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An investigation into the effectiveness of two mindfulness techniques: mindful breathing and the body scan

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Thesis for the Doctor of Clinical Psychology

October 2006

Word Count: 19973

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Abstract

Literature Review

The use of mindfulness techniques has gained popularity over the last two decades or so, and increasing amounts of research are being undertaken in the field. There now exists a range of literature to support the use of mindfulness techniques in clinical practice with a range of populations. The current research leaves many questions unanswered, particularly the need for a clear definition and exploration of what the concept of mindfulness is and how and why training in mindfulness works. The following review describes the existing research around mindfulness training and explores the different therapeutic models which incorporate aspects of mindfulness in clinical interventions. Limitations of the current literature are discussed and directions for future research are suggested.

Empirical Paper

The literature on mindfulness as a clinical intervention has rapidly expanded in recent years but questions about its use and effectiveness remain unanswered, one of which concerns the active agents of change. The current study aimed to investigate two specific techniques which currently form part of larger mindfulness training packages: mindful breathing and the body scan. 59 university undergraduates were recruited and were tested on a number of measures of stress tolerance, psychological symptoms and affect, as well as attention and mindfulness skills. A range of mixed design ANOVA statistics are calculated but no significant effect of training in either technique is reported. These results are discussed in terms of their implications for future research and clinical interventions. The study suggests that non-specific factors, such as membership of a group, might be important in the success of mindfulness training.

Acknowledgements

I am grateful for all the support I have received whilst researching and writing up this dissertation. Thanks especially go to Dr Nick Maguire and Professor Paul Chadwick for their supervision and extensive input into the design of the project. Thanks also to Daniel Meron for recording the CDs. Thanks are also due to all the participants who gave so much of their time and effort.

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Helen Care

Prepared for submission to Psychological Review

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The current state of mindfulness research: Its limitations and future directions.

Abstract

The use of mindfulness techniques has gained popularity over the last two decades or so, and increasing amounts of research are being undertaken in the field. There now exists a range of literature to support the use of mindfulness techniques in clinical practice with a range of populations. The current research leaves many questions unanswered, particularly the need for a clear definition and exploration of what the concept of mindfulness is and how and why training in mindfulness works. The following review describes the existing research around mindfulness training and explores the different therapeutic models which incorporate aspects of mindfulness in clinical interventions. Limitations of the current literature are discussed and directions for future research are suggested.

Keywords

Mindfulness, clinical intervention

Introduction

Interest in the clinical application and use of mindfulness has rapidly increased over the last few years. It is becoming increasingly popular in managing a wide range of physical and mental health problems, such as chronic pain, psoriasis, anxiety and hallucinations in schizophrenia (Bach & Hayes, 2002; Kabat-Zinn, Wheeler, Light, Skillings, Scharf, Cropley, Hosmer & Bernhard, 1998; Miller, Fletcher & Kabat-Zinn, 1995). In fact, one particular form of mindfulness training, the Mindfulness Based Stress Reduction programme, was reported to have been used in 240 clinics by 1997 (Moore, 1998). However, there is a relative paucity of research on the subject and there is still little known about the mechanisms of change or modes of actions. The range of research has increased over the past few years and this review will aim to explore this and to discuss possible future directions.

Before beginning this review a brief introduction will be made to mindfulness and its historical setting, as well as its current practice. The review will then go on to explore the literature around its application to different clinical conditions, beginning with the early use of mindfulness in the treatment of chronic pain. A brief review will then be made of the place mindfulness has taken in the "*Third Wave*" therapies (Hayes, 2004) where it is often a central tenet of such approaches. However limited the research may be, there has been investigation into its effectiveness and discussion will also be made around the limitations of mindfulness and the possible contraindications to its use. The review will conclude with an exploration of the questions the research to date has raised and the possible directions of future research into the use, efficacy and action of mindfulness in clinical practice.

What is mindfulness?

Before beginning any discussion of the literature surrounding mindfulness it is essential to have a conceptualisation of the technique and its historical context. Mindfulness is an ancient technique taken from Buddhist practices, which have been practised for over two and a half thousand years, although its roots can be traced back much further to yogic practices centuries earlier. For many Buddhist teachers mindfulness is an essential element of Buddhism and Thera (1962) referred to it as "*the heart of Buddhist meditation*". Meditation is defined as "*The action, or an act, of meditating; continuous thought or musing upon one subject or series of subjects; (a period of) serious and sustained reflection or mental contemplation.*" (OED, 2006) In Buddhist teachings there are a number of meditation techniques, with mindfulness often being considered the most significant (Thera, 1962). According to Buddhist teaching, Buddha is reported to have referred to mindfulness as "*the direct path for the purification of beings, for the overcoming of sorrow and lamentation, for the disappearance of pain and distress, for the attainment of the right method*" (Thera, 2006).

Although its historical roots lie in Buddhist teachings and earlier yogic practices, its current clinical incarnation does not teach or demand a particular religious or cultural stand-point. It is thought of as a special form of attention, which can be considered to be a universal human attribute (Miller, Fletcher & Kabat-Zinn, 1995). Kabat-Zinn (2001) describes mindfulness as "*moment-to-moment awareness*" and defines it as "*the complete 'owning' of each moment of your experience, good, bad or ugly…think of mindfulness as a lens, taking the scattered and reactive energies of your mind and focusing them into a coherent source of energy for living, for problem solving and for healing.*" (p.11)

As this comment suggests, mindfulness essentially involves the practice of awareness within the moment to whatever is going on in the practitioner and there are a number of techniques for learning to achieve mindfulness, such as mindful breathing, which is the focus on the sensation and experience of breathing as it is happening.

Mindfulness involves the focused attention on an internal process or object, such as the breathing, in a sustained and non-judgemental way. The practitioner is required to focus their attention on the given internal object, and to notice whenever that attention is drawn away by an internal or external event, such as a thought or distracting noise. The practitioner is asked to note the event and then return their attention to the original object of focus. Mindfulness does not involve thought suppression, rather the recognition of thoughts and the shifting of attention away from them. It is suggested that by shifting attention in this way the practitioner avoids engaging in ruminative patterns of engaging with thoughts. Bishop et al. (2004) provide an operational definition of mindfulness as therefore consisting of two components: the self-regulation of attention and orientation to experience.

The first component is described as the self-regulation of attention in order to bring it to focus on the current experience. It requires the practitioner to observe and attend to the thoughts, feelings and sensations as they change from moment to moment. Parasuraman (1998) suggests that sustained attention is required to maintain awareness of current experience. Not only must attention be sustained but practitioners must also be able to switch attention effectively in order to allow attention to be brought back once it has wandered away from the desired object. Thus in a mindfulness exercise using attention to the breath, the practitioner learns to sustain attention initially on the sensation of breathing, and learns flexibility of attention in order to bring it back to the breath when other

thoughts, emotions and sensations are noted. Because these thoughts and sensations which draw attention are not engaged with or judged, it is thought that mindfulness thus "*inhibits secondary elaborative processing*" (Bishop et al. 2004, p.233). Not only does Bishop propose that this prevents practitioners becoming caught up in ruminative thoughts about experience, but also suggests that this frees up attentional resources. These extra resources can then be used to process information relevant to current experience, allowing access to information that would otherwise remain outside of awareness.

The second component of mindfulness Bishop et al. describe is the particular style of orientation to experience that is adopted, one of openness and curiosity. Whenever the mind wanders from the object of attention, such as the breathing, it is noted with interest and curiosity, but without judgement. Thus all thoughts, feelings and sensations that arise are seen as equally relevant and subject to observation. This involves a degree of acceptance, that each moment is viewed as valid and allowed, and an abandonment of any agenda or attempt to force a certain goal or state, such as relaxation.

Is mindfulness different from other forms of meditation?

There has been clinical interest and research into the use of meditation practices over a number of years (e.g. Gellhorn & Kiely, 1972; Davidson & Coleman, 1977), much of which has focused on the physiological effects of meditation and the relaxation response (Benson, Beary & Carol, 1974). Delmonte (1984) provided a review of the physiological effects of meditation and noted that most studies to date had utilised transcendental meditation (TM), and had found significant improvements in physiological markers of stress and relaxation. However, he concludes "*there is little evidence to suggest superiority to established relaxation techniques*" (p.30). He does however note a distinction between TM and similar

meditation practices and mindfulness meditation in terms of their scope, describing mindfulness as requiring an attentional focus on the whole field, whilst others either require focus on a specific object or switching between a specific object and the whole field. Shapiro (1982) describes this as the difference between 'wide-angle lens attention' and 'zoom lens attention'.

Since the time of Delmonte's review there has been much more focus on mindfulness as a technique and its use and clinical application has become more widespread (Salmon, Santorelli & Kabat-Zinn, 1998). This has been followed with a greater understanding of the difference between mindfulness and other forms of meditation. The significant difference is noted to be the attitude with which mindfulness is undertaken, that being one of non-judgemental acceptance and curiosity about where attention may wander to. Other forms of meditation tend to be concentration-based, whereby practitioners are trained to restrict their attention and to bring it back when it wanders. No attention is paid to the nature of the distraction. Baer (2003) states that "*Mindfulness meditation, in contrast, involves observation of constantly changing internal and external stimuli as they arise*" (p.126). It is thus an active process which does involve the training of attention, but allows a different understanding of distractions and wanderings of attention which may in turn allow greater understanding and knowledge of the nature and substance of thoughts, emotions and sensations as they are experienced by the practitioner. This review therefore focuses specifically on the clinical applications of mindfulness-based meditation techniques, rather than of meditation techniques in general.

It should also be noted at this stage that there is a cognitive model of mindfulness which was proposed by Langer (1989, 1997) but which will not form part of this review. Langer's model does share some similarities with the mindfulness approaches explored in this

review but it has several important differences. Mindfulness interventions studied by Langer and colleagues (e.g. Langer, 1989; Langer & Moldoveanu, 2000) often involve teaching participants to consider external information and require active, goal-oriented tasks such as problem solving. Participants may be required to consider information or situations from multiple perspectives in order to increase learning and creativity. Thus, although some of the basic principles and techniques are similar to the mindfulness-based studies discussed here, they are sufficiently distinct to be beyond the scope of this review. Langer herself has cautioned against drawing parallels between the form of mindfulness she teaches and the form of mindfulness as described here (1989).

Clinical applications

Given the operational definition of mindfulness outlined above it is possible to see why mindfulness might have clinical applications for a wide range of populations. If cultivation of mindfulness allows the observation of all thoughts, sensations and emotions as mental events, which are not judged or engaged with, the practitioner would be afforded space in which to avoid slipping into depressive or disturbing cycles of thought. Although it comes from a cultural and historical past associated with Buddhism and other practices, its application need not be tied to such a background. Dimidjian and Linehan (2003) state that "*the integration of mindfulness training into clinical treatment has been largely achieved by the secularisation of mindfulness*" (p.167). Bishop et al. (2004) summarise mindfulness as a "*form of mental training to reduce cognitive vulnerability to reactive modes of mind that might otherwise heighten emotional distress or that might otherwise perpetuate psychopathology*" (p.231).

This understanding of mindfulness as 'mental training' has been used by Teasdale and colleagues (e.g. Teasdale, 1999; Teasdale, Segal & Williams, 1995), who have proposed that

mindfulness can be fitted within a theoretical cognitive framework called Interacting Cognitive Subsystems (ICS; Teasdale & Barnard, 1993). Central to the ICS model is the proposition that knowledge and experience are stored and processed in the brain in qualitatively different forms. In particular, the model differentiates between specific meanings and generic, richly elaborated models. It is suggested that only these generic models can act as triggers for emotional states and that in people prone to depression, such models contain global negative beliefs about the self. They refer to a state of 'depressive interlock' which is entered once such models are triggered, in which feedback from both the body and from negative thinking maintains low mood and creates a depressive cycle. It is suggested that mindfulness allows this depressive interlock to be broken by interrupting the negative feedback and therefore preventing the depressive cycle from being maintained. Teasdale also describes mindfulness as facilitating 'metacognitive insight', which he defines as the ability to experience thoughts as events in the field of awareness (Teasdale, 1999). This allows the practitioner to change their relationship with such thoughts, rather than viewing them as facts they are seen as merely events that can be observed.

The therapeutic mechanism of mindfulness

Mindfulness in this conception is thought of as a psychological process, and as such it could act through a number of different mechanisms to assist psychological well-being and reduction of symptoms. There are other areas of therapeutic interest which may highlight the possible psychological processes to which mindfulness could contribute. For example, both relaxation techniques and attentional training have been used therapeutically for the treatment of psychological disorders and both could have implications for the positive effects seen with mindfulness training. The use of relaxation techniques to treat psychological distress has a long history and there are many different relaxation techniques

being used in therapy to date. It has long been proposed that anxiety and stress can be expressed and experienced in a number of different ways, identified by Davidson and Schwartz (1976) as somatic (such as muscular tension), cognitive (such as worrying thoughts) and behavioural (such as avoidance). Relaxation techniques can therefore focus on different aspects of these in isolation or in combination. For instance, when treating chronic pain using relaxation techniques, there may be physiological approaches, such as exercise and muscle relaxation, as well as cognitive approaches to tackle to associated worry and anxiety aroused by the pain, and behavioural approaches to reduce avoidance of previously enjoyed activities (Harding and Watson, 2000). Relaxation training may work in a number of ways, by reducing autonomic nervous system arousal, thereby reducing wear and tear on certain muscles and organs, and by improving the action of the body's natural healing and immune system responses. It may also act to increase coping skills and allow more effective problem solving, which are thought to be impaired under conditions of stress (see Payne, 2005, for a more in depth discussion).

There is a theoretical reason, as presented above, why relaxation training might help relieve symptoms of psychological distress, and there is experimental evidence to support this. For instance, Ost and Breitholtz (2000) compared Cognitive Behavioural Therapy with relaxation training in an outpatient setting for participants with generalised anxiety disorder, and found that though both techniques led to quite large improvements in symptoms there was no significant difference between the two techniques. Jacobs and Friedman (2004) completed an EEG study to monitor activity in the brain during relaxation training, and found that it significantly reduced cortical arousal when compared to a control. The authors suggest that their findings may indicate that relaxation training induces a hypoactive central nervous system state that may be similar to that seen in stage one sleep and that relaxation training possibly works by conserving or restoring cerebral energy.

Similarly, it could also be suggested that mindfulness training could teach attentional control, which has also been used clinically. Mohlman (2004) provides a helpful review of the use of attentional training as a therapeutic intervention for anxiety. Experimental cognitive research has demonstrated that attentional biases (e.g. a bias in attending to negative information rather than positive information) are vulnerability factors in the development of psychological disorders (see Leppanen, 2006, for a comprehensive review). This is therefore used as the rationale for attentional training: if attentional biases are a vulnerability factor, could training to alter or manipulate these biases be protective or help reduce symptoms? There is a relative paucity of evidence relating to the effectiveness of this technique, but the evidence that has been produced is promising. For example, Papageourgiou and Wells (2000) report a series of cases of recurrent major depression which were treated with attentional training. They report significant improvement across a number of measures, including ruminative thinking, self-focused attention and negative automatic thoughts following attentional training, when compared to a wait-list baseline measure. They report that all patients showed significant improvement in anxiety and depression following training and conclude that the results suggest that attentional training can be helpful. However, they also acknowledge that the lack of a randomised control trial into the technique prevents strong conclusions being drawn about its efficacy as yet.

The evidence presented above indicates that both relaxation and attentional control training can be useful psychological interventions. It is possible that mindfulness training works because it too engenders better attentional control skills and aids relaxation. However, it seems that mindfulness as a psychological process may go beyond either of these. Hayes and Shenk (2004) describe mindfulness as a psychological process in its own right and note that this psychological process requires that the practitioner goes beyond

normal cognitive processes in order to access a position of present awareness and acceptance. They suggest that meditation may be the best way to achieve this "uncoupling" from normal cognitive processes. They describe this uncoupling as required in order to reach a state where it is not the content of language that is important, where "what is thought *about* is no longer of primary concern…instead the process of thinking (and feeling, sensing and so on) itself comes to the fore." (p252). Hence although mindfulness may indeed encompass some of the same skills as attentional training and relaxation techniques, it appears to go beyond these skills and offer something extra.

Mindfulness Based Stress Reduction

The first wide-scale clinical application of mindfulness was that of the Mindfulness Based Stress Reduction programme (MBSR; Zabat-Zinn, 1982), originally termed the Stress Reduction and Relaxation Program (SR&RP; Kabat-Zinn, 2001). The MBSR was originally devised as a manualised treatment programme for the management of chronic pain (Kabat-Zinn, 1982). It is generally delivered as an intensive eight-week training course, involving weekly sessions, one day-long session at week six, and the commitment of participants to carry out extensive homework practice of the techniques. MBSR is usually delivered to a group of up to 30 participants with a heterogeneous range of primary mental and physical health complaints. The two and a half hour long weekly sessions tend to be highly experiential, with direct practice of techniques and discussion of difficulties and experiences. Techniques range from focused meditation techniques, such as the mindful breathing exercise which involves paying attention to the sensations and experience of breathing. Other meditation exercises include sitting meditation and walking meditation, where mindfulness skills are brought to bear on intensive, focused activities. Hatha yoga is

also used in order to encourage moment-to-moment awareness of the whole body and the breathing during slow, gentle stretching exercises. There is also a didactic element of the programme which tends to focus on the physiological and psychological components and concomitants of stress. Aside from these formal meditation and yoga exercises, mindfulness of everyday tasks is also encouraged, such as washing up or driving the car. Both formal and informal tasks are given as homework each week.

