'I am aware of what thoughts are passing through my mind' (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often). The Hospital Anxiety and Depression Scale (HADS) was used to characterise level of distress (Zigmond & Snaith, 1983). The HADS is a self-screening questionnaire for depression and anxiety consisting of 14 questions, seven for anxiety and seven for depression. It was designed for use in medical settings and has also been used extensively in primary care (Wilkinson & Barczak, 1988).

On the occasion of their referral, patients completed the short form of the Brief Pain Inventory (Cleeland, 1991; Cleeland & Ryan, 1994) with their consultant. The BPI asks patients four "severity" questions involving rating their "pain at its worst," "pain at its least," and "pain on average" over the previous 24 h, as well as "how much pain you have right now" (0 = no pain to 10 = pain as bad as you can imagine). The BPI also asks patients to rate how their pain interferes with "enjoyment of life," "general activity," "walking ability," "mood," "sleep," "normal work," and "relations with other people" (0 = does not interfere to 10 = interferes completely) (Table 1).

Patients were asked about their experience of mindfulness-based techniques (Ussher et al., 2009): "Have you had experience of yoga, tai-chi or any type of meditation?" (0 = I have had no experience of these activities, 1 = I have tried these activities on about one to three occasions, 2 = In the past, I have practiced these activities on more than three occasions, but for less than once a week, 3 = I have practiced these activities regularly in the past (i.e., at least once a week for at least six weeks), 4 = I currently practice these activities, but not usually on a weekly basis, 5 = I currently practice these activities at least once a week, on average, and have been doing so for at least six weeks). Patients also provided demographic information.

Brief measures immediately before and after interventions

Immediately before and after listening to the recordings participants completed ratings for 10 questionnaire items (see Tables 2, 3). Four of the ratings were for primary outcomes (0–10 scale): (i) pain severity was measured by a single item from the BPI (Cleeland, 1991; Cleeland & Ryan, 1994); (ii) pain related distress was assessed by a standard clinical item; (iii) perceived ability to perform daily activities was again assessed with a standard clinical item; and (iv) perceived social functioning was assessed with an item adapted from the BPI (see Table 2).

The remaining six ratings, as secondary measures, were chosen to examine the processes underlying mindfulness and to determine whether these are enhanced by the body scan intervention. This included measures of acceptance, present focus and decentering; which are generally the main targets of mindfulness (Bishop et al., 2004). In this context, decentering is defined as the ability to observe thoughts and feelings as temporary events in the mind, as opposed to reflections of the self that are necessarily true (Fresco et al., 2007). For example, a worry that the pain will get much worse is a valid thought but is not necessarily a fact. No one brief questionnaire could be identified which assessed these three mindfulness processes; therefore, six items were extracted from validated mindfulness questionnaires (see Table 3). It is a common procedure to select items out of standard questionnaires to create a brief assessment (e.g., Boersma et al., 2004; de Jong et al., 2008). Items were selected which might be sensitive to the immediate effects of an intervention:

(v) Pain acceptance: two items were drawn from the Chronic Pain Acceptance Questionnaire (McCracken et al., 2004; Vowles et al., 2008).

(vi) Decentring: two items were extracted from the Experiences Questionnaire (EQ, Fresco et al., 2007), which has a scale addressing decentring.

(vii) Present focus: two items were taken from the Mindful Attention Awareness Scale (MAAS, Brown & Ryan, 2003). The MAAS is one of the most widely used measures of present focus for pain management studies.

Table 1 Baseline characteristics

Variable	Body scan (n = 27) n (%)	Control (n = 28) n (%)
Female	23 (85)	20 (71)
Professional/managerial*	4 (15)	11 (39)
Caucasian	18 (67)	21 (75)
Married/living with partner	9 (33)	16 (57)
No experience of yoga/tai-chi/meditation	17 (63)	19 (68)
Back pain diagnosis	20 (74)	[a]24 (89)
Opioids analgesia	15 (56)	11 (39)
Non-Opioids analgesia	17 (63)	20 (71)
Neuropathic analgesia	13 (48)	8 (29)
Medication changed in previous week	6 (22)	5 (18)
	Mean (SD)	Mean (SD)
Age	59.5 (15.8)	61.6 (17.4)
Full-time education (years)	13.0 (2.9)	13.9 (6.3)
Pain diagnosis duration (years)	6.8 (6.1)	[a]4.8 (4.5)
[Δ]BPI pain severity score (0–10)	[a]6.0 (2.1)	[b]4.9 (2.5)
[ΔΔ]BPI pain interference score (0–10)	[a]5.2 (2.3)	[b]5.1 (2.6)
HADS anxiety score (0–21)	8.9 (4.5)	6.9 (4.1)
HADS depression score (0–21)	6.9 (4.1)	7.3 (4.6)
PHLMS awareness score (10–50)	34.6 (5.4)	32.9 (6.8)
PHLMS acceptance score (10–50)	29.7 (8.2)	30.1 (7.6)