MBSR has been the subject of a number of studies which have all broadly supported its effectiveness with a range of populations. As it was originally designed for use with medical patients suffering from chronic pain, this was one of the first clinical applications that was evaluated. Kabat-Zinn, Lipworth and Burney (1985) suggested it could be used effectively in the self-regulation of chronic pain and led to a significant improvement in subjective reports of well-being and symptom management. They studied 90 chronic pain sufferers who took part in the MBSR programme and reported significant improvement on a number of self-reported measures, including rating of present-moment experience of pain, restriction to activity due to pain and negative body image. Their use of pain medication also decreased. These improvements were reported to have been maintained at 15 month follow-up for all measures except that of present-moment pain. In 1987 Kabat-Zinn also published a four-year follow up to this study which again suggested that improvements in self-reported symptoms and management had been maintained, and that participants had continued to practice mindfulness in the majority of cases (Kabat-Zinn, Lipworth, Burney & Sellers, 1987).

Kutz et al (1985) studied the effectiveness of mindfulness meditation for a clinical population with a wide range of psychiatric disorders, as an adjunct to more typical psychotherapy. Their results were encouraging and moderate improvements in a variety of

psychological symptoms, including anxiety, were reported over the course of the therapy by both participants and therapists. However, the study was uncontrolled and had no standardised diagnostic assessments of participants. It is therefore difficult to draw any clear conclusions about the efficacy of the technique for different disorders or the part that the mindfulness component might actually have played.

Although these early studies did indicate that mindfulness meditation techniques could be useful for clinical patients, they were relatively limited in their scope and had methodological flaws, such as a lack of randomised control, that prevented strong conclusions being drawn. Although the Kabat-Zinn (Kabat-Zinn, Lipworth & Burney, 1985) study did make comparison with subjects who had received a standard, non-MBSR treatment, there was no attempt to randomise participation in the groups and the control group consisted of less than one quarter the number of participants as the experimental group. Since then the evidence base has grown and a number of studies have looked at the efficacy of MBSR across different populations. Kabat-Zinn and colleagues have spear-headed much of this more recent research and in 1992 reported on the use of MBSR with participants who had clinical diagnoses of anxiety disorders, either generalised anxiety disorder or panic disorder (with or without agoraphobia). They reported that for twenty of the 22 participants there were significant decreases in clinician ratings of anxiety ($F=21.1$, $df = 3.39$, $p<0.001$) and participant self-reported levels of anxiety ($F=15.36$, $df = 3.42$, $p<0.001$) at the end of treatment and at 3 month follow-up. A follow-up evaluation was completed three years later with 18 of the original subjects and suggested that improvement seen after the intervention period had been maintained, both for clinician ratings of anxiety ($F=13.22$, $df = 2.32$, $p<0.001$) and for participant ratings($F=9.83$, $d.f.=2.32$, $p<0.001$) (Miller, Fletcher & Kabat-Zinn, 1995).

The above discussion suggests that the MBSR has been used with a variety of clinical populations and has shown some encouraging results. This has led to the widening of the scope of investigations and applications of the programme and several studies have now begun to look at its use with non-clinical populations. This has been part of a drive towards a more preventative role for the technique. Williams, Kolar, Reger and Pearson (2001) suggest that stress is now recognised as a factor in the development and maintenance of psychological disorders, and that combating the effects of stress, and its subsequent effects on absence from work and health care needs, has become the subject of American government policy. They therefore proposed that if mindfulness training was able to help participants to learn to manage stress more effectively that this might indicate a role for MBSR in community-based preventative programmes. They completed a randomised-controlled trial of MBSR with a community sample of self-referred adults who all volunteered to take part in stress-reduction training. They used a variety of measures in order to assess the perceived level of daily stress, number of psychological symptoms and subjective experience of well-being and reported a significant improvement at the end of the intensive 8-week MBSR training. They reported a reduction from pre- to post-treatment of 46% for medical symptoms and 44% for psychological distress.

Astin (1997) carried out a similar, small-scale, randomised controlled trial of MBSR with undergraduate students and reported significant reductions on self-report measures of psychological symptoms, such as depression and anxiety. The global measure of symptoms was said to have been reduced by 64% following participation in the MBSR, when compared to the wait-list control group. Astin also reports significant improvements in positive sense of control and sense of self as a source of control. They hypothesise that this may have a significant effect on stress by increasing self-efficacy and note that enhancing feelings of control is a common goal of most psychotherapies.

Similarly, Shapiro, Schwartz and Bonner (1998) used the MBSR programme in order to combat the effects of stress on medical and pre-medical students. These were identified as a group likely to suffer significant levels of stress, in terms of workload and responsibility, and the study also identified that the effects of stress on doctors ability to practice medicine has been well documented. The study therefore looked at the effectiveness of the MBSR to reduce reported symptoms of stress and to help medical students manage the effects of such demanding training. There were some differences with the programme as compared to the original MBSR model, because the authors chose to include an element of spirituality, which they report can "*enhance physical and psychological well-being*" (1998, p.583). The investigation concluded that training in MBSR significantly reduced state and trait anxiety and that a path diagram indicated that this in turn reduced levels of depression and other psychological distress. They also report an increase in empathy with patients and personal spirituality.

Thus far the evidence into the efficacy of the MBSR has been conducted on a relatively small scale but has broadly been encouraging. In fact, in a meta-review of twenty clinical and non-clinical studies, Grossman, , Niemann, Schmidt and Walach (2004) concluded that "*Although derived from a relatively small number of studies, these results suggest that MBSR may help a broad range of individuals to cope with their clinical and non-clinical problems,*" (p.35). They found 64 studies but excluded 44 studies due to insufficient statistical information or lack of information about the mindfulness approach that was taken. Studies that were included covered a wide spectrum of clinical populations (e.g. anxiety, depression, pain, cancer, heart disease and fibromyalgia). Some were controlled, others did not include a control group but the effect sizes reported were similar, between 0.30 and 0.67 for all studies, but with a mean effect size of approximately 0.50. Only one study had an effect size significantly lower than

0.50, at the 0.30 level. This study was conducted with prisoners and had a small number of participants, with only 15 in the treatment group, which may account for the low effect size seen.

As can be seen from the above review, the MBSR approach has begun to receive a great deal of attention and this reflects its increasingly popular status as a clinical intervention. By 1997 it was reported that over 240 hospitals and clinics in the United States and other countries were offering stress reduction programmes based on the technique (Salmon, Santorelli & Kabat-Zinn, 1998). However, despite this widespread clinical use and apparent empirical interest there are some difficulties with the research to date. As noted by Bishop (2002) the popularity of MBSR has grown up largely in the absence of rigorous evaluation. The Grossman, Schmidt, Niemann and Walach meta-review (2004) found 64 studies into the effectiveness of MBSR but excluded 44 of these, in the main part due to lack of statistical information and clear information about the mindfulness techniques used. This highlights the two major criticisms of research into MBSR to date, namely methodological flaws and poor operational definitions. Most of the early research was carried out on uncontrolled trials (e.g. Kabat-Zinn, Lipworth & Burney, 1985) which indicated a positive outcome for many participants but which did not allow strong conclusions to be drawn. It is very difficult to determine whether it was in fact the MBSR which was the significant factor leading to the improvement in symptoms, or whether other changes were being made via some other mechanism. Without a control group it is also impossible to say whether the improvement would have been seen over time regardless of whether any intervention was offered.

The more recent studies have included randomised control trials but again there is a difficulty as most of these have used a wait-list control group. This means that those

undertaking the programme are compared to those left on a waiting list for later treatment. This does allow conclusions to be made about the probability that change occurred naturally over time even in the absence of intervention, however it does not rule out the possibility of a placebo effect (Beecher, 1955) The placebo effect refers to the phenomenon of a patient's symptoms being alleviated by an otherwise ineffective treatment, due to the individual's belief or expectation that the treatment will work. If only wait-list controls are used it is impossible to determine whether any changes seen are due to the enhanced well-being associated with feeling someone has taken you seriously and is offering help rather than with any active agent of the intervention.

The relatively small numbers included in the trials have also made drawing strong conclusions difficult. Although there are relatively good effect sizes reported, with the average calculated by Grossman, Schmidt, Niemann and Walach (2004) as 0.50, most of the studies in their review had fewer than 40 participants. There have been larger samples reported but these have tended to be in studies using non-clinical populations, such as the Rozenweig et al (2003) study cited in the meta-review which had 277 student participants.

Apart from the difficulties in drawing strong conclusions based on the poor methodology of studies, a second major area of criticism of the literature around MBSR to date concerns the definitions of mindfulness itself. Many of the 44 studies that were rejected from the Grossman, Schmidt, Niemann and Walach (2004) meta-review were discounted due to the paucity of information about the mindfulness procedure followed. Although most studies do begin by introducing mindfulness and giving a brief generic description, they rarely give a definition of the specific procedure used or attempt to record or measure adherence to the protocol (e.g. Astin, 1997). There is rarely any information given as to the qualification of those teaching the mindfulness technique and without information about the degree of

adherence it is difficult to determine whether the mindfulness training per se was the active agent of change. Equally, without any measurement of adherence it is impossible to determine the consistency of the training between different groups or different trainers. It is possible that those studies that report a larger effect size do so because the trainers follow the protocol more closely or are more experienced. However, it is equally possible to argue that changes seen in some groups might be due to other techniques the trainers are using which are nothing to do with mindfulness.

This last point highlights a further difficulty with most of the studies, because not only is mindfulness poorly operationalised, but as a result of this failure, there is usually no attempt made to measure mindfulness. As Bishop et al (2004) note, in the absence of a clear definition of a construct it is very difficult to attempt to quantify it. Equally, without any effective measure of mindfulness it is difficult to determine whether the agent of change is the one predicted. Just because clinicians and therapists believe they are teaching mindfulness does not necessarily imply that that is what group participants are learning. It is equally possible that there are other important factors which are causing the positive changes recorded and the subjects have not in fact increased their mindfulness skills at all.

It can therefore be seen that although the signs are positive and the trend in the literature certainly appears to support the efficacy of MBSR for a number of different populations, there is clearly a need for more rigorous research. The issue of future research needs and directions will be discussed in detail later in this review. There are also some patients for whom MBSR does not appear to work, and regardless of the positive indication of its effectiveness, it clearly does not have a one hundred percent success rate. Other techniques have grown up, often based on the original MBSR programme, which have sought to make it applicable to other populations and potentially to some of those who are not able to

benefit from the original MBSR approach. The following sections will go on to discuss some of these, beginning with mindfulness based cognitive therapy (Teasdale, Segal & Williams, 1995).

Mindfulness Based Cognitive Therapy

Mindfulness Based Cognitive Therapy (MBCT; Teasdale, Segal & Williams, 1995) was developed in order to help participants with a history of recurrent depression avoid relapse once recovered. It is based on the same principles and basic techniques as the MBSR programme and uses many of the same exercises and approaches. It uses both the formal and informal mindfulness techniques, such as formal sitting and walking meditation, as well as mindfulness of everyday tasks being encouraged. However, it combines these with elements of cognitive behavioural therapy (CBT; Beck, 1970, 1976). Like the MBSR training it is delivered in a group setting and has a general focus on teaching skills, however it is usually delivered to a group who all have a history of depression, rather than the heterogeneous groups usually used in the MBSR programme. The didactic element of the programme therefore focuses primarily on depression, rather than on stress, as in MBSR. It is designed to train recovered participants in skills which will have some protective factor preventing future depressive relapse. It uses the MBSR emphasis on viewing thoughts and sensations as mental events worthy of observation, rather than indisputable facts. It also has similarities with CBT in this respect, as CBT aims to give a greater awareness of thoughts and feelings and an ability to distinguish thoughts from facts. However, unlike CBT it does not aim to alter thought content or teach labelling of thoughts as helpful or unhelpful, positive or negative (c.f. Hawton, Salkovskis, Kirk & Clark, 2002). Other cognitive exercises are taught alongside the techniques taken from MBSR, including discussion of automatic thoughts and introduction of the ABC model of CBT (Hawton,

Salkovskis, Kirk & Clark, 2002). MBCT also explicitly teaches awareness of warning signs of impending depression and identification of escalating depressive patterns of thought. As MBCT is taught to those recovering from depression it can therefore be taught in the absence of current depressive symptomatology or diagnosis.

One significant technique in MBCT which is not present in the MBSR programme is the three-minute 'breathing space' exercise. It is introduced in week three of the eight-week course and participants are asked to practice it several times per day. It involves three stages, each practised for approximately one minute. Stage one is to focus attention on current experience, and non-judgementally notice all thoughts, sensations and emotions that may be present. Stage two is to focus attention on the sensation of breathing and stage three is to expand attention to the body as a whole. It is designed as a 'mini-meditation' to help participants to recognise the difference between automatic reaction and skilful responding. Baer and Krietemeyer (2006) report use of the metaphor of opening a door "which reveals a number of corridors down which we might choose to walk" to describe the breathing space exercise (p.14).

As MBCT is a more recent development than MBSR it has yet to have been the subject of as much empirical research. However, studies have begun to appear in the literature and so far the results are broadly encouraging. In 2000, Teasdale et al. reported a multi-centre randomised controlled trial for MBCT in reducing relapse for depression. They had 145 participants who had all experienced two or more episodes of depression but were currently in recovery or remission. Although all had previously been on anti-depressant medication this was discontinued at least three months prior to the start of the trial. They reported a significant improvement when compared to a treatment-as-usual (TAU) control group. For participants with a history of three or more previous depressive episodes, 37%

relapsed, as compared to 66% in the TAU group, although no significant reduction in risk was seen for those with a history of only two or fewer episodes. However, the rate of antidepressant medication was lower for the MBCT group than the TAU group.

A second randomised control trial replicated these findings, using 75 recovered or remitting depressed participants (Ma & Teasdale, 2004). It too used an MBCT versus TAU design and randomly assigned patients to one approach or the other. Again a significant reduction in rates of relapse was seen for those with a history of three or more depressive episodes, of whom 36% relapsed, compared to 78% of the TAU control group. However, once again the rate of relapse was not significantly different for participants who had only had two previous depressive episodes.

When investigating the cognitive element of the MBCT programme, Williams, Teasdale, Segal and Soulsby (2000) conducted experimentation looking at the amount of memory retrieval that could be elicited following participation in MBCT training. This was related to previous findings that patients with psychopathology, such as depression, tend to retrieve generic summaries of past events, rather than specific details (e.g. Goddard, Dritschel, & Burton, 1996). Hence their memory could be said to be 'over-general'. They found that general recall was reduced for participants who had received the MBCT treatment, but not for controls in the TAU group. They suggested that the MBCT training had altered the encoding and retrieval of personal events. This supports the theoretical underpinning of MBCT, which suggests that individuals who have experienced depressive episodes have learnt an association between sadness and negative thought patterns, such that whenever they experienced sadness, a cycle of negative thinking is triggered (e.g. Segal, Gemar & Williams, 1999). These negative thought cycles also lead to a ruminative style of thinking, including analysis of why the individual feels sad and their self-perceived short-comings.

Although individuals who enter into these ruminative thinking styles tend to report that it will lead to insight into their difficulties, the research suggest that it perpetuates depressive mood (Nolen-Hoeksema, 1991). The proponents of MBCT suggest that the mindfulness component of the programme teaches non-judgemental attentional focus on thoughts feelings and emotions, and that this focus uses attentional resources such that there are not sufficient left to enter ruminative thinking patterns. This attitude of observation and acceptance is also hypothesised to prevent negative thinking cycles by stopping the evaluative, judgemental element of negative thinking. The cognitive element of the programme helps to teach participants recognise such patterns of negative thinking and use strategies to prevent relapse. Thus the Williams et al. (2000) study suggests that MBCT does indeed reduce retrieval of the negative information by those with a history of depression, indicating that the expected negative thinking cycles have been prevented.

The above review suggests that the evidence surrounding the use of MBCT for those with a history of depression is encouraging, however, there are several limitations which it is important to note. Firstly and most obviously, the number of studies is as yet very small and this limits the strength of any conclusions that can be drawn. Both randomised controlled trials discussed above did have large numbers of participants and did show significant reduction in relapse risk for those with three or more depressive episodes. However, the results suggest that for those with fewer episodes of depression the MBCT programme is not significantly better than the alternative treatment options. This warrants further investigation as it may be that longer term follow-up studies will indicate a more significant difference between the two treatment approaches. It is equally possible that the MBCT programme is more useful for those who have a greater tendency to enter into negative and ruminative styles of thinking, but that for those with only one or two

episodes, the link between experience of sadness and such depressive thinking styles is not sufficiently strong to require MBCT.