BPI brief pain inventory, *HADS* Hospital Anxiety and Depression Scale, *PHLMS* Philadelphia Mindfulness Scale

* Significant difference between groups at $p < 0.05$

[Δ] Mean of four severity items

[ΔΔ] Mean of seven interference items; missing data for one[a] or three[b] participants

After completing the final set of ratings of pain, distress and mindfulness processes participants responded to two questions to assess the perceived credibility of the interventions (Ussher et al., 2009): 'How useful did you find listening to the audio-guide for helping you to relax?' (1 = not at all useful, 2 = slightly useful, 3 = moderately useful, 4 = very useful, 5 = extremely useful) and 'Would you recommend this strategy to others who are trying to manage their chronic pain?' (1 = definitely would not recommend, 2 = probably would not recommend, 3 = not sure, 4 = probably would recommend, 5 = definitely would recommend).

Analysis

All baseline measures, including pre-intervention scores for the 10-item inventory, were compared between the two groups using *t* tests, Mann–Whitney tests and Chi-squared tests. For the main analysis, the effect of the body scan versus the control intervention on ratings for the measures administered immediately before and after the interventions was assessed. The scores for all the measures were skewed, and neither logarithmic nor square root transformations produced normal distributions; therefore it was not possible to use analysis of covariance. Nor was it possible to use residual change scores as the residuals in the regressions were also skewed. Consequently, change scores were computed, by subtracting post-intervention scores from pre-intervention scores, and non-parametric tests (i.e., Mann–Whitney tests) were used to compare the change scores between the two groups.

In addition, solely for the four primary outcomes (i.e., pain severity, distress, perceived ability for daily activities, perceived social functioning), Wilcoxon tests were used to examine changes within each group from pre- to post-intervention. All the tests were conducted separately for the assessments in the clinic and in the participants' own environment. Mann–Whitney tests were used to compare scores between the two groups for ratings of 'usefulness' and for whether participants would recommend the intervention. As we formulated specific hypotheses with regard to the effect of the interventions, we retained a significance level of $p < 0.05$ throughout the analysis. All data were analysed using SPSS V19.

Results

Eighty-six eligible patients were referred to the study by clinicians; of these, six could not be contacted, 25 were not interested in participating, and 55 (64 %) were recruited and randomized. Four individuals failed to complete the second part of the study (i.e., listening to the audio-guide in their own environment).

Table 2 Brief inventory scores for before and after listening to the recording in the clinic setting and in the participants' own environment (primary outcomes)

Primary outcomes	Body scan (n = 27) Mean (SD)	Control (n = 28) Mean (SD)
How much pain are you experiencing right now?[a]		
Clinic: before	5.8 (3.0)	4.6 (2.7)
After	4.7 (3.1)	3.8 (2.5)
Own environment: before	5.9 (2.6)	5.0 (2.8)
After	4.8 (2.6)	4.3 (2.6)
How distressing is your pain right now?[b]		
**Clinic: before	5.9 (2.7)	4.1 (2.9)
After	4.7 (2.9)	4.1 (2.9)
Own environment: before	5.4 (2.7)	5.0 (2.8)
After	4.2 (2.5)	4.2 (2.7)
How able are you in doing your daily activities at this time?[b]		
Clinic: before	5.0 (2.0)	5.0 (2.9)
After	5.4 (2.1)	5.5 (3.0)
Own environment: before	4.9 (2.4)	5.7 (2.6)
After	4.9 (2.5)	6.0 (2.4)
How likely is it that your pain will interfere with your relations with other people at the moment?[b]		
*Clinic: before	5.7 (2.8)	4.7 (3.4)
After	4.7 (2.5)	4.6 (3.6)
Own environment: before	4.7 (2.9)	4.0 (3.1)
After	4.0 (2.6)	3.9 (3.1)