Third Wave Therapies

The so called 'third wave' therapies (Hayes, 2004) have been thus termed because they are seen as the new wave of developments in behavioural therapy, following the original behavioural and then cognitive behavioural approaches. Hayes states that "*The third-wave treatments are characterized by openness to older clinical traditions, a focus on second order and contextual change, an emphasis of function over form, and the construction of flexible and effective repertoires, among other features. They build on the first- and second-wave treatments, but seem to be carrying the behavior therapy tradition forward into new territory*" (2004, p.239). The group includes a number of approaches and schools of therapy which have been designed for a variety of different populations and disorders, including Dialectical Behavioural Therapy (DBT; Linehan 1993) and Acceptance and Commitment Therapy (ACT; Hayes, Strosahl & Wilson, 1999). Many of the third wave therapies, including the two just mentioned, include an element of mindfulness in their teaching. However, this is incorporated in a very different way to MBSR and MBCT. This section of the review will therefore explore the use of mindfulness in these approaches, focusing primarily on DBT and ACT as the two therapies which have become most widespread and have been subject to the most empirical investigation.

Dialectical Behavioural Therapy

Dialectical Behavioural Therapy (DBT; Linehan, 1993;) is a treatment programme originally developed for treating those with borderline personality disorder (BPD) although more recently it has been adapted for use with other populations, such as those with binge

eating disorder (Telch, Agras & Linehan, 2001). The OED (2006) offers a number of definitions of dialectic, one of which is as a "*process whereby contradictions merge to form a higher truth*" and it is this sense of the balance and integration of opposing ideas which is meant in DBT. In the context of the therapy the central dialectic is the integration of acceptance and change. It uses a range of techniques from cognitive therapy and integrates mindfulness training as a way of facilitating acceptance and change. DBT includes four modules of skills of which core mindfulness is just one. It differs from the use of mindfulness in MBSR and MBCT in a number of important ways, the most significant of which is the style of teaching. Linehan (1994) suggests that those with BPD may not be willing or able to tolerate lengthy formal meditation practice, and DBT therefore teaches mindfulness through a variety of short, informal techniques. Unlike other treatments using mindfulness, it equally does not demand that therapists have regular, formal meditation practice of their own, but it does require that they engage in and are familiar with the mindfulness exercises that are taught. The format of DBT is also very different, comprising of both group and individual therapy sessions, each delivered weekly, and contact with therapists between sessions is allowed if required. It is also a much longer-term treatment programme than either MBSR or MBCT, which are both just eight-week long courses. DBT usually requires an initial commitment of one year. DBT rationalises the use of mindfulness by recourse to the description of three states of mind: the 'reasonable mind' is described as the rational, logical part that uses facts and solves problems; the 'emotion mind' is a state in which emotion's control thoughts and behaviours; the 'wise mind' is a balance between these two, which can know facts but also know emotions. Practising mindfulness skills is suggested to help cultivate this state of the wise mind.

Mindfulness training in DBT includes three 'what' skills and three 'how' skills. The what skills are observing (attending to emotions, sensations and thoughts as they occur),

describing (labelling observed experiences with words) and participating (attending completely to the current activity and doing it wholeheartedly without self-consciousness), whilst the how skills are nonjudgmentally (refraining from judging experience as good or bad), one-mindfully (focus undivided attention on one thing at a time) and effectively (doing what works or using skilful means of achieving goals). A range of exercises is used to teach these skills, such as the conveyor belt, in which the mind is imagined as a conveyor belt on which thoughts and sensations appear, are observed and allowed to pass by.

There have been a number of studies that suggest DBT is indeed a useful treatment for those with BPD and with other mental health difficulties. Bohus, Haaf, Simms, Limberger and Linehan (2004) report a randomised controlled trial of women meeting a diagnosis of BPD, of whom 50 took part in a three-month DBT intervention and 19 were placed in a wait-list control group. The DBT group significantly improved on seven out of nine variables that were measured at four-month follow-up, including depression, anxiety and self-injury. They reported that 42% of the DBT group had made significant clinical improvement.

Similarly, Linehan and colleagues have expanded the use of DBT for BPD to treat other often co-morbid conditions, such as substance misuse. Linehan, Dimeff, Reynolds, Comtois and Kivlahan (2002) completed a randomised controlled trial comparing DBT with a combined alternative treatment approach of comprehensive validation therapy and a twelve-step substance-abuse programme, for the treatment of women with BPD and an opioid dependency. Twenty-three subjects were randomly assigned to the treatment groups and received therapy as well as an opiate replacement therapy over a period of twelve months. The DBT treatment group had significantly higher drop-out rate over the treatment period, at 36% versus zero drop-out. Opiate use was measured using urine

analysis, which dropped from 68 and 65% during the first 4 months of treatment to 35 and 42% (DBT and CVT+12S, respectively) during the last 4 months. However, self-report measures of drug use were significantly more highly correlated with actual drug use than in the DBT group, suggesting greater self-awareness.

There is also evidence that those receiving DBT find the mindfulness component helpful. In a study of the behavioural skills used by suicidal adolescents who had been receiving DBT, Miller, Wyman, Huppert, Glassman and Rathus (2000) found that mindfulness and acceptance skills were most highly endorsed by patients as helpful. This suggests that the mindfulness skills taught as part of the DBT package are indeed useful and are appreciated by clients who are taught them.

These studies do provide good indications that DBT can be successful with those with a diagnosis of BPD and can successfully treat other conditions, such as binge-eating disorder. However, they are plagued with some of the same difficulties that the other studies already discussed experience. It is very difficult to determine whether the mindfulness component of the programme works, whether it is successful at teaching what it is designed to teach, and what its role in change actually is. It is not possible to separate mindfulness from any other part of the package and it may therefore not be an active agent of change, or it may only work in combination with other components. Further research into the action of mindfulness and the part it plays in any behaviour change or improvement seen in participants is still needed.

Acceptance and Commitment Therapy

Acceptance and commitment therapy (ACT; Hayes, Strosahl & Wilson, 1999) is an individual therapeutic approach which can be used with a wide range of clinical problems and populations. It includes both behaviour change processes, as in cognitive therapy, and mindfulness and acceptance processes which are designed to facilitate the necessary behaviour changes. One of the central concepts of ACT is experiential avoidance, which is seen as key in many psychopathologies. Experiential avoidance refers to the tendency to try and avoid negative internal phenomena, such as thoughts and emotions, and taking actions in order to avoid or eliminate such experiences. This has a theoretical basis in laboratory findings which show the attempt to avoid thoughts and emotions makes them more likely to be experienced (e.g. Gross, 2002; Gross & John, 2003). Mindfulness is used to help participants disengage from experiential avoidance. As with other therapies previously discussed, ACT uses mindfulness to encourage noticing and observing whatever the present experience is without judgement or avoidance.

ACT resembles DBT in the use it makes of short, informal mindfulness tasks rather than longer, formal meditation exercises. It uses exercises such as the 'leaves on a stream', in which participants are invited to imagine a stream with leaves floating on it, onto which they place each thought as it arises and watch it as it floats down the stream. Unlike the other therapies described above ACT also seeks to help clients explicitly identify and examine their own values and goals. It includes exercises and discussions aimed at helping clients to work with these and identify obstacles which may prevent them reaching such goals. The mindfulness practices, along with other techniques, are used as a way of identifying and moving past such obstacles. Hence, as Baer and Krietemeyer (2006) state "*mindfulness skills are not practised solely for their own sakes, but rather to facilitate progress towards a life that is meaningful to the client.*" (p.26)

ACT, like DBT is a relatively recent therapeutic development and the literature surrounding it's use is therefore not extensive. However, there are some promising studies appearing. Bach and Hayes (2002) reported a significant decrease in the probability of re-hospitalisation for inpatients reporting hallucinations or delusional beliefs. The patients were randomly assigned during their inpatient admission to either a four-session ACT intervention or to treatment as usual (TAU). Following discharge from hospital, 40% of those in the TAU group were re-admitted by the time of the 4 month follow-up, whilst only 20% of the ACT group had been rehospitalised over the same period. They do report an interesting result, which appears paradoxical at first glance, as patients who had undergone ACT therapy reported greater numbers of symptoms at follow-up, with 21 out of 35 participants reporting hallucinations, compared to the TAU group, with only 11 out of 35 reporting hallucinations. However, ACT participants reported less believability of hallucinations. Bach and Hayes speculate that this may indicate that because patients have learnt not to avoid the distress of their symptoms they are less likely to deny their presence, but are less inclined to believe them due to their ability to see them as mental events, not facts.

A further RCT is reported in Bach, Gaudiano, Panky, Herbert and Hayes (2006) undertaken with an inpatient population with psychosis by Gaudiano and Herbert, although it is yet to be published. They describe an RCT study in which patients were randomly assigned to either enhanced treatment as usual (ETAU) or ETAU with ACT and sessions were delivered individually. They report no data but do indicate that those who received ACT showed greater improvements in clinician-rated mood symptoms, impairment in social functioning and self-reported distress about hallucinations. Although both groups showed some improvement in functioning and reduction in number of hallucinations reported by patients, only the ACT group reported a reduction in the

believability of the hallucinations. They report that at four-month follow up those who had received ACT were les likely to have been re-hospitalised.

These studies do suggest that for psychosis in particular, there is some evidence for the acceptability and efficacy of ACT. However, there are still difficulties in drawing any strong conclusions and much more research needs to be carried out. The initial Bach and Hayes (2002) study did show some promising results, but it failed to provide an adequate control. Those receiving ACT received greater numbers of sessions than those in the TAU alone group and thus the placebo effect cannot be ruled out. The unpublished Gaudiano and Herbert study appears to have rectified this by providing enhanced TAU, during which patients did indeed receive the same number of sessions but without any ACT component. However, neither study was conducted blind, so raters did have knowledge of which therapy patients were receiving. It is thus possible that some bias could have entered into the clinician rated measures. This difficulty is mitigated against by the inclusion of such a wide number of different measures, both clinician and patient rated, thus results are unlikely to be solely influenced by this effect. However, it does illustrate the need for further research to replicate these findings.

What has been learnt about the clinical uses of mindfulness?

The above review has discussed some of the literature around the use of mindfulness skills and training across a number or different therapeutic approaches and with a number of different populations. As can be seen from the relative breadth of the studies, MBSR is the treatment approach which has received the most attention, due to it having been practised for over twenty years. Other therapies have a more recent history and therefore do not have as extensive an empirical backing. What the above review does indisputably indicate is

that the use of mindfulness in clinical work has increased hugely over the past two decades and looks set to continue to expand. A number of encouraging points have come out of the research to date and there are clear indications that mindfulness can benefit some populations.

The research to date has highlighted a number of encouraging signs. The research discussed above has demonstrated that the skills of mindfulness appear to be well-suited to some forms of cognitive and behavioural practices which are thought to contribute to psychopathology. The large literature which surrounds the damaging effects of suppression of thought and emotion has not been fully explored above, but suggests that this may have a significant impact on mental and physical health (e.g. Gross, 2002; Gross and John, 2003). Mindfulness techniques are proposed to aid participants in facing emotions, thoughts and sensations, whether they be pleasant or not and is therefore thought to help prevent such damaging suppression. Teasdale and colleagues, (e.g. Teasdale, Scott, Moore, Hayhurst, Pope, & Paykel, 2001; Teasdale, Moore, Hayhurst, Pope, Williams & Segal, 2002) have also highlighted the increase in metacognitive insight which appears to result from mindfulness training. This is highlighted by all the different therapies using mindfulness discussed above as an important component, helping change the relationship between the participant and their thoughts and allowing them to see them purely as mental events worthy of observation. This is thought to be useful because it prevents mental events being viewed as objective truth and therefore allows space between the participant and any thought or emotion in which they can make choices about how to react. Whether this is called observing, having a wise mind or being non-judgemental it appears to be the same skill which is taught across the different therapeutic approaches.

Despite the largely positive findings being reported around the clinical use of mindfulness, there are still a number of difficulties with the research to date. The following section will provide a summary of these difficulties and the questions that this poses for future research.

What is not known about the clinical uses of mindfulness?

Despite all the encouraging findings around the clinical application of mindfulness, there is still very little evidence of how or when it works. What research to date has failed to identify is the specific effect of mindfulness components of therapy as opposed to any other element. Research as reported above has focused on demonstrating the effectiveness of therapeutic approaches and training packages which utilise mindfulness in some form or another. The research is certainly suggestive that these approaches work, at least for some populations. However, the research has failed to tease apart the mode of action of these different therapeutic approaches. It is therefore not possible to identify which are the most significant elements, it could be mindfulness, but it could equally be the positive effects of being in a group (Yalom, 1994), the relaxation which accompanies mindfulness practice, or any number of other factors present in each therapy. The lack of control and reporting of adherence to treatment protocols also makes it hard to draw strong conclusions about whether the agent of change is the one that was expected by the therapy's designers.

There is evidence that the mindfulness component is important to participants, for instance the Miller, Wyman and Huppert (2000) study into the reported usefulness of mindfulness skills among suicidal adolescents, does suggest it plays some part in reducing psychological distress and aiding recovery. However, what is still very unclear is exactly which parts of mindfulness are important. As yet, mindfulness is delivered as a package of related but

distinct skills and exercises, ranging from formal sitting meditation, to the conveyor belt exercise, to mindfulness of everyday tasks such as washing up. From research carried out thus far it is not possible to determine which of these elements are important, and what actions each have.

This links to another difficulty with the research as highlighted to date, that of the lack of attempt to operationally define and quantify mindfulness. Very few studies have attempted to measure mindfulness (for a full discussion see Bishop et al. 2004; Dimidjian & Linehan, 2003) although some self-report measures have begun to appear in the literature (Baer, Smith, Hopkins, Krietemeyer & Toney, 2006). The lack of clear operational definitions and measurement of the construct of mindfulness makes it difficult to determine whether interventions claiming to teach mindfulness are actually managing to do so. Until it is possible to demonstrate that mindfulness does indeed increase following participation in a therapy programme incorporating mindfulness in some way it is very difficult to make strong arguments about its status as an agent of change.

Future research questions

The above discussion all leads to a series of questions which current research has not fully answered. Many of these relate to the role of mindfulness within the programmes that have been developed and the extent to which they teach mindfulness skills and operate as agents of positive change. Dimidjian and Linehan (2003) provide a more comprehensive review of the questions and directions of future research into mindfulness practices. From the discussion outlined in this review they key questions can be summarised as:

- Is mindfulness effective over and above any placebo effect?
- Is mindfulness applicable to a wide range of populations?

- Are the different therapies which incorporate mindfulness elements teaching the same skills?
- Which of the skills that are being taught are effective?
- Does mindfulness training teach mindfulness at all, or are there other active agents of change?

The number of questions that remain unanswered in the literature is not an indication of the lack of research interest or the poor quality of research to date. Instead, it is a testament to the fact that mindfulness training, in its many forms, appears to be efficacious and deserves further, rigorous testing, in order to allow it to be used to its best advantage. The number of questions that can still be asked of mindfulness also indicate that it is a growing and exciting area that warrants greater levels of research.

Conclusion

As can be seen from the number of studies that have begun to appear over the last few decades, interest in the clinical uses of mindfulness meditation has increased enormously. It is apparent that it is being incorporated into a wide range of therapies and is being applied to a variety of different populations. The results of these clinical applications are encouraging and suggest that mindfulness is likely to continue to have an important role to play in clinical practice for mental health practitioners for years to come. It may attain an even greater significance for some populations if it becomes part of the standard accepted and recommended treatment for certain disorders. However, as highlighted above, there are a number of limitations with the research to date. There has been little or no attempt to disentangle the various mindfulness techniques either from each other or from the wider

packages of therapeutic techniques that are being offered. It is therefore very difficult to determine the mode of action of the training and to state with confidence that it is the mindfulness element which is responsible for positive change seen. Without stronger research it will be very difficult to argue for the increasing use of mindfulness practices. If it is to prove useful and enduring as a treatment component, it needs to be clearly defined and researched. It is imperative that the function of mindfulness and its specific mode of action is identified, in order to help target its use more effectively and promote its application to populations for whom it would be most beneficial.

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An investigation into the effectiveness of two mindfulness techniques: mindful breathing and the body scan

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Prepared for submission to Behaviour Research and Therapy

(See Appendix A for Instructions to Authors)

An investigation into the effectiveness of two mindfulness techniques: mindful breathing and the body scan

Abstract

The literature on mindfulness as a clinical intervention has rapidly expanded in recent years but questions about its use and effectiveness remain unanswered, one of which concerns the active agents of change. The current study aimed to investigate two specific techniques which currently form part of larger mindfulness training packages: mindful breathing and the body scan. 59 university undergraduates were recruited and were tested on a number of measures of stress tolerance, psychological symptoms and affect, as well as attention and mindfulness skills. A range of mixed design ANOVA statistics are calculated but no significant effect of training in either technique is reported. These results are discussed in terms of their implications for future research and clinical interventions. The study suggests that non-specific factors, such as membership of a group, might be important in the success of mindfulness training.

1. Introduction

1.1 Explanation of Mindfulness

Mindfulness meditation techniques have been used for over two thousand years as part of Buddhist practice and may in fact have a history which extends much further into yogic practice centuries earlier (Thera, 2006). However, in more recent years mindfulness has been adapted for use in clinical practice and there is now a considerable research base indicating its efficacy with a wide range of populations, from those with chronic pain (Kabat-Zinn, 1982, Kabat-Zinn, Lipworth, Burney & Sellers, 1986), a history of depression (Teasdale, Segal & Williams, 1995; Segal, Williams & Teasdale, 2002) to cancer (Speca, Carlson, Goodey & Angen, 2000). This evidence suggests that the application of mindfulness techniques is a worthwhile pursuit for clinicians in a number of fields. However, there are some limitations to the research to date which may restrict the effectiveness and application of the techniques.

Mindfulness refers to the deliberate action of paying attention to experience, both internal and external, on a moment-to-moment basis. It is described by Kabat-Zinn (2001, p.11) as "*the complete 'owning' of each moment of your experience, good, bad or ugly*" This quote highlights the two main areas which distinguish it from other forms of meditation and relaxation which may appear superficially similar; namely the degree of activity required by "complete owning" and the attitude of acceptance and openness taken towards this experience, be it "good, bad or ugly". Unlike other forms of relaxation, practitioners are required to actively pay attention to their experiences, thoughts and feelings, without trying to attain a goal of

'being relaxed'. They are encouraged to acknowledge and accept whatever state of tension or relaxation they find themselves in and to actively tune their attention in to this experience. Unlike other forms of meditation, such as transcendental meditation (TM), the practitioner is required not just to focus their attention deliberately on an object, such as a mental image or their own breathing, but also to note whenever their attention wanders from this (Delmonte, 1984). Mindfulness views all wanderings of attention and all distractions as observable entities in themselves, and therefore unlike in TM there is no focus of attention, awareness is simply drawn non-judgementally to whatever occurs.

Although mindfulness practices stem from a background in Buddhist teaching, their clinical application has been a secularised process (Dimidjian & Linehan, 2003). Bishop et al (2004). summarise the rationale for a clinical application of the technique by stating that mindfulness is a "*form of mental training to reduce cognitive vulnerability to reactive modes of mind that might otherwise heighten emotional distress or that might otherwise perpetuate psychopathology*" (p.231). It is clear from the descriptions of mindfulness already given why it might be thought to have potential as a clinical intervention. The clinical uses of mindfulness have become increasingly widespread, following one of the first uses of mindfulness in clinical practice in the Mindfulness Based Stress Reduction programme, initially devised for use with patients in a health setting (Kabat-Zinn, 1982; 2001). MBSR is usually delivered as an 8-week intensive programme, with weekly group sessions and one whole day session at week six. It is also expected that participants will practice techniques each day between sessions for at least 40 minutes. The sessions consist of experiential teaching of specific techniques, ranging from formal meditation whilst sitting or whilst focused on the experience of breathing, to informal mindfulness of everyday tasks, such as driving or washing up. They also include discussion of experiences during mindfulness practice and any difficulties or blocks that arise.

1.2 Mindfulness in Clinical Practice

The MBSR programme has proved remarkably popular and by 1997 it was estimated that 240 clinics across the US and worldwide were offering MBSR based programmes (Moore, 1998). This popularity is based to some extent on the evidence which suggests that MBSR can be efficacious for a number of different populations. Kabat-Zinn and colleagues have reported a number of different studies including one of the first papers published in the area (Kabat-Zinn, Lipworth & Burney, 1985). They studied 90 chronic pain sufferers who took part in the MBSR programme and reported significant improvement on a range of subjective measures, including well-being and restriction of activity due to pain, as well as objective measures of use of pain medication. These improvements were reported to have been maintained at 15 month follow-up for and again at a four-year follow-up (Kabat-Zinn, Lipworth, Burney & Sellers, 1986). This study also reported that four years after completion of the programme, the majority of participants continued to practice mindfulness.

More recently there have been reports of the use of MBSR with other populations, such as those with psoriasis and those with anxiety disorders. Kabat-Zinn, Massion, Kristeller et al (1992) and in a three year follow-up, Miller, Fletcher and Kabat-Zinn (1995), reported that outpatients with diagnoses of generalised anxiety disorder or panic disorder (with or without agoraphobia) demonstrated statistically significant improvement in subjective and objective measures of anxiety following completion of the MBSR programme.

MBSR was also used as the basis for a further therapeutic programme, Mindfulness Based Cognitive Therapy (MBCT; Teasdale, Segal & Williams, 1995) which was developed for use

with patients with a history of depressive illness. This too uses many of the same techniques as are present in MBSR, and in fact many of the exercises are identical. However, it combines these skills with elements of cognitive therapy (CBT; Beck, 1970, 1976) in order to help patients identify patterns of negative thought which are proposed to lead into depressive cycles and low mood (Nolen-Hoeksema, 1991; Segal, Gemar & Williams, 1999).

Again, there is an impressive amount of research beginning to appear which points to the effectiveness of MBCT, most of which focuses on its primary target audience of those with a history of depression, although more recently studies have appeared suggesting it can be applied to other populations. A study by Teasdale et al. (2000) reported a multi-centre randomised controlled trial for MBCT in reducing relapse for depression. 145 participants who had all experienced two or more episodes of depression but were currently in recovery or remission were randomly assigned to either MBCT or treatment as usual (TAU). For participants with a history of three or more previous depressive episodes, 37% relapsed, as compared to 66% in the TAU group. The rate of antidepressant medication was lower for the MBCT group than the TAU group. Ma and Teasdale (2004) replicated these findings in a further randomised controlled trial. This study recruited 75 participants and of those with a history of three or more depressive episodes 36% relapsed, compared to 78% of the TAU control group.

These results are certainly impressive for those participants who had a history of three or more depressive episodes. However, it is interesting to note that neither study demonstrated a significant reduction in risk of relapse for those who had experienced only two previous episodes of depressive illness. Segal, Williams & Teasdale (2002) suggest that this might be accounted for by the relative likelihood of external stress leading to

depressive illness in those who have experienced three or more previous episodes. Post (1992) suggests that as the number of episodes increases, the threshold level of stress required to trigger the next decreases. Hence for those with only two episodes, any further incidence is likely to be triggered by a significant life event and the practice of mindfulness is less likely to have an influence over this. Only once the degree of stress required to trigger a depressive episode is reduced does the practice of mindfulness act as a protection against this threshold being reached.

There are several other so called 'third wave' therapies (Hayes, 2004) which have appeared in the last decade or so and which incorporate mindfulness into their programme. Acceptance and Commitment Therapy (ACT; Hayes, Strosahl & Wilson, 1999) was developed as an individual therapy to be used with a range of psychological problems. It incorporates aspects of mindfulness, but unlike MBSR and MBCT it does not require formal meditation practice but instead teaches mindfulness through shorter tasks. Similarly, Dialectical Behavioural Therapy (DBT; Linehan, 1993) is a treatment that combines elements of mindfulness techniques. It is a treatment programme originally developed for treating those with borderline personality disorder (BPD) although more recently it has been adapted for use with other populations, such as those with binge eating disorder (Telch, Agras & Linehan, 2000). As with ACT, DBT does not teach formal meditation practice but instead teaches a range of skills which draw on mindfulness techniques. These are designed to allow participants to view painful thoughts merely as thoughts, rather than facts.

Although studies have been published indicating the efficacy of both ACT and DBT approaches, they are not of relevance to this current study. The present research aims to investigate more 'pure' forms of mindfulness which use formal meditation techniques. It is

clear that research aimed at investigating the properties of mindfulness itself may have implications for all therapies that incorporate aspects of mindfulness, but the specific research question examined in this study relates to techniques used in both MBSR and MBCT, but not utilised formally in other therapies such as ACT or DBT.

Mindfulness techniques have also been adapted for use in self-help practices. Kabat-Zinn and colleagues reported the use of a modified mindfulness programme delivered via audiotape (Kabat-Zinn, Wheeler, Light, Skillings, Scharf, Cropley et al. 1998). Participants were required to listen to the tapes of the techniques whilst they were undoing light therapy to treat their psoriasis. Kabat-Zinn et al. (1998) reported significantly faster recovery time for psoriatic lesions for participants who received mindfulness training via audiotape, compared to participants who received light therapy alone. This suggests that mindfulness approaches can be helpful when delivered in a self-help format, in an individual setting without training from an experienced practitioner.

1.3 Limitations of Current Research

Despite the recent promising research into mindfulness discussed above, several questions still remain unanswered about the use of mindfulness-based therapies, both in terms of MBSR and MBCT approaches. Perhaps the most important of these questions is highlighted by Dimidjian and Linehan (2003) who ask "*what are the active or essential ingredients of mindfulness training?*" (p.168). At present it is very difficult to identify how or why mindfulness might work in its current guise. There are a number of reasons for this. Firstly, because mindfulness is generally delivered as a package, be that MBSR, MBCT or any other therapeutic approach which encompasses mindfulness, a number of different skills are taught alongside each other and it is difficult to determine which are the active agents

of change. This makes it difficult to identify ways of making delivery more efficient or of highlighting those elements which are most important.

A further reason for the difficulty in determining the agents of change in mindfulness is the lack of clear operational definition and attempt to measure the construct of mindfulness itself. Dimidjian and Linehan (2003) state "*The lack of a clear operational definition of mindfulness has given rise to considerable and unfortunate ambiguity in the field*" (p.166) This ambiguity is also commented upon by Bishop, Lau, Shapiro, Carlson, Anderson, Carmody et al (2004) who state that as long as it remains "*it is not possible to undertake important investigations into the mediating role and mechanisms of action of mindfulness*" (p.231). In almost all of the research published so far there is very little attempt to offer an operation definition of mindfulness which can be measured, and this lack of definition leads to a difficulty in interpreting what is really being taught. It has equally meant that few studies have attempted to determine whether mindfulness training has actually altered any mindfulness ability in the participants. Without a clear definition or a means of measuring mindfulness skills in participants, it is impossible to say whether they have indeed learnt mindfulness at all, or whether some other factor has been instrumental in the positive changes recorded. Thus it is hard to determine whether the agents of change are in fact mindfulness skills. It is possible that any of one of a number of other non-specific factors could be the important agent of change, such as the positive effects of being in a group (Yalom, 1994), or the experience of having contact with a therapist (Horvarth & Symonds, 1991).

Another difficulty relating to the current research around mindfulness-based approaches is the degree of adherence to the technique. Both MBCT and MBSR give guidelines about the degree of qualification required before therapists can lead their groups. In MBCT, group leaders are required to have their own ongoing meditation practice (Segal, Williams &

Teasdale, 2002). They also suggest that some experience with yoga, and knowledge and experience of working with CBT and with populations who suffer from mood disorders is also useful. The MBSR programme requires a variety of qualification in teachers, including a professional qualification in the mental health field, as well as range of personal meditation and yoga practices over a number of years. Group leaders must also attend a five or seven day residential training course in MBSR (Center for Mindfulness, 2006). Despite these specifications, the research presented above rarely states what the level of qualification of therapists was, but even assuming the protocol is followed, there is no attempt to record adherence to the technique or level of consistency between therapists and sessions. This makes it difficult to determine if the same programme was delivered each time or if other skills or techniques that did not fit the mindfulness model were actually being taught by leaders.

Although the weight of evidence now available certainly suggests that mindfulness-based treatment approaches can be effective across a wide range of clinical populations, and in non-clinical settings, strong conclusions as to how or why this is so are as yet elusive. The difficulties with the studies outlined above have been noted by researchers and there have been recent calls for further robust research to help to clarify the situation. (e.g. Bishop et al. 2004)

1.4 Aims of the Present Research

The present research intends to investigate the first of the questions posed above regarding the effectiveness of mindfulness by trying to determine the active agents of change in

mindfulness approaches. It aims to do so in a way which avoids some of the pitfalls identified in existing research. It will therefore look at two of the techniques commonly taught as part of both MBSR and MBCT programmes, Mindful Breathing and the Body Scan, and will examine their effectiveness when delivered alone. It will use a control group who will receive a comparable non-active 'treatment' in the form of relaxing, speech-based music in order to eliminate any possible placebo effect. It will seek to eliminate some of the difficulties presented by packages of techniques delivered in an intensive, group-setting, by removing some of the non-specific factors such as group support, which have been highlighted as possible agents of change. It will also use a single delivery method, in line with the Kabat-Zinn et al. (1998) study, using a recorded technique, to ensure adherence to the technique and ensure consistency in delivery of the training. Thus it is hoped that this current study will act as a first step on the road to more robust, clear research which can begin to explain how teaching mindfulness might be able to deliver the results that studies to date have suggested it can.

1.5 Hypotheses

1) Both the body scan and mindful breathing groups will demonstrate a higher degree of mindfulness following treatment than a non-treatment control group.
2) Both treatment groups will report fewer symptoms of psychological distress than a non-treatment control group.
3) Both treatment groups will report a higher level of attentional control than a non-treatment control group.
4) Both treatment groups will demonstrate a higher degree of stress tolerance than a non-treatment control group.

2. Method

2.1 Participants

Participants were recruited from an undergraduate psychology programme in a British university. Fifty-nine participants were recruited, of whom fifty-three (89.8%) were female and six (10.2%) were male. They were predominantly in the first year of a three-year degree programme of study (86.4%). They were recruited using posters and were offered course credit and free copies of the CD recording of the mindfulness techniques as an incentive to participate. They ranged in age from 18 to 56, although 91.5% were 21 or younger. Participants were randomly assigned to one of the three groups: mindful breathing, body scan or the control. Of the 59 recruits, 54 completed the study. The main demographic information on the three groups is presented in Table 1 below.

Table 1. Demographic information on participants in each of the three groups.

Group	Sex	Year of study			Total
		1	2	3	
Mindful Breathing	Male	1	1	0	2
	Female	17	0	1	18
	Total	18	1	1	20
Body Scan	Male	0	0	1	1
	Female	17	0	0	17
	Total	17	0	1	18
Control	Male	2	1	0	3
	Female	9	3	1	13
	Total	11	4	1	16

2.2 Drop-out

One person reported having diabetes and therefore was excluded from taking part in the cold pressor test, but was included in the rest of the analysis. One participant dropped out following the first time point, and four further participants dropped out before the final time point. Of the five who did not complete the whole course, three were in the control group and one was in each of the experimental groups.

2.3 Measures

2.3.1 The Mindful Attention Awareness Scale (MAAS), Brown and Ryan (2003)

The MAAS is a fifteen item self-report questionnaire that asks individuals to rate how frequently they experience certain events on a Likert scale from one to six, where one is 'almost always' and six is 'almost never'. The questions focus on the individual's moment to moment awareness during everyday tasks. It is the focus on day-to-day tasks that was particularly useful in terms of this study and which made it accessible and easy to complete for those with no previous experience of mindfulness or meditation.

The authors report good internal consistency, with a coefficient alpha of .82. They also report a range of convergent and discriminant validity correlations, such as a significant positive correlation with openness to experience and well-being and negative correlation to rumination and social anxiety (Brown & Ryan, 2003). They also report good predictive validity on a study looking at emotional well-being and stress among patients with cancer taking part in the MBSR programme. For those whose scores on the MAAS were lower, their reported stress levels were also lower. The MAAS is also reported to have been able to distinguish between those who had had mindfulness practice and those who had not. A

further study examining the MAAS is comparison to other measures of mindfulness also reported good internal consistency, alpha coefficient of .86 and describe it as yielding a useful, single factor score of mindfulness (Baer, Smith, Hopkins, Krietemeyer & Toney, 2006).

(For a full copy of the MAAS see Appendix B)

2.3.2 The Positive and Negative Affect Scale (PANAS), Watson, Clark & Tellegen (1988)

The PANAS is a 20 item self-report questionnaire designed to assess recent experience of certain emotional states. It asks individuals to rate twenty emotion terms according to the extent to which they have experienced them over a given time scale. In this case participants were asked to consider their experiences during the previous week. Individuals rate each emotional term on a Likert scale from one to five, where one is 'very slightly or not at all' and five is 'extremely'.

The authors report good discriminant validity between the positive and negative scales, with correlations ranging from -.12 to -.23. They also report good external validity, with the positive scale showing significant negative correlations with the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, et al 1961) and substantial correlations between the negative scale and the BDI. Both positive and negative scales also show significant correlations with the State-Trait Anxiety Inventory (Speilberger, Gorsuch, & Lushene, 1970).

2.3.3 The Attentional Control Scale (ACS), Derryberry and Reed (2002)

The ACS is a twenty item self-report questionnaire designed to assess individual's perceptions of their ability to control and switch their attention in day-to-day situations. Individuals are asked to indicate on a four-point Likert scale how strongly they agree to certain statements regarding their attention, where one is 'almost never' and four is 'always'. The measure is reported to have good internal consistency (alpha = .88). It is positively related to indices of positive emotionality such as extraversion (r = .40) and inversely related to aspects of negative emotionality such as trait anxiety (r = -.55) (Derryberry & Reed, 2002).