For all the data in the participants' own environment there is missing data for the body scan for one participant and for the control group for three participants

Significant difference in change scores (i.e., pre-intervention scores minus post-intervention scores) for the body scan versus control group: * at $p < 0.05$ and ** at $p < 0.01$

[a] 0 = no pain to 10 = pain as bad as you can imagine

[b] 0 = not at all to 10 = extremely

Table 3 Brief inventory scores for before and after listening to the recording in the clinic setting and in the participants' own environment (mindfulness measures)

Mindfulness measures[a]	Body scan (n = 27) Mean (SD)	Control (n = 28) Mean (SD)
Pain acceptance		
I feel it is okay to experience pain		
Clinic: before	2.9 (2.2)	2.8 (2.2)
After	3.3 (1.9)	2.8 (2.1)
Own environment: before	2.7 (1.5)	2.6 (2.1)
After	2.7 (1.5)	2.7 (2.1)
I feel I need to concentrate on getting rid of my pain		
Clinic: before	2.7 (2.1)	3.4 (2.3)
After	2.9 (2.1)	3.3 (2.0)
Own environment: before	3.6 (1.9)	4.5 (1.6)
After	3.3 (1.8)	3.7 (1.5)
Decentring		
I can observe unpleasant feelings without being drawn into them		
Clinic: before	3.4 (1.9)	2.6 (1.7)
After	3.4 (1.8)	3.3 (1.9)
Own environment: before	3.4 (1.7)	3.6 (1.6)
After	3.7 (1.7)	3.6 (1.7)
I have the sense that I am fully aware of what is going on around and inside me		
Clinic: before	3.8 (2.0)	3.0 (2.1)
After	3.6 (2.2)	3.3 (2.1)
Own environment: before	3.5 (1.9)	4.4 (1.7)
After	3.6 (1.8)	4.2 (1.7)
Present focus		
I am focused on what's happening in the present		
Clinic: before	3.6 (2.1)	3.6 (2.1)
After	3.5 (2.2)	3.5 (2.1)
Own environment: before	3.7 (1.7)	4.5 (1.5)
After	3.8 (1.8)	4.6 (1.4)
I find myself pre-occupied with the future and the past		
Clinic: before	2.6 (2.0)	2.8 (1.9)
After	2.6 (1.7)	2.9 (1.9)
Own environment: before	3.1 (1.5)	2.5 (1.6)
After	2.7 (1.5)	2.5 (1.7)

For all the data in the participants' own environment there is missing data for the body scan group for one participant and for the control group for three participants

[a] all items were rated from 0 = not at all to 6 = extremely so

Table 1 presents the baseline characteristics of the sample. Over three quarters of participants were female and were diagnosed with back pain. The most common pain medication used was non-opioid medications. Around two thirds declared no experience of mindfulness techniques and PHLMS scores were comparable to those reported for the original validation of the scale (Cardaciotto et al., 2008). While following the audio-guide in the clinic all but five participants chose to sit, rather than lay down (three participants in body scan group and two in control group). There was one significant difference in the baseline demographic and pain characteristics of the two treatment groups, with significantly more individuals with a professional-managerial occupation in the control group compared with the body scan group ($\chi = 4.1$, $p = 0.04$). By chance, there was also one significant difference between the groups in the brief inventory scores recorded pre-intervention; namely, in the clinic setting, ratings for distress were higher for the body scan group versus the control group (Mann–Whitney u = 249, $p = 0.029$).

Tables 2 and 3 presents the mean scores for outcomes assessed pre- and post-intervention. In the clinic setting, for the body scan group compared with the control group, analysis of the change scores showed that there was a significant reduction in ratings for pain related distress and for pain interfering with social relations ($u = 217.5, p = 0.005$; $u = 257.5$, $p = 0.036$, respectively). In this setting, there were no significant differences in change scores between the groups for severity of pain, perceived ability to perform daily activities, or for any of the mindfulness measures. In the participants' own environment none of the changes scores were significantly different between the groups.