(For a copy of the ACS see Appendix C)

2.3.4 The Brief Symptom Inventory (BSI), Derogatis & Melisaratos (1983)

The BSI is a 53 item self-report questionnaire and is designed to assess individual's experience of certain psychological symptoms on ten subscales, ranging from obsessive-compulsive to phobic symptoms (for details see Appendix D). Individuals are asked to rate each item on a five point scale to indicate how much they have been distressed or bothered by each symptom in the preceding week. The scale ranges from zero, meaning 'not at all', to four, meaning 'extremely'.

It is reported to have good test-retest reliability, ranging from .68 to .91 for the individual subscales. (Piersma, Boes & Reaume, 1994). The same authors also report internal consistency reliabilities for the subscales of the BSI ranging from alpha coefficients of .71 to .85

2.3.5 The Cold Pressor Test

The cold pressor test is designed as a test of stress tolerance and consists of a circulating cooling water bath, which is set to maintain a given temperature. Participants are asked to place their non-dominant hand into the water bath and leave it in the water for as long as they can and to remove it once it becomes too uncomfortable. Tolerance is recorded in terms of the number of seconds the hand is left submerged in the water. It is necessary for the water to be circulated to prevent pooling around the hand which might increase the temperature and thus help prevent inconsistencies in the methodology (Mitchell, Macdonald & Brodie, 2004). (For a full protocol see Appendix E)

The cold pressor test has successfully been used with a variety of populations, including more vulnerable groups such as pregnant women (e.g. Woisetschlager et al, 2000) and children (e.g.Goodman & McGrath, 2003). It is not reported to cause any adverse health reactions and has been safely used for a number of years. However, to insure the safety of participants, they were screened for any diseases or conditions which might affect their peripheral circulation and were advised not to take part if these were present.

2.4 Experimental Equipment

The mindfulness techniques used were both taken from the Kabat-Zinn MBSR manual (Kabat-Zinn & Santorelli, 1999) and were adapted for use in this way by an MBCT trained practioner with 15 years of meditation experience who had run 3 complete MBCT programmes. Although the original CD versions of the MBSR technique available from Kabat-Zinn (2005) do contain both of these techniques, they are both 45 minutes long and contain large amounts of silence. For the purposes of this study it was felt that a shortened version would increase the levels of compliance. It was also felt that as very little other

instruction was given to participants about the nature of the techniques, in order not to jeopardise their blindness to whether they were in the control or an experimental group, that silences would be removed. Thus the recordings were shortened to 20 minute versions of the same techniques. These were recorded onto CDs which could then be played at any time. (Copies of the recording are included in Appendix L).

The control that was used was matched as to length and was also recorded onto CD. It consisted of a piece of relaxing music, of which the composer said "The compositions can be spiritual, religious, meditative – it's open to 'move' people in a way that they choose to experience" (Jenkins, 2006), chosen in order to have face validity as a relaxation technique. It was deliberately chosen to be as close to the experimental techniques as possible, as it uses actual speech sounds written phonetically, but does not use recognisable words and therefore does not carry meaning. This was used to ensure that the same cognitive processes might be used but to remove any possible confounding problem caused by words carrying specific meaning for given participants. It was felt that the inclusion of music would be more likely to hold participants attention over repeated presentations.

3. Design

This was a mixed design study, using both within-group (across time) and between-group (across conditions) methods.

The independent variable was the type of mindfulness technique that was taught, i.e. Body Scan, Mindful Breathing, or none. There were three dependent variables: the effectiveness of teaching mindfulness, the level of stress tolerance and the level of self-reported psychological distress and symptomatology.

The main data gathering technique was quantitative, using questionnaires in order to assess mood, psychological symptoms and skills in mindfulness and attentional control. Quantitative measurement was also made of stress tolerance using the cold pressor technique. Alongside this quantitative methodology some qualitative data was collected. Participants were asked about their experiences of completing the techniques and any comments or responses were recorded.

4. Procedure

Ethical approval was obtained from the University Ethics Committee (See Appendix F). Participants were recruited via the university psychology department using posters and internet advertisements. Upon volunteering to take part in the study they were presented with an information sheet and were offered the opportunity to ask questions in a one-to-one setting. They were screened for health concerns which may have affected their participation in the cold pressor test, such as heart conditions or diabetes. Participants were fully informed as to the nature of the study and were asked to sign a consent form of which they were given a copy for their own records (for a copy of the information and consent form see Appendix G).

Once consent had been given and any questions had been answered, participants were then asked to complete the questionnaires, which were given in a counterbalanced fashion to eliminate any ordering effects. Participants were offered the opportunity to have questionnaires read to them if they wished, although all chose to complete questionnaires on their own. The researcher was available to answer any queries that arose. Following completion of the questionnaires the cold pressor test was then completed. Participants

were asked whether they had easy access to a CD player and assuming they did, they were given a copy of the CD containing one of the mindfulness techniques or the control recording and a diary to record the number of days on which they listened to the CD. (See Appendix H for an example of the diary sheet) Participants were asked to listen to the CD on their own whilst doing nothing else each day at a time that was convenient to them. It was impressed on participants that daily practice was preferred but that honesty in accurately recording the number of times they practiced was more important. Appointments were then made to see the participant both 14 days and 28 days later.

At each of the two subsequent time points the procedure was repeated almost exactly as it had been at the first time point, with the exception of the completion of a consent form. At the beginning of each subsequent testing session subjects were given the opportunity to ask questions and any qualitative information or comments that were made regarding the experience were recorded. At each testing session questionnaires were given first, in counterbalanced order, before the cold pressor test was repeated. On each occasion subjects were reminded of the procedure for the cold pressor test and were again asked if there were any health concerns which might affect their circulation. At the end of the final testing session participants were asked to hand in their diary sheets which recorded how many times they had practised the technique over the preceding four weeks. Participants were then given a debriefing statement and asked to give contact details if they wanted to receive a summary of results once the study was completed (see Appendix I for a copy of the debriefing statement).

5. Results

5.1 Descriptive Statistics

In order to test for normality of distribution of the quantitative data, Kolmogorov-Smirnov tests were used. These indicated that the data for the MAAS, the PANAS, the ACS, and the BSI were normally distributed: 1 sample Kolmogorov-Smirnov tests were non-significant (Table 2). Thus the assumptions for the use of parametric statistics with these data were met.

Table 2. Kolmogorov- Smirnov statistics to test for normal distribution of scores on the measures at time point one.

	MAAS	PANAS positive	PANAS negative	ACS	BSI
N	54	54	54	54	54
Kolmogorov-Smirnov Z	.687	.761	1.080	.644	.836
p (2-tailed)	.733	.608	.194	.801	.486

However, the Kolmogorov-Smirnov test indicated that the data for the cold pressor test was not normally distributed: 1 sample Kolmogorov-Smirnov test was significant (N=53, K-S Z = 2.331, p<.001). On closer examination of the data it could be seen that there were two extreme outliers, and when these two outliers were removed, the normality was confirmed (N=51, K-S Z = 1.102, p=.176). These two outliers both kept their hands in the water for the maximum time allowed. Their time was therefore vastly greater than that of any other participant and suggests that their data should be excluded from any tests using

the cold-pressor data. When these two outliers were removed, assumptions were met for the use of parametric statistics

Descriptive statistics for the scores of the three groups at time point one are presented in the tables below. All three groups showed a wide range of scores across all measures at the start of the experiment. The BSI in particular shows a huge variation in scores, with some participants barely registering any score at all, and one in the Body Scan group scoring as high as 146. The cold pressor also registered wide variation in stress tolerance within each group.

Table 3.Descriptive statistics showing scores on all measures at time point one for the mindful breathing experimental group.

	Mean	Standard Deviation	Range
BSI	53.00	31.021	103
Cold Pressor	22.6858	16.25181	55.37
MAAS	55.63	8.008	29
PANAS Positive	33.00	5.239	22
PANAS Negative	19.63	7.305	25
ACS	46.42	7.734	35

Table 4. Descriptive statistics showing scores on all measures at time point one for the body scan experimental group.

	Mean	Standard Deviation	Range
BSI	44.17	37.955	144
Cold Pressor	15.0756	8.75966	38.8
MAAS	52.72	14.241	62
PANAS Positive	30.50	6.519	26
PANAS Negative	20.22	7.901	29
ACS	48.78	6.413	24

Table 5. Descriptive statistics showing scores on all measures at time point one for the body scan experimental group.

	Mean	Std. Deviation	Range
BSI	30.93	12.505	40
Cold Pressor	24.9179	15.45744	63
MAAS	57.71	6.207	24
PANAS Positive	30.50	6.925	22
PANAS Negative	18.50	3.459	10
ACS	44.36	5.415	16

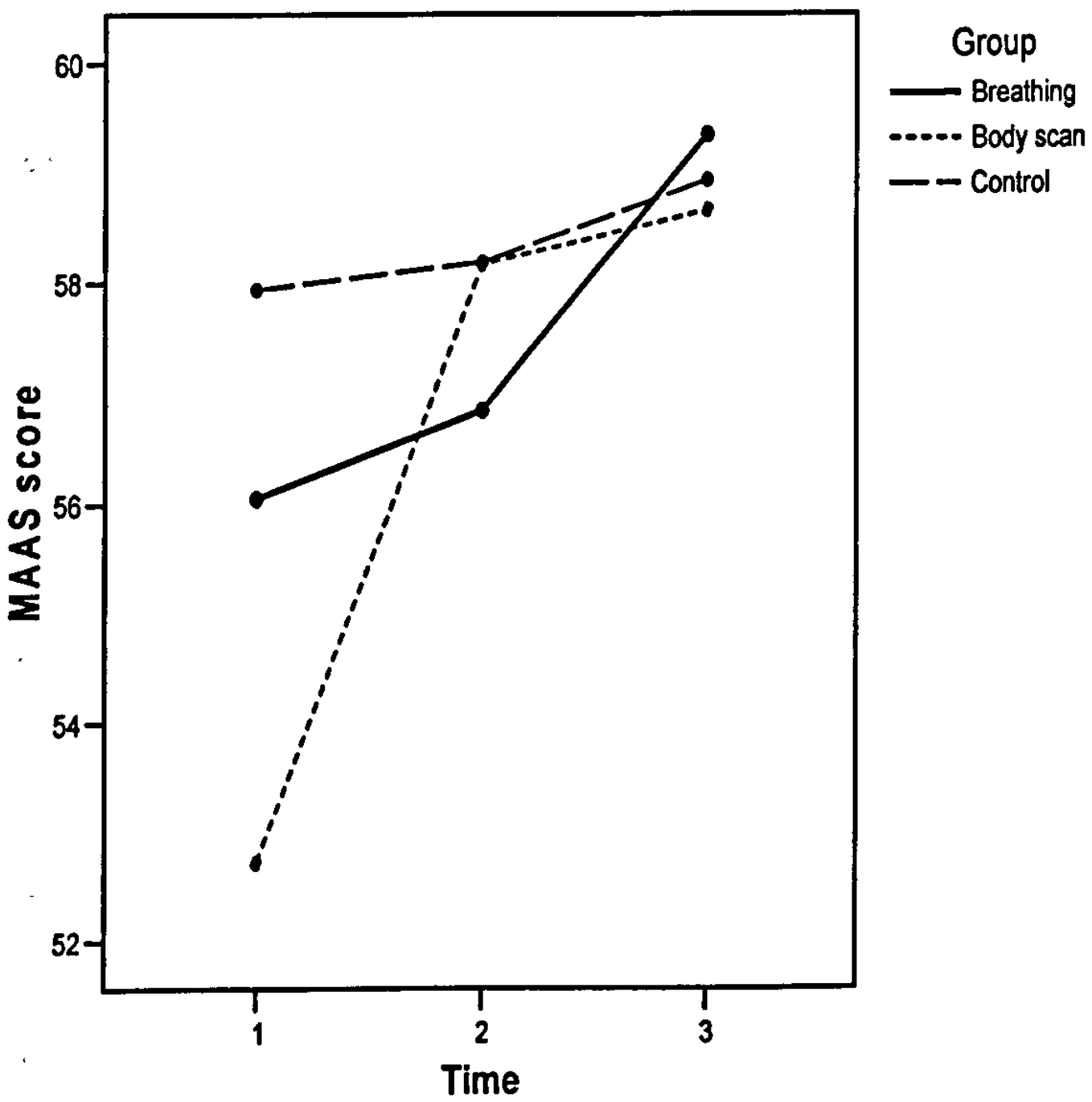
5.2 Randomisation of groups

One-Way Analysis of Variance (ANOVA) was used to test the groups at the beginning of the study. There were no significant differences between the groups at the first testing point for any of the measures: cold pressor (F=2.34, 2df, p=.107); MAAS (F=.95, 2df, p=.393); PANAS Positive (F=.97, 2df, p=.386); PANAS Negative (F=.26, 2df, p=.771); ACS (F=1.74, 2df, p=.187) or BSI (F=2.15, 2df, p=.127). This indicates that the randomised allocation to the three different groups had insured that the groups were equally distributed for scores across the different measures.

5.3 Hypothesis Testing

Hypothesis 1)

Figure 1.Graph showing scores for all three groups on the MAAS at time point one, two and three.

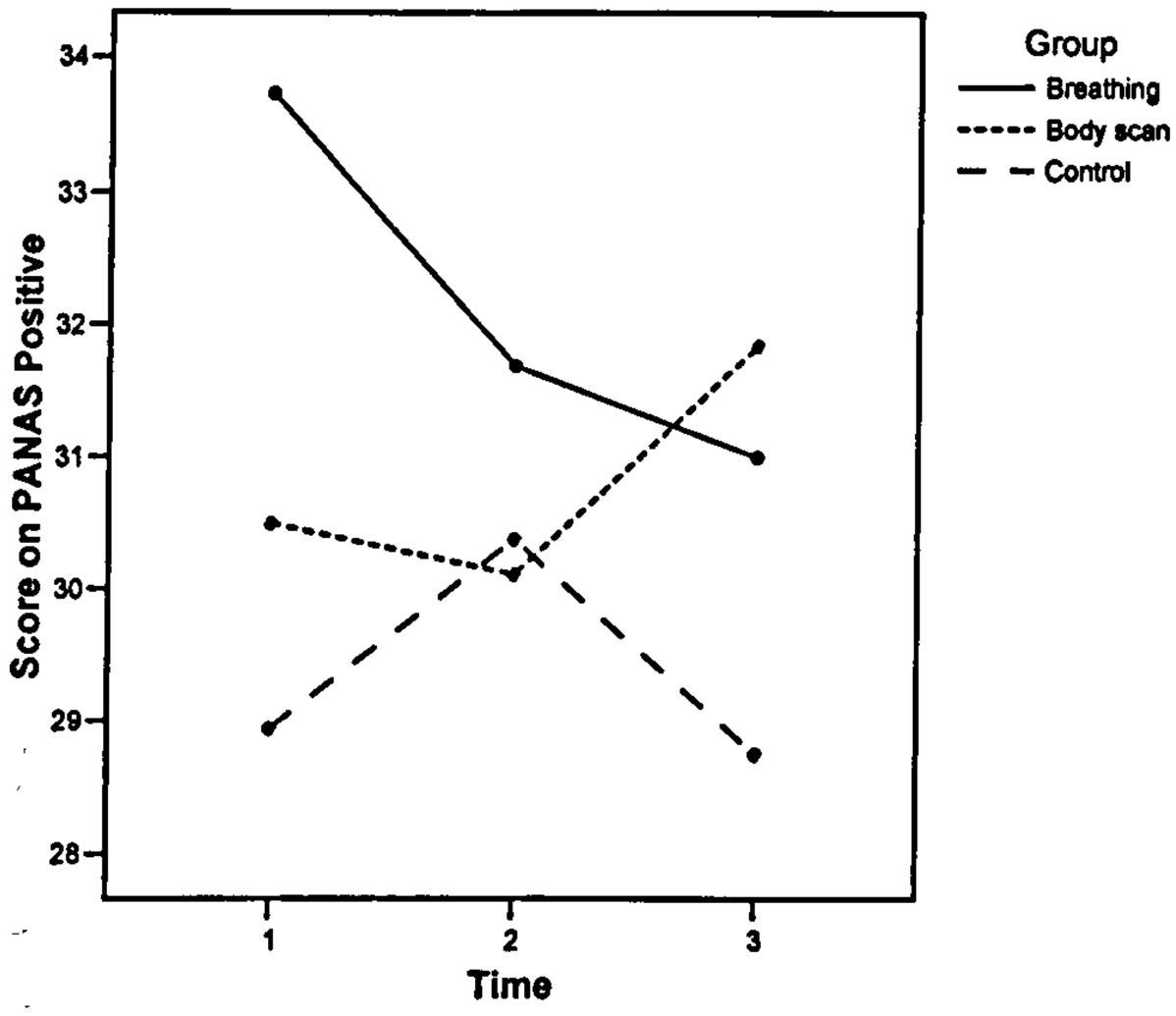


As can be seen from Figure 1 above, there does appear to be an effect of time on scores on the MAAS, as all three groups appear to have improved slightly. A Three x Three mixed design ANOVA was used in order to test for differences between the treatment and control groups on degree of mindfulness following treatment. It did demonstrate a small but significant effect of time-point ($F=4.9$, 2df, $p=.009/<.05$) but there was no interaction with group ($F=1.39$, 2df, $p=.244$). The Bonferroni statistic was calculated in order to determine which time-points differed and it indicates that time points one and two did not differ significantly ($p=.255$) but time points one and three did ($p=.02$) suggesting that there was a more gradual change over the course of the experimental period. Although the overall scores on the measure did increase, there was no statistical difference depending on which group a participant was in. Therefore the null hypothesis, that the groups would not vary on measures of mindfulness, was not rejected.

Hypothesis 2)

In order to test for differences between the treatment groups and the control group on measures of experience of psychological symptoms a Three x Three mixed design ANOVA was used. This hypothesis was tested using scores on both the positive and negative sub-scales of the PANAS and on the BSI.

Figure 2. Graph showing the scores for all three groups on the PANAS Positive at time point one, two and three.



The above graph (Figure 2) suggests that both the mindful breathing and the control group both registered slightly reduced scores on the PANAS Positive subscale, whilst the body scan group slightly improved. However, the ANOVA showed that the Positive subscale of the PANAS showed no effect of time point (F=.183, 2df, p=.833) or any interaction with group (F=1.47, 4df, p=.217) indicating that there were no significant changes at all on this measure.

Figure 3. Graph showing scores for all three groups on the PANAS Negative at time point one, two and three.

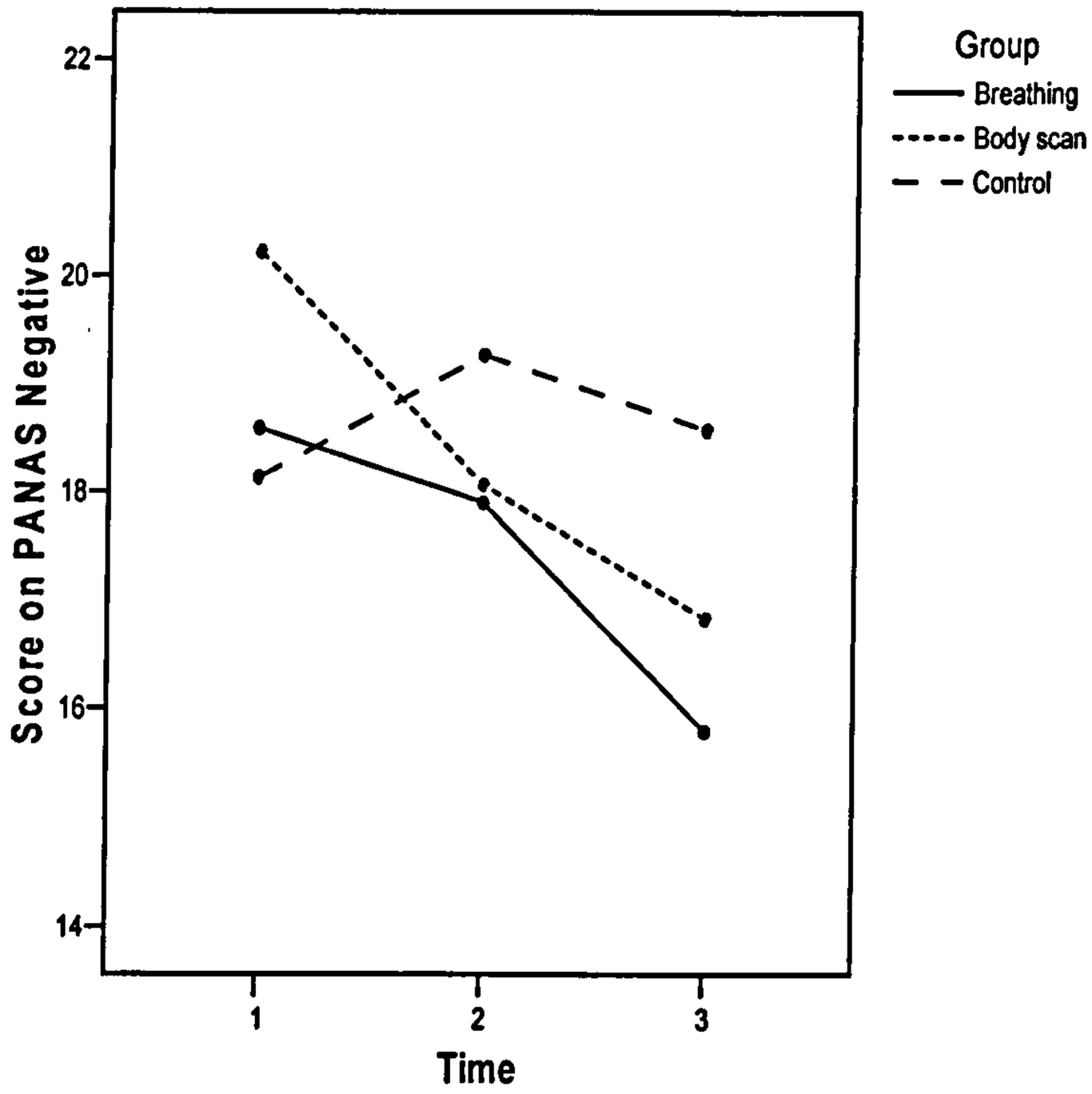


Figure 3 (above) shows the change in scores on the Negative subscale of the PANAS and again indicates some change over time, with all three groups appearing to improve and register lower scores on this measure by the third time point. However, a Three x Three mixed design ANOVA failed to show any significant effect of time (F=2.08, 2df, p=.130) or any interaction between time and group (F=.86,4df, p=.491).

Figure 4. Graph showing scores for all three groups on the BSI at time point one, two and three.

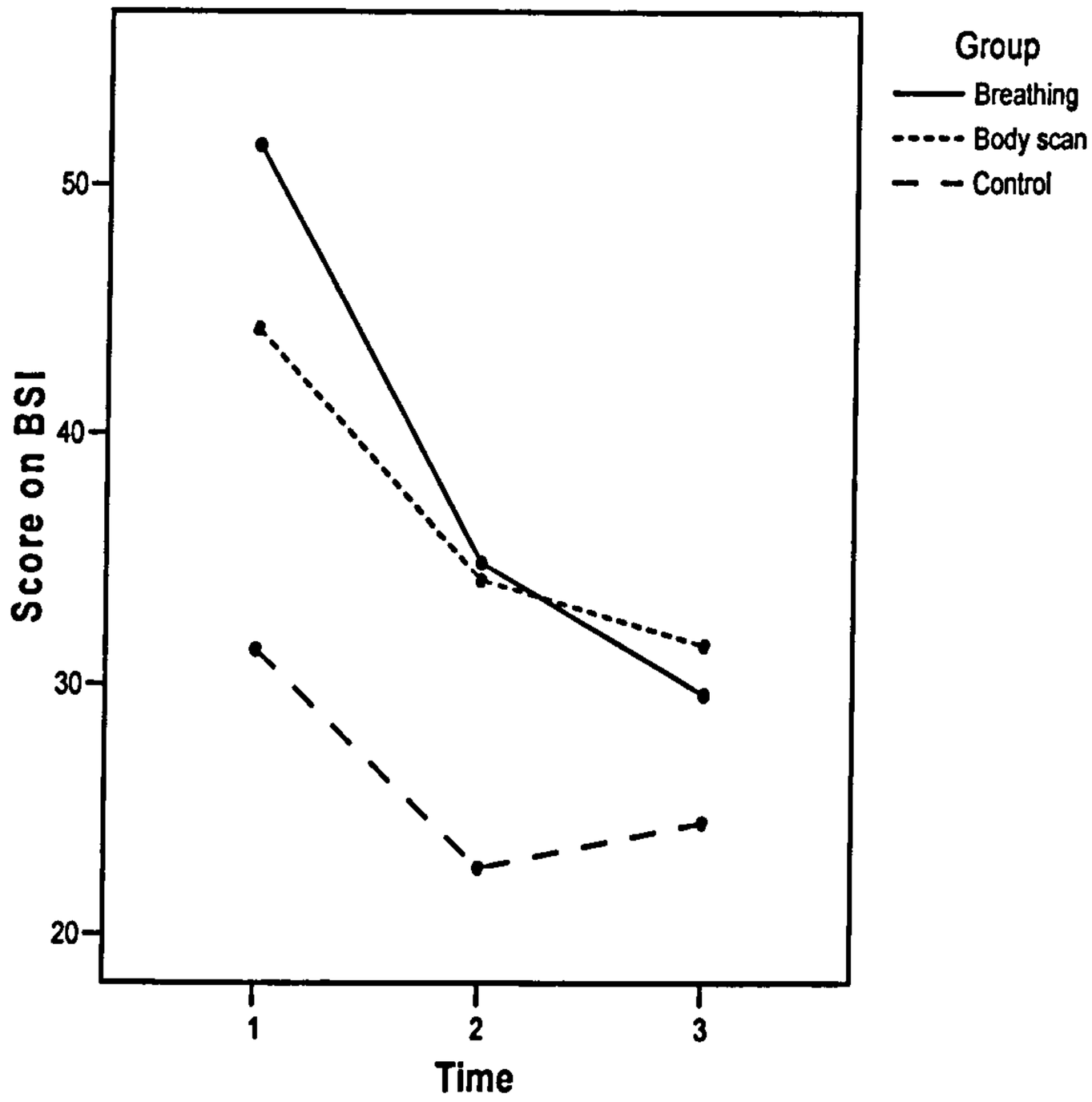


Figure 4 shows the scores for all three groups across the three time points on the BSI and suggests that all three improved slightly over time. The Three x Three mixed design ANOVA indicates that there was a significant effect of time ($F=12.60$, 2df, $p<.001$) but there was no interaction with group ($F=1.14$, 4df, $p=.342$). Post hoc Bonferroni pair-wise comparison statistics were calculated in order to determine at which testing point the

change with time had occurred and indicated that time points one and two significantly differed ($p=.003$) and time points one and three significantly differed ($p<.001$) indicating that there was change across the three testing points.

The PANAS measured no significant change over time either within or between groups, and although the BSI did record a significant change over time, this was not affected by which group a participant might have been in. Therefore, the null hypothesis, that the groups would not vary on measures of psychological symptoms and distress, was not rejected.

Hypothesis 3)

Figure 5. Graph showing scores for all three groups on the ACS at time point one, two and three.

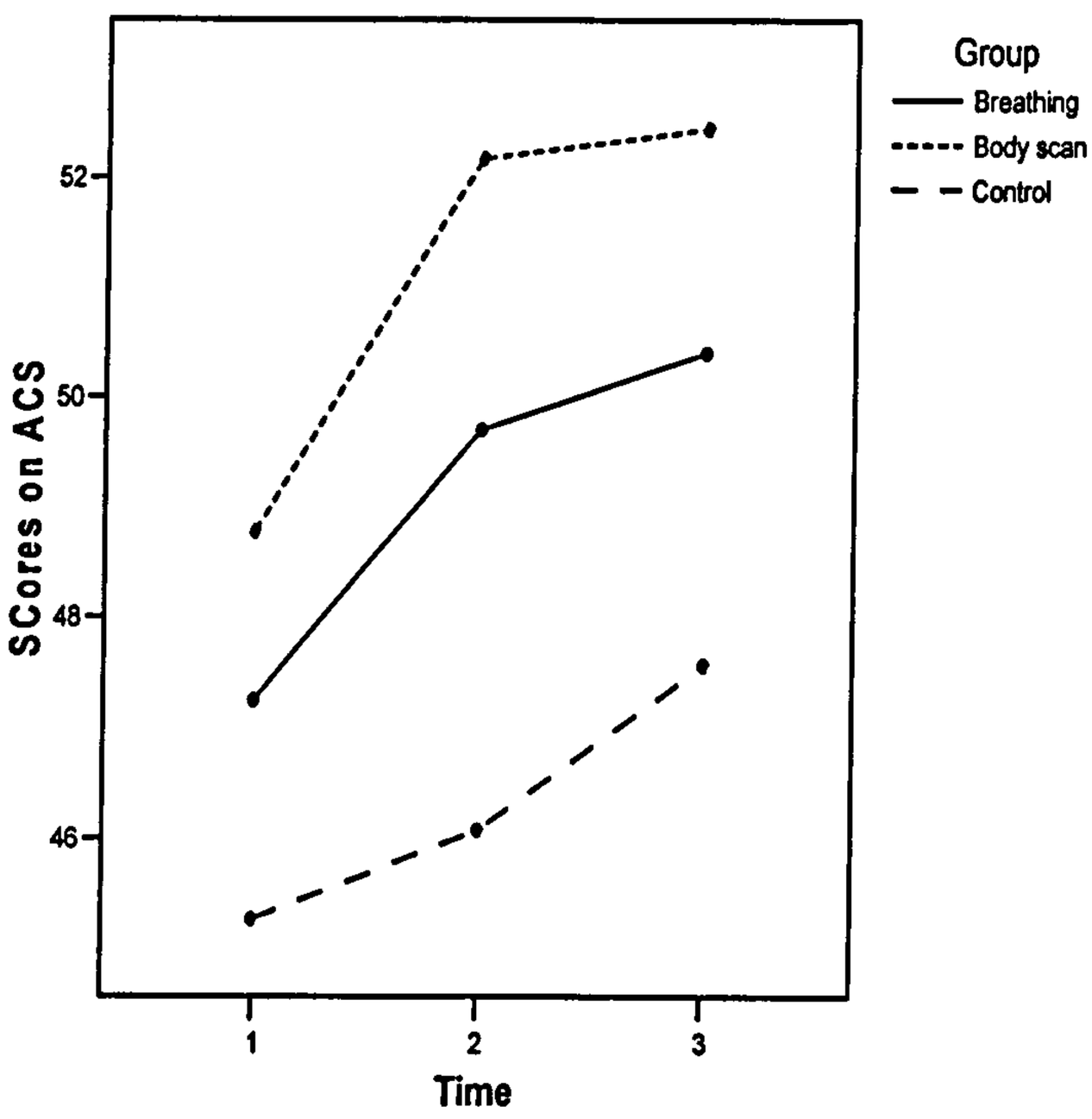


Figure 5 shows the scores at all three time points for the groups on the ACS. It suggests that all three groups showed some improvement on the measure across the time points. In order to test for differences between the treatment groups and the control group on levels of attentional control a Three x Three mixed design ANOVA was used. It showed a

significant effect of time point (F=10.91, 2df, p<.001) but no significant interaction with group (F=.59, 4df, p=.672).

A post hoc Bonferroni statistic was calculated in order to determine which time points differed and it demonstrated that all time point one and two were significantly different (p=.003) and time point one and three were also significantly different (p<.001).

Although there was a significant change over time for all three groups, the groups did not significantly differ from one another and the null hypothesis, that the groups would differ on measures of attentional control, was not rejected.

Hypothesis 4)

Figure 6. Graph showing mean scores for cold pressor test (in seconds) for all three groups at time point one, two and three.

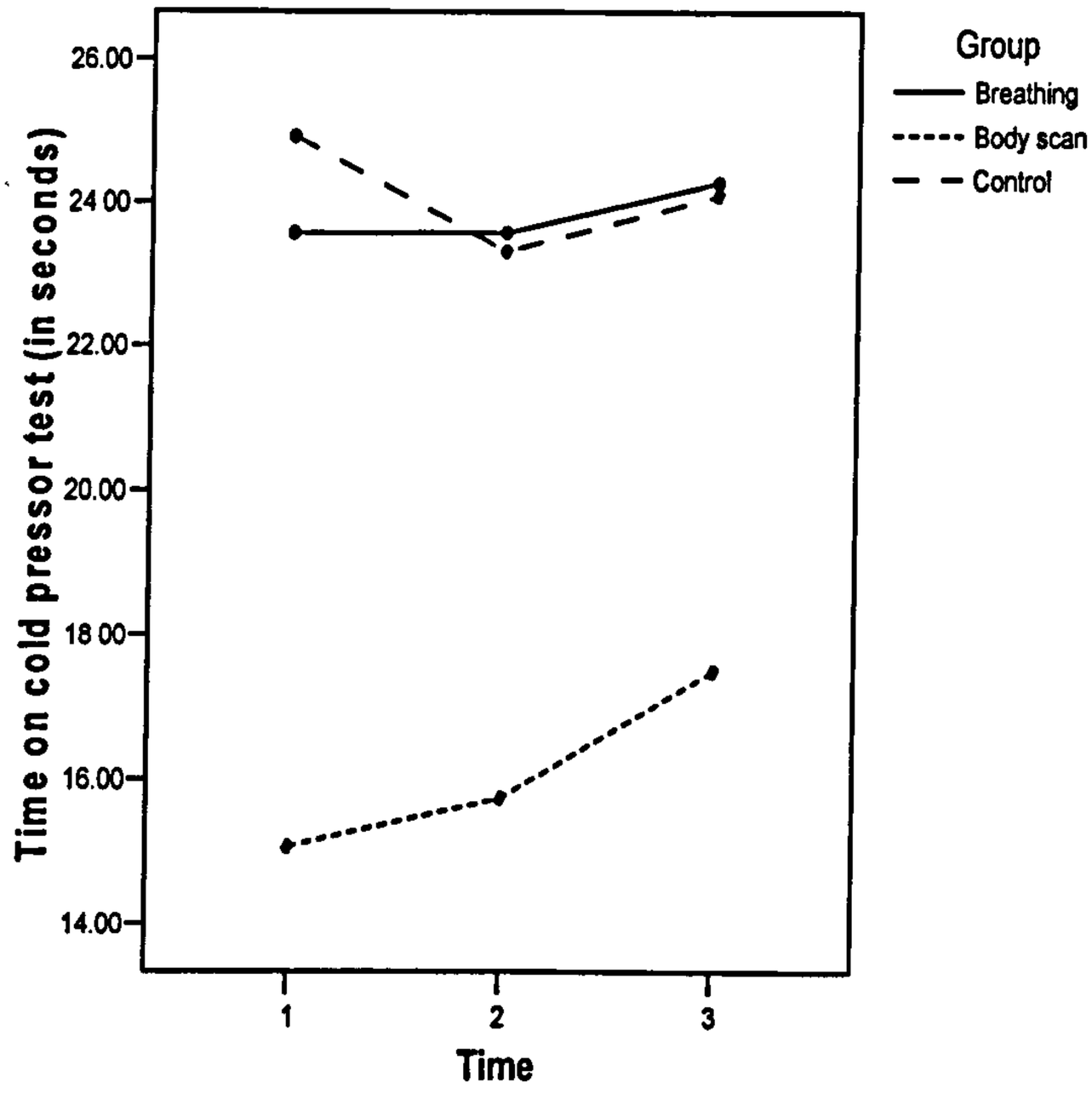


Figure 6 shows the scores for all three groups across the time points on the cold pressor test. It appears to how relatively little change across the time points, although does suggest that the body scan group appears lower from the start than the other two groups.