Next, changes were considered within the two groups. In the body scan group, in both the clinic and in the participants' own environment, there was a significant reduction in scores between pre- and post-intervention for distress and for pain severity ($p = 0.001$, $p = 0.004$, respectively). Ratings of pain interfering with social relations were significantly reduced for this group in the clinic ($p = 0.009$) and the finding from their own environment approached significance ($p = 0.075$). For the control group, pain severity scores were significantly reduced between pre- and post-intervention in both the clinic and the participants' own environment ($p = 0.006, p = 0.007$, respectively). Also for this group, distress scores were significantly lower at post-intervention compared with pre-intervention in the participants' own environment ($p = 0.004$), but not in the clinic.

Sixty-four per cent of the control group and 78 % of the body scan group reported that they found the intervention moderately, very or extremely useful for helping them to relax. Additionally, 46 % of the control group and 67 % of the body scan group stated that they would probably or definitely recommend the strategy to others who are trying to manage their chronic pain. These group differences were not significant, although the finding for recommending the intervention approached significance ($p = 0.096$).

Discussion

This is the first study to assess the immediate effects of a brief mindfulness-based body scan on patients with chronic pain. In the clinic a 10 min body scan reduced ratings of pain related distress and ratings of the perceived interference of pain in social relations more effectively than a control condition. Both the body scan and the control intervention reduced ratings of the severity of pain, but there was not a significant difference between the interventions. There was no evidence for the interventions affecting ratings for the perceived ability for daily activities or for mindfulness. Around two thirds of the control group and over three quarters of the body scan group rated the intervention as being helpful for relaxation, although these ratings were not significantly different between the two groups.

There are no comparable studies among those with chronic pain, but the observed benefits of the body scan in the clinic are consistent with findings among those subjected to experimentally induced pain (Zeidan et al., 2010) and among abstaining smokers (Cropley et al., 2007; Ussher et al., 2009).

No effects of the body scan versus the control intervention were detected in the participants' own environment. This may be because when in their own environment the participants were instructed to use the intervention when they experienced high levels of pain or distress and the body scan may not have been as effective when faced with this challenge, especially as they had only practiced the intervention on a single occasion and had not practiced the intervention in their own environment during less distressing times. However, there was no indication that pre-intervention ratings of distress or pain were higher when in their own environment compared with in the clinic. The lack of effect may have been due to poor compliance; as with all body scan interventions, it was not possible to completely determine compliance. However, all of the participants confirmed that they had listened to the entire recording and had completed the body scan. The lack of effect may also have been due to the participants being in an environment where they were less able to focus on the task compared with the clinic. It is also possible that the initial use of the intervention in the clinic was partly effective due to the novelty of the intervention.

The finding that, compared with a distracting control intervention, the body scan had a greater effect on measures of distress and social relations but not on the measure of pain suggests a specific effect rather than a generalised distraction or expectancy effect. In addition, the chance of an expectancy effect was reduced by not making explicit the aims of the study. The most pronounced benefit of the body scan was a reduction in ratings of pain related distress. In the absence of any detectable changes in the mindfulness measures, this is likely to be largely due to the intervention acting as a relaxation technique. Unfortunately, in the absence of measures of relaxation, this cannot be verified.

To our knowledge, this is the first study to assess the immediate effects of a brief mindfulness intervention on measures of mindfulness. No changes in any of the mindfulness measures were observed. Previous studies have observed changes in these measures following attendance at an intensive mindfulness programme, typically extending over 8 weeks (e.g., Carmody & Baer, 2009; Morone et al., 2008). Studies are required to determine processes underlying the effects of brief mindfulness interventions and the best means for creating change in these processes. An

extremely minimal intervention was tested here, including automated self-delivery and essentially no interaction with a therapist. There will clearly be limitations with employing such a minimal intervention; for example, it is not clear whether patients will be able to learn the attitudes of acceptance and non-judgement simply by listening to an audio-guide. Interaction with a therapist or trained mindfulness practitioner may be necessary. Additionally, the intervention was tested in the normal environment on only a single occasion and the benefits of mindfulness strategies are likely to increase with independent practice (Carmody & Baer, 2008; Lau et al., 2006). Studies are needed to determine whether greater impact on key outcomes and mindfulness measures simply requires further practice and more therapeutic interaction, and it would be important to differentiate between the impacts of these two components of the intervention. More specific process measures may be required (e.g., those tuned to a body scan), rather than assessing wider processes in mindfulness,

Future studies would benefit from including additional strategies to both increase and assess compliance, such as the use of palm-top computers to record the timings of ratings and use of the audio-recording (Ussher et al., 2009). Further guidance could also be given about when, where and how to use the intervention and could include assessments of patients experience of using the intervention in the clinic versus in their normal environment. Besides allowing more time for practice before using the intervention independently, the impact of the intervention might also be enhanced by including a broader set of brief mindfulness strategies.