A Three x Three mixed design ANOVA failed to show any effect of time point on the scores (F=.41, 2df, p=.664) or any interaction with group (F=.31, 4df, p=.873).

The null hypotheses, that groups would differ on a measure of stress tolerance, was not rejected.

As the above results indicate, none of the null hypotheses could be rejected as there were no significant effects of group on any of the measures.

5.4 Effect Sizes

Effect sizes were calculated using Cohen's d, for time points one and two for all measures. This was to allow comparison of the results with other studies and with a meta-analysis (Schmidt, Niemann & Walach, 2004) and thus the same methodology was used as in the meta-review. Effect size was therefore calculated from the difference in means between the experimental group and the control at the final testing point for both experimental conditions, using pooled standard deviations. Effect sizes ranged from 0.02 to 0.59, and are presented in Table 6 below. The mean was 0.1 for breathing and 0.08 for body scan.

Table 6. Cohen's d effect size for experimental groups

Experimental measure	Mindful breathing	Body Scan
Cold pressor test	-0.33721	-0.46386
Maas	0.041335	-0.0255
PANAS Positive	0.339795	0.414901
PANAS Negative	0.508877	0.23617
ACS	0.354727	0.589639
BSI	-0.29253	-0.25455
Mean	0.1025	0.0828

5.5 Post Hoc

In order to investigate the results further, post-hoc Pearson's correlation tests were carried out to determine whether there were any relationships between scores on particular tests. These tests indicated that some measures were indeed correlated.

MAAS

The MAAS was negatively correlated with the PANAS Negative sub-scale (N=54, r=-.302, p=0.20), indicating that those who scored more highly on the MAAS tended to score lower on the PANAS Negative. These results did not change over time but remained consistently related.

The MAAS was also negatively correlated with the total score on the BSI (N=54, r=-.358, p=.005, indicating that those who scored highly on the measure of mindfulness skills also reported fewer psychological symptoms.

PANAS

The two subscales of the PANAS were negatively correlated (N=54, r= -.272, p=.037) which would seem to confirm the findings of the authors of the measure (Watson, Clark & Tellegen, 1988) that the two subscales show good discriminant validity .

BSI

The BSI was positively correlated with the Negative subscale of the PANAS (N=54, r=.560, p<.001), which again would fit expectations. As the number of reported symptoms of psychological distress increases, so too does the reported experience of negative affect, suggesting that the PANAS and the BSI have good convergent validity.

ACS

The only slightly more confusing correlations were between the ACS and other measures. The ACS was significantly negatively correlated with the BSI (N=54, r= -.258,p=.048) and was significantly positively correlated with the cold pressor (N=51, r=.364, p=.005) and the Positive subscale of the PANAS (N=54, r=.275, p=.035).

Time

Post hoc tests were also carried out to further investigate the effect of time. The BSI statistic shows the widest variation in score at time point one and a new variable of the change in BSI from time point one to time point three was calculated. This was then tested

against the number of days participants reported completing the study. A Pearson's correlation was calculated and showed a significant negative correlation (N= 54, r= -.315, p=.025).

5.6 Diary data

Participants were asked to complete a diary to indicate which days they had completed the techniques and which they had missed. The results for compliance with the practice routine are quite encouraging, as can be seen in Table 7 below. Forty-eight point one percent completed the diary at least 24 out of 28 days, and 88.9% completed the diary at least five times per week. There were only three participants who completed the diary less than five times per week, and all three reported having found difficulty due to outside commitments such as exams.

Table 7. Descriptive statistics indicating the number of days participants listened to CDs according to their diary data.

No. days completed	Frequency	Percent	Cumulative Percent
18	1	1.9	1.9
19	2	3.7	5.6
20	3	5.6	11.1
21	10	18.5	29.6
22	7	13.0	42.6
23	5	9.3	51.9
24	6	11.1	63.0
25	7	13.0	75.9
26	5	9.3	85.2
27	5	9.3	94.4
28	3	5.6	100.0
Total	54	100.0	100.0

In order to determine whether the three groups differed on the number of days practice completed a One-Way ANOVA was calculated which showed no significant difference between the groups (F=.104, 2df, p=.902).

6. Discussion

6.1 Aims

The current study aimed to investigate the effectiveness of two mindfulness techniques currently delivered as part of structured mindfulness-based therapeutic packages, in both the MBSR and MBCT. It was designed to study the effect of 'self-help' practice of two mindfulness techniques supported by CDs, on experience of psychological symptoms and affect, as well as stress tolerance. It also aimed to investigate whether teaching the two techniques had an impact on participant's abilities to be mindful or to control their attention. In line with calls from several authors in the field (e.g. Bishop et al. 2004; Dimidjian & Linehan, 2003) this study was intended to begin to answer one of the questions that current research into the effectiveness of mindfulness has left unanswered, which Dimidjian and Linehan (2003) state as "*what are the active or essential ingredients of mindfulness training?*" (p.168). The current methodology was used to assess the efficacy of guided 'self-help' applications of mindfulness, as a possible future means of effectively and efficiently delivering mindfulness training. This approach was also used to examine the techniques in the absence of group or teacher contact time and to separate out the two techniques being studied, in order to begin to determine what the active agents of change really are.

6.2 Results

As can be seen from the results presented above, there were some differences measured over time between the baseline at time point one and the end of the experimental period at time point three. Measures of mindfulness, psychological symptoms and attentional control all slightly, but significantly, improved over the period of the study, but there was no effect of which technique was practiced. This was confirmed for the BSI in the post hoc correlational test looking at the change in BSI score over time and the number of days complete. There was a statistically significant negative correlation which suggests that as the number of days participants practiced increased, their BSI score fell.

Both the groups of participants who received the mindfulness training and those that did not showed an improvement in some of the factors that were measured. This may be as a result of demand characteristics of the study, such that all participants may have scored higher because they were trying to give the answers that were expected of them (Robson, 1993) . It is also possible that this increase was due to familiarity with the procedure and the measures. However, were either of these explanations to be the case it might be expected that all measures, including the cold pressor test, would increase. The fact that this was not seen suggests a need for future research to pay more careful attention to this issue.

Two possible explanations for this result present themselves from the demographic data. Most of the participants who volunteered were first year undergraduates (51, 86%) and this population were all undertaking university examinations either immediately preceding or during the first part of the study. It is possible that measures record a genuine change that occurred as a result of decreased pressure by the final time point, once all exams were

completed. It is equally possible that for a slightly stressed population, who all reported significant pressures on their time, that the act of making time just to sit and listen to relaxing music or complete a relatively relaxing task was in itself of benefit, regardless of the technique used. Future research should therefore seek to control better for external stresses and to determine whether the act of taking time out is itself beneficial for such a population.

The findings from the post hoc tests were in the main, in line with expectations from the literature and suggest that the predicted relationships between the variables were present, although the current study failed to make significant changes in these over time. This indicates that the expected relationship between high scores on ability to be mindful and lower experience of negative mood and psychological distress was in fact present. It does not allow any conclusions to be drawn as to any causal relationship, but does suggest that the measures were valid with the current population.

The post-hoc findings relating to the ACS are less clear. There was no significant correlation between scores on the ACS and the MAAS, suggesting that the expected relationship between mindfulness and attentional control was not present. However, the ACS was positively correlated with both the PANAS positive and the cold pressor test, indicating that if attentional control was higher, then experience of positive affect and ability to tolerate stress was also higher. Similarly, the ACS was negatively correlated with the BSI, again suggesting that with higher attentional control the number of symptoms of psychological distress experience was lower. This would fit with the literature around ruminative thinking styles and depressive thought patterns. (Segal, Gemar & Williams, 1999). Those who are prone to enter depressive ruminative cycles of thought are unable to control their attention and re-direct it once engaged in such negative thought processes.

Thus the ability to control attention might be expected to be related to lower scores on experience of negative affect and psychological symptoms. However, given that attention did not have a relationship with mindfulness skills, it would be important for any future research to investigate this relationship further. It is possible that the ability to control attention might actually be one of the key elements which mindfulness training teaches, and that attention may be a mediating factor in the success of mindfulness training.

The results of the effect size calculations also indicate that this study did not measure significant change between the experimental condition and the control. The mean Cohen's d effect size was 0.1 for breathing and 0.08 for body scan. According to Cohen's own classification (1988) an effect size of 0.2 or lower is considered "small" and these therefore indicate no overall significant effect of experimental condition. Grossman, , Niemann, Schmidt and Walach (2004) conducted a meta analysis of studies using the Mindfulness Based Stress Reduction programme and reported average effect sizes of 0.5, which although still in the moderate range according to Cohen, does indicate that larger effect sizes are seen in other studies using mindfulness based techniques.

Despite the finding that some measures did improve slightly between the first and last testing points, the current study failed to show any significant change according to which group participants were in. Therefore none of the hypotheses were borne out, however, there are a number of interesting features which may help to explain this. The fact that the study failed to demonstrate significant change as a result of teaching mindfulness techniques does not invalidate their use. It does pose a question as to why the techniques did not indicate difference in this instance. There are five possible answers to this question which will be discussed in more detail below. Firstly, it could be that there were methodological problems with this study, which either prevented change being seen when

it should have been, or failed to recognise change that did actually occur. Secondly, it could be argued that the amount of experience with the techniques was too small to effect any positive change. Thirdly, it could be that the technique should work but that the specific presentations of the techniques in this current study were ineffective. The fourth explanation might be that the population used in the current study may somehow differ from those used in previous studies. The final explanation is that this form of teaching mindfulness, using single techniques delivered via individual CD presentation, is not sufficient for mindfulness techniques to be effectively learnt.

The first explanation encompasses a number of possible difficulties with the study itself. It could be that the methodology used here was not sufficient to effect change, or in fact that the methodology was not sensitive enough to detect change even if it were present. Although 59 participants were recruited, this yielded just 20, 18 and 16 in the three groups, and this may not have been of sufficient size to detect statistically significant change. No power calculations were completed before testing proceeded, and it was felt that the numbers were favourable in comparison to those cited in previous studies (e.g. Chadwick, Taylor &Abba, 2005, which reported change in one group of just ten participants) but this should be investigated more rigorously in future studies. There are other difficulties in detecting change over a short period of time and it is possible that the measures used in the current study were not sensitive enough. The fact that the mindfulness measure failed to detect any change at all in the experimental groups may be a case in point. This possibility is being addressed in the literature and there are other measures of mindfulness in development, such as the Mindfulness Questionnaire (Hember, 2003) which may be useful for future research in addressing this issue.

The second explanation offered concerns the lack of sufficient practice of the mindfulness techniques. It may be that the presentations of the techniques used here were insufficiently long. Although a twenty-minute long formal meditation practice was deliberately chosen in order to maximise compliance levels, it is possible that this was not long enough to make the technique effective. The original 40 minute meditation practices which are produced by Kabat-Zinn as part of his CD version of the MBSR (2005) contain quite a large amount of silence and it was felt a condensed version would be able to deliver the same instruction. Perhaps the periods of silence and the longer sessions allowed a greater depth of mindfulness to be encountered. Future research should aim to investigate techniques in a similar way but could use longer meditation practices, if compliance could be assured.

If length of practice time was insufficient for change to be seen, there is a chance that continuing the study over a longer period would have led to greater measurable changes. However, the literature suggests that there is reason to believe that change should be possible within such a time period. Mead (2004) used a six week long intervention, with just one two-hour session per week and was able to demonstrate change in mindfulness and other skills in this time. Although this took place over six weeks, rather than four, under half of the participants attended all six (ten out of twenty-one participants) and participants did not complete as much practice outside formal sessions. This suggests that were this method of delivery to be sufficient for affecting change, then some change ought to measurable after the period of four weeks. It seems possible to conclude that even were the study period to have been extended, positive change would not have been recorded. This suggests that length of practice time alone is unlikely to account for the lack of measurable change. It is much more likely that as mindfulness is a complex concept, 'self-help' methodology is unlikely to be sufficient.

The third possible explanation of the lack of measurable change concerns the nature of the presentations used in the current study. In light of the anecdotal evidence from participants' comments about their experiences whilst taking part in the study, it is possible that the particular presentations recordings of the techniques were not very successful (see Appendix J for a record of participants' comments). There were a number of participants who commented on finding the voice on the recordings of the mindfulness techniques "annoying" or irritating in some way. It is possible that this distracted from the effectiveness of the technique itself. The voice used in the present recordings did have a strong accent and it is possible that this caused some difficulties. It might be useful for future research to consider using a recording of someone who is local or whose accent is familiar to the participants in the study. It is obviously difficult to achieve this, given the unlikelihood of having an ethnically and geographically homogenous sample. However, this may have implications for clinical interventions if they are to make use of recordings or group leaders who are unfamiliar to the participants.

What the anecdotal evidence does indicate is that the control condition had high face validity. Many of those in the control group reported enjoying listening to the CD and found it relaxing. One participant (16), unaware that they were in the control group, also reported that the CD was "exactly what they had expected it to sound like". These comments suggest that many participants were unaware that they were in the control group. However, the credibility of the control as a treatment option could have caused more difficulties in interpreting the results if a significant difference had been seen between the experimental conditions and the control. Although some of these subjects anecdotally appeared to accept the control as a plausible treatment condition, it is possible that other participants might not find listening to music so plausible. In this case, significant results could have been criticised on the grounds hat subjects were aware of being part of the

control group, and therefore not expecting or reporting any change. Future research will need to ensure that the control condition is indeed plausible to participants, and systematic checking of this fact by asking participants about their beliefs about the treatment might be helpful.

The fourth explanation of the lack of change recorded concerns the specific population used in the present study. Although participants did not choose to seek out mindfulness because they felt they needed help, all were undergraduate students and the majority of the participants (51, 86%) were undertaking exams during or just prior to the time of the study. Although mindfulness has been reported to be effective when taught to medical students during exam periods (Shapiro, Schwartz & Bonner, 1998) this source of stress which was not explicitly targeted by the study may have confounded the findings. Future research should therefore consider the external stresses placed on participants and whether any other factors might need to be controlled.

The descriptive statistics presented on the groups at the start of the study may also suggest that there was something specific about the population being studied that prevented any change being recorded. Although One-Sample ANOVAs did not show any significant differences between the means of the groups at time point one on any of the measures, there are differences in their scores. Looking at the descriptive statistics it is clear that the range of scores on the measures was very wide within each group, particularly for the BSI. However, this is not as apparent in the control group. Although the participants were randomly allocated to the three groups it is possible that the control group differed from the other two groups. The wide variation in all three groups may also have confounded the results and prevented any significant effect being measured.

The final explanation of the lack of change recorded in the study would suggest that the method used is fundamentally insufficient for change to be seen. This would suggest that non-specific factors are an important part of the success of mindfulness techniques. The anecdotal evidence from this study fits with qualitative evidence from Mason and Hargreaves (2001) and may shed light on the findings. Mason and Hargreaves interviewed participants from an MBCT programme for depression and their research highlighted two important factors which may have been significant in the current study. The first was the importance of the group. The decision not to deliver the mindfulness techniques in a group format in the present study was deliberate and was designed to remove any possible non-specific factors which may have influenced the results seen in previous literature. It was decided to deliver the techniques in a 'pure' form, with as few other extraneous factors which might influence the results as possible. However, as the Mason and Hargreaves research states "*All participants reported finding the 'familiar faces' of the group a supportive and learning experience*" (p.203). Therefore, it is possible that teaching mindfulness in a group format is important. Future research could investigate whether the same style of presentation of single techniques but delivered in a group format might have a more significant impact on the results.