This study has important strengths, the chief of which is that it is the first randomized controlled study of a brief mindfulness intervention for patients with chronic pain. The interventions were tested in both a supervised clinical setting and in the participants' own environment. An established control condition with a level of distraction comparable with the body scan was also used. Additionally, the interventions were delivered via an audio guide, thereby maximising adherence.

There were also limitations of the study. In the clinical setting the pre-intervention scores for distress were significantly higher for the body scan group compared with the control group and we were constrained to use non-parametric tests; therefore the findings for distress must be treated with caution. The sample was mostly elderly, female and diagnosed with back pain and the results cannot be generalised beyond this population. However, these characteristics are consistent with a European survey of those experiencing chronic pain (Breivik et al., 2006). Also, increasing age and being female are associated with seeking help for chronic pain (Cornally & McCarthy, 2011). Participants were highly accepting of the control condition, involving a reading of a natural history text, but future studies might consider using materials which might be more meaningful to patients, for example related to chronic pain.

In conclusion, this study showed that in a clinic setting, among those with chronic pain, a brief mindfulness-based body scan reduced ratings of pain related distress and ratings of the perception that pain will interfere with social relations. The findings are encouraging as pain related distress, in particular, is common among those with chronic pain (Gormsen et al., 2010). The finding of no effect of the intervention outside of the clinic is important as it suggests that it is likely that a more intensive intervention than used here is necessary for benefitting patients in their normal environment. More than two thirds of participants rated the body scan as being useful for helping them to relax and said that they would recommend the strategy to others who are trying to manage their chronic pain, suggesting that the intervention is likely to be acceptable to this population. Further research is now needed to determine whether this intervention can be effective in the field, can be translated into longer lasting outcomes, and therefore can benefit those with chronic pain when using the intervention independently.

References

Bishop, S., Lau, M., Shapiro, S., Carlson, L., Anderson, N., Carmody, J., et al. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*, 230–241. doi:10.1093/clipsy.bph077

Bodenheimer, T. (1999). Disease management-promises and pitfalls. *The New England Journal of Medicine, 15*, 1202–1205. doi:10.1056/NEJM199904153401511

Boersma, K., Linton, S., Overmeer, T., Jansson, M., Vlaeyen, J., & de Jong, J. (2004). Lowering fear-avoidance and enhancing function through exposure in vivo: A multiple baseline study across six patients with back pain. *Pain, 108*, 8–16. doi:10.1016/j.pain.2003.03.001

Breivik, H., Collett, B., Ventafridda, V., Cohen, R., & Gallacher, D. (2006). Survey of chronic pain in Europe: prevalence, impact on daily life, and treatment. *European Journal of Pain, 10*, 287–333. doi:10.1016/j.ejpain.2005.06.009

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848. doi:10.1037/0022-3514.84.4.822

Cardaciotto, L., Herbert, J. D., Forman, E. M., Moitra, E., & Farrow, V. (2008). The assessment of present-moment awareness and acceptance: The philadelphia mindfulness scale. *Assessment, 15*, 204–223. doi:10.1177/1073191107311467

Carmody, J., & Baer, R. A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *Journal of Behavioral Medicine, 31*, 23–33. doi:10.1007/s10865-007-9130-7

Carmody, J., & Baer, R. A. (2009). How long does a mindfulness-based stress reduction program need to be? A review of class contact hours and effect sizes for psychological distress. *Journal of Clinical Psychology, 65*, 627–638. doi:10.1002/jclp.20555

Cleeland, C. S. (1991). Research in cancer pain: What we know and what we need to know. *Cancer, 67*, 823–827. doi:10.1002/1097-0142(19910201

Cleeland, C. S., & Ryan, K. M. (1994). Pain assessment: Global use of the brief pain inventory. *Annals of the Academy of Medicine, Singapore, 23*, 129–138.

Cornally, N., & McCarthy, G. (2011). Help-seeking behaviour for the treatment of chronic pain. *British Journal of Community Nursing, 16*, 90–98.

Cropley, M., Ussher, M., & Charitou, E. (2007). Acute effects of a guided relaxation routine (body scan) on tobacco withdrawal symptoms and cravings in abstinent smokers. *Addiction, 102*, 989–993. doi:10.1111/j.1360-0443.2007.01832.x

de Jong, J. R., Vangronsveld, K., Peters, M. L., Goossens, M. E., Onghena, P., Bulté, I., et al. (2008). Reduction of pain-related fear and disability in post-traumatic neck pain: A replicated single-case experimental study of exposure in vivo. *The Journal of Pain, 9*, 1123–1134. doi:10.1016/j.jpain.2008.06.015

Fresco, D. M., Moore, M. T., van Dulmen, M. H., Segal, Z. V., Ma, S. H., Teasdale, J. D., et al. (2007). Initial psychometric properties of the experiences questionnaire: Validation of a self-report measure of decentering. *Behavior Therapy, 38*, 234–246. doi:10.1016/j.beth.2006.08.003

Gormsen, L., Rosenberg, R., Bach, F. W., & Jensen, T. S. (2010). Depression, anxiety, health-related quality of life and pain in patients with chronic fibromyalgia and neuropathic pain. *European Journal of Pain, 14*, 127.e1–127.e8. doi:10.1016/j.ejpain.2009.03.010

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits. *A meta-analysis. Journal of Psychosomatic Research, 57*, 35–43. doi:10.1016/S0022-3999(03)00573-7

Hayes, S. C. (2004). Acceptance and commitment therapy, relational frame theory, and the third wave of behavioral and cognitive therapies. *Behavior Therapy, 35*, 639–665. doi:10.1016/S0005-7894(04)80013-3

Institute of Medicine; Committee on Advancing Pain Research, Care, and Education. Committee on Advancing Pain Research, Care, and Education. (2011). *Relieving pain in America: a blueprint for transforming prevention, care, education, and research.* Washington: The National Academies Press. Retrieved from http://www.ncbi.nlm.nih.gov/books/NBK91497/pdf/TOC.pdf

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York: Dell Publishing.

Lau, M. A., Bishop, S. R., Segal, Z. V., Buis, T., Anderson, N. D., Carlson, L., et al. (2006). The Toronto mindfulness scale: Development and validation. *Journal of Clinical Psychology, 62*, 1445–1467. doi:10.1002/jclp.20326

McCracken, L. M., Vowles, K. E., & Eccleston, C. (2004). Acceptance of chronic pain: component analysis and a revised assessment method. *Pain, 107*, 159–166. doi:10.1016/j.pain.2003.10.012

Morone, N. E., Greco, C. M., & Weiner, D. K. (2008). Mindfulness meditation for the treatment of chronic low back pain in older adults: A randomized controlled pilot study. *Pain, 2008*(134), 310–319. doi:10.1016/j.pain.2007.04.038

Shapiro, S., & Schwartz, G. (1999). Intentional systemic mindfulness: An integrative model for self-regulation and health. *Advances in Mind-Body Medicine, 15*, 128–134. doi:10.1054/ambm.1999.0118

Ussher, M., Cropley, M., Playle, S., Mohidin, R., & West, R. (2009). Effect of isometric exercise and body scanning on cigarette cravings and withdrawal symptoms. *Addiction, 104*, 1251–1257. doi:10.1111/j.1360-0443.2009.02605.x

Von Korff, M., Glasgow, R. E., & Sharpe, M. (2002). Organising care for chronic illness. *BMJ, 325*, 92–94. doi:10.1136/bmj.325.7355.92

Vowles, K. E., McCracken, L. M., McLeod, C., & Eccleston, C. (2008). The chronic pain acceptance questionnaire: Confirmatory factor analysis and identification of patient subgroups. *Pain, 140*, 284–291. doi:10.1016/j.pain.2008.08.012

Wilkinson, M. J., & Barczak, P. (1988). Psychiatric screening in general practice: comparison of the general health questionnaire and the hospital anxiety depression scale. *Journal of the Royal College of General Practitioners, 38,* 311–313. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1711493/pdf/jroyalcgprac00019-0020.pdf

Zeidan, F., Gordon, N. S., Merchant, J., & Goolkasian, P. (2010). The effects of brief mindfulness meditation training on experimentally induced pain. *Journal of Pain, 11*, 199–209. doi:10.1016/j.jpain.2009.07.015

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica, 67*, 361–370. doi:10.1111/j.1600-0447.1983.tb09716.x