Mason and Hargreaves (2001) also describe a second factor, that of "*coming to terms*", which might be important in the current study. The concept of 'coming to terms' is described as containing both participants' internalisation of the course, in terms of attitude and skills etc, as well as their personal experiences relating to attendance and practice. What they highlight is not only the attitude that participants came to the study with, but also their reappraisal of the technique as the study progresses. They describe a need for "*open and flexible expectations*" and although this does not imply absolute belief in the techniques it does indicate that participants needed to be open to the possibility of some change

occurring and therefore to make some form of commitment to them (p. 208). The attitude taken by participants towards the techniques, either at the start or during the study, was not investigated in this study, but it seems likely that for many participants the issue of 'coming to terms' may never have been achieved. The fact that participants were recruited via a university department and received course credit as recompense for taking part, suggests that they may not have chosen to complete a mindfulness programme in other circumstances. Although the study was presented as a relaxation course, it seems unlikely that many of the participants had specific difficulties or problems that they were seeking help for, as is the case with most studies published to date. Thus, a significant factor for investigation in any future research is the attitude participants are taking towards the technique and their experiences during practice. It would be interesting to investigate whether the presence or absence of 'coming to terms', or openness towards the techniques, is predictive of significant change.

6.3 Implications for clinical practice

The lack of any change seen in the current study has implications for mindfulness-based clinical interventions. The evidence in support of the clinical use of mindfulness training is now substantial and impressive, as the studies discussed in the above introduction indicates. However, the current research failed to demonstrate any change on a number of measures following training on just one technique delivered via CD. This suggests that for clinical purposes, such delivery is not an efficient use of resources and will not lead to positive change. In a health service driven by a need to ensure efficient delivery of interventions and greatest possible value for money, the concept of delivering therapeutic interventions via CD might well seem a tempting one.

There is a movement towards self-guided therapy for a number of populations and techniques at present eg computerised CBT treatment for anxiety and depression (McCrone, Knapp, Proudfoot, Ryden, Cavanagh, Shapiro et al., 2004); Proudfoot, Ryden, Everitt, Shapiro, Goldberg, Mann, & Tylee, 2004) The evidence for the use of these is promising, and in both the McCrone et al (2004) and the Proudfoot et al (2004) studies, the conclusion is drawn that the technique could be useful. However, in these studies contact with health professionals and therapists for discussion of difficulties was offered if required. Hence, although the techniques were delivered remotely, questions and difficulties could be answered in person. Similarly, Clarke et al (2005) also report that in a randomised trial comparing computer delivered treatment for depression, no effect of the treatment was seen when offered in isolation. However, by adding in contact with therapists, either delivered by phone or by postcard, subjects did show significant improvement after treatment. The present study may support this literature, in suggesting that a therapeutic intervention delivered entirely remotely is less likely to be effective. It appears that the non-specific factors, such as being in a group and having opportunities to ask questions of a skilled trainer, may well be important in ensuring efficacy of the technique. The current study clearly requires further investigation, but does suggest that delivery of mindfulness training via self-guided CD presentations may not be sufficient to effect change.

The qualitative anecdotal evidence, in line with that discussed from the Masson and Hargreaves (2001) paper, also suggests that any clinical use of mindfulness training may require the presence of certain factors. Education and awareness of the participants may be important in allowing informed participation in a state of open-minded willingness. Without the knowledge of what might be encountered during participation in the techniques, it is possible that effective use of them becomes less likely. The participants in

the present study were deliberately given only brief information, and according to their comments during testing sessions, it does not appear that many went away and researched the techniques further. The lack of knowledge about what to expect from the techniques appears to have led to some surprise and possibly irritation at times, which may have restricted any potential effectiveness. It also seems that were CD recordings to be used, the choice of voice and the form of the recording might be important, such that other sounds like ringing bells were not too intrusive and that voices were both clearly comprehensible and acceptable to the intended audience.

6.4 Future research directions

There are a number of questions arising from the current study which need to be addressed in future research. The majority of these relate to the extent to which the limitations of the current study can be improved. The difficulty with the length of time required for exposure to mindfulness techniques before change can be measured could be examined. It might, for instance, be possible to extend the meditations to a full 40 minutes. This would allow for control of any limitation in the degree of engagement that is possible in the 20 minute time frame. In a similar way, the possibility that the specific recordings used in the current study somehow lacked face validity or were unacceptable to the audience could also be controlled. It would be interesting to see whether any change could be measured were different recordings to be used. Equally, the presence or absence of external stressors should also be better controlled for. This would ensure that changes were not masked by external stresses which altered the mood and symptom state for participants.

However, the conclusions from this study do not appear to imply that there were minor difficulties with the specific methodology which, if removed, would mean significant

change would be seen. Rather, it seems more likely that 'self help' methodology alone is not suited to this technique. The most interesting future research question that the current study highlights is the degree to which 'non-specific' therapeutic factors, such as being in a group, impact on change. It appears from the literature that these may be an important part of the experience of mindfulness training as it is currently delivered. It might be possible to repeat the current study but provide access to group discussion and/or contact with a trained teacher in order to determine how significant such a factor might be. It would be interesting to determine what the minimal mount of contact time with either group or teacher would need to be for significant results to be recorded. This would certainly have extremely important clinical implications in helping to devise the most cost-effective and efficient therapeutic services.

6.5 Conclusion

Mindfulness is a technique which has aroused much clinical interest over the past twenty years or so. The literature surrounding its clinical application certainly demonstrates its increasing popularity. This popularity does not appear unjustified, however, and there is increasingly good evidence that therapeutic programmes which incorporate mindfulness techniques can be efficient and effective. There are still some gaps in this research and by the nature of its relative infancy in clinical terms there is a need for further investigation. This study aimed to try and investigate one of the questions surrounding the area at present, namely what the active agents of change in mindfulness might be. The present study was not able to demonstrate significant change following use of individual techniques and this may have important clinical implications. It suggests that delivery of single techniques in the absence of the whole mindfulness package may not be of benefit. The results are suggestive that perhaps there are other non-specific factors at work in the

mindfulness programmes or that the techniques are more effective when delivered as a package rather than in isolation. This may indicate that in terms of delivery mindfulness training, the whole is greater than the sum of its parts, and it is essential for the future delivery of efficient clinical interventions that the nature of this 'whole' is further investigated.

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Appendices

Appendix A

Instructions for authors for Behaviour Research and Therapy

Products

Behaviour Research and Therapy

Journal information
Product description
Editorial board
Audience
Abstracting/indexing

For Authors
Guide for authors
Online Submission

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Appendix B

The Mindful Attention Awareness Scale (MAAS), Brown & Ryan (2003)

Day-to-Day Experiences

Instructions: Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

1	2	3	4	5	6
Almost Always	Very frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never

I could be experiencing some emotion and not be conscious of it until some time later. 1 2 3 4 5 6

I break or spill things because of carelessness, not paying attention, or thinking of something else. 1 2 3 4 5 6

I find it difficult to stay focused on what's happening in the present. 1 2 3 4 5 6

I tend to walk quickly to get where I'm going without paying attention to what I experience along the way. 1 2 3 4 5 6

I tend not to notice feelings of physical tension or discomfort until they really grab my attention. 1 2 3 4 5 6

I forget a person's name almost as soon as I've been told it for the first time. 1 2 3 4 5 6

It seems I am "running on automatic," without much awareness of 1 2 3 4 5 6

what I'm doing.

I rush through activities without being really attentive to them 1 2 3 4 5 6

I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there 1 2 3 4 5 6

I do jobs or tasks automatically, without being aware of what I'm doing. 1 2 3 4 5 6

I find myself listening to someone with one ear, doing something else at the same time 1 2 3 4 5 6

I drive places on "automatic pilot" and then wonder why I went there. 1 2 3 4 5 6

I find myself preoccupied with the future or the past. 1 2 3 4 5 6

I find myself doing things without paying attention. 1 2 3 4 5 6

I snack without being aware that I'm eating. 1 2 3 4 5 6

Appendix C

Attentional Control Scale (ACS), Derryberry & Reed (2002)

Please read the following statements carefully and score each one out of four, according to the scale below. Circle the number which represents how strongly you agree or disagree with the statement.

1=almost never; 2=sometimes; 3=often; 4=always

It's very hard for me to concentrate on a difficult task when there are noises around.

1 2 3 4

When I need to concentrate and solve a problem, I have trouble focusing my attention.

1 2 3 4

When I am working hard on something, I still get distracted by events around me.

1 2 3 4

My concentration is good even if there is music in the room around me.

1 2 3 4

When concentrating, I can focus my attention so that I become unaware of what's going on in the room around me.

1 2 3 4

When I am reading or studying, I am easily distracted if there are people talking in the same room.

1 2 3 4

When trying to focus my attention on something, I have difficulty blocking out distracting thoughts.

1 2 3 4

I have a hard time concentrating when I'm excited about something.

1 2 3 4

When concentrating I ignore feelings of hunger or thirst.

1 2 3 4

I can quickly switch from one task to another.

1 2 3 4

It takes me a while to get really involved in a new task.

1 2 3 4

It is difficult for me to coordinate my attention between the listening and writing required when taking notes during lectures.

1 2 3 4

I can become interested in a new topic very quickly when I need to.

1 2 3 4

It is easy for me to read or write while I'm also talking on the phone.

1 2 3 4

I have trouble carrying on two conversations at once.

1 2 3 4

I have a hard time coming up with new ideas quickly.

1 2 3 4

After being interrupted or distracted, I can easily shift my attention back to what I was doing before.

1 2 3 4

When a distracting thought comes to mind, it is easy for me to shift my attention away from it.

1 2 3 4

It is easy for me to alternate between two different tasks.

1 2 3 4

It is hard for me to break from one way of thinking about something and look at it from another point of view.

1 2 3 4

Appendix D

List of Subscales for the Brief Symptom Inventory (BSI), Derogatis &

Melisaratos (1983)

BSI Symptom Subscales:

Somatisation

Obsessive-compulsive

Interpersonal sensitivity

Depression

Anxiety

Hostility

Phobic Anxiety

Paranoid ideation

Psychoticism

Appendix E

Cold Pressor Test Protocol

Cold Pressor Protocol

Before beginning, ensure that the water bath is at the correct temperature (0.2 degrees centigrade) and that the water is clean and free of any ice.

Ensure the participant has read the information sheet and completed the consent form. Check their answers to the questions regarding any medical conditions which may affect circulation.

Ask the participant "Can you confirm that you don't have diabetes, Reynauld's Disease or any heart conditions? Do you have any other conditions which may affect your circulation?"

If the participant answers yes, advise the participant that they should not continue with this part of the test.

If the participant answers no, proceed with the test.

Ask the participant which is their dominant hand. Then ask the participant to roll up the sleeve of their non-dominant hand and remove watches or jewellery. The participant is shown the cooling water bath and then given instructions as follows:

"I'm going to ask you to place your non-dominant hand into the water bath, here, up to your wrist. You may move your hand around or keep it still as you wish, as long as it stays in the water up to the wrist (indicate the level of the wrist). Keep your hand in the water until it becomes too uncomfortable and then remove it. I will be timing you, but please remove your hand as soon as it becomes too uncomfortable. I will stop you after five minutes if you choose to leave your hand in for that long."

Ask the participant if they have any questions. Check they understand the protocol and answer any queries.

Once the participant is ready to begin and understands what is expected, ask them to place their hand into the water. Begin timing using the stop watch as soon as the hand enters the water. Stop timing as soon as the participant removes their hand from the water.

Offer the participant a warmed towel and check that they are not uncomfortable. Ensure the participant has recovered and their hand has warmed up before they leave.

Appendix F

University Ethics Committee Approval

Appendix G

Information Sheet and Consent Form

An Investigation into the Effectiveness of Two Mindfulness Techniques

Consent Form for Research Participants

My name is (researcher's name) and I am Trainee Clinical Psychologist at the University of Southampton. I am requesting your participation in a study regarding the use of mindfulness techniques in stress reduction programmes. Mindfulness is a traditional relaxation technique taken from Buddhist practices and has been in use for centuries. More recently, it has been adapted for use in treating a large number of physical and psychological problems.

The study will involve listening to an audio CD containing a mindfulness technique training programme for 20 minutes each day, over a period of four weeks. You would be required to complete a number of questionnaires, which should take approximately 30-40 mins at the beginning, after two weeks, and at the end of study. You would also be asked to take part in a physical test of distress tolerance at these times. This will involve placing your hand in cold water whilst measures of heart rate and blood pressure are taken. This is a well-established and widely-used test but it can cause some slight discomfort due to the cold temperatures. Effects are very short lived and should not cause any serious distress. If you have a heart condition, diabetes, Reynauld's disease or other circulation difficulties please let us know before agreeing to take part. If you have any concerns about this part of the study please ask for further information.

Personal information will not be released to or viewed by anyone other than researchers involved in this project. Results of this study will not include your name or any other identifying characteristics.

Your participation in the study is voluntary and you may withdraw your participation at any time. If you do choose not to participate you do not have to give a reason for your decision and it will not effect your our academic progress (*To be included for Psychology students* or your receipt of course credits. It will have no consequences for your treatment as a student in the psychology department.)

If you have any questions, please ask me or you can contact me at the Department of Clinical Psychology at the University of Southampton on 023 80 595321 or at (email address). I will also provide a written summary of the study once it has been completed.

Yours sincerely

(Name)
Trainee Clinical Psychologist

Statement of Consent

I _____ have read the above informed consent form.
I understand that I may withdraw my consent and discontinue participation at any time without penalty or loss of benefit to myself. I understand that data collection as part of this research project will be treated confidentially, and that published results of this research

project will maintain my confidentiality. In signing this consent letter, I am not waiving my legal claims, rights, or remedies. A copy of this consent letter will be offered to me.
(Circle yes or no)

I give consent to participate on the above study. Yes/No
I understand that any responses I give will be confidential and all personal details will be removed so that I will not be identifiable. Yes / No
I understand that I can change my mind about taking part in the group without having to give a reason. This will not affect the number of course credits I receive nor my receipt of CD copies of the techniques. Yes / No

Please give details of any medical conditions, such as heart conditions, diabetes or Reynaulds Disease which may affect you circulation, below

.....
.....
.....
.....

I understand that if I have questions about my rights as a participant in this research, or if I feel that I have been placed at risk, I can contact the Chair of the Ethics Committee, Department of Psychology, University of Southampton, Southampton, SO17 1BJ. Phone (023) 8059 3995.

Name
.....
Signature Date
....

Appendix H

Diary Sheet

Name.....

Week 1							
Day	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
Complete?							
Week 2							
Day	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
Complete?							
Week 3							
Day	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
Complete?							
Week 4							
Day	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
Complete?							

Appendix I

Debriefing Statement

An Investigation into the effectiveness of two Mindfulness Techniques – Mindful Breathing and the Body Scan.

Debriefing Statement

The aim of this research was to investigate the effectiveness of two techniques which are commonly used in Mindfulness-based stress reduction training programmes.(For examples of their use in clinical populations see Ma and Teasdale, 2004, and Kabat-Zinn, Lipworth, Burney & Sellers, 1986.) It is expected that participants who used either the Mindful Breathing technique or the Body Scan technique will both have shown reductions in their reported level of stress and anxiety and an improvement in their sense of well-being. It is expected that participants who used the control CD, which contained a music recording, will not have shown the same improvements. The series of questionnaires which were completed during the research were designed to assess general feelings of well-being, symptoms of anxiety and depression, ability to be mindful and ability to focus attention. The cold pressor test, which was the test involving cold water, was designed to assess distress tolerance.

Your data will help our understanding of the effectiveness of Mindfulness techniques and their possible use with clinical populations, such as those with depression. Once again, the results of this study will not include your name or any other identifying characteristics. The research did not use deception, although you will not have been told which relaxation technique you were using. If you are unsure which technique you used please ask for clarification. It is too early to determine any results yet, but you may have a copy of a summary of the findings once the project is completed. Please let me know if you wish to receive a copy of this summary by indicating below the address to which you would like the summary sent.

If you have any further questions please contact me, Helen Care, at the Department of Clinical Psychology, University of Southampton on 023 8059 5321 or at hjc303@soton.ac.uk.

Thank you very much for participation in this research.

Helen Care Date

If you have any questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you my contact the Chair of the Ethics Committee, Department of Psychology, University of Southampton, Southampton, SO17 1BJ. Phone 023 8059 3995.

.....

I would like a copy of the summary of the findings of the research in to Mindfulness techniques.

Name _____

Please send this summary to

Address: _____

_____

_____

_____

Appendix J

Anecdotal Evidence: Participants' Comments

Participants were asked for any feedback about the experience at the two-week and four-week test points and any responses were recorded and are presented below.

Several participants in the experimental groups made comments about finding the recording of the mindfulness techniques difficult to listen to. Three commented about the voice of the therapist. One (participant 16) stated "His voice is so annoying I want to hit him!" and another (29) stated that "I find his voice really irritating". The third asked where the therapist came from and said "His accent is really hard. I find it difficult to listen to him." There were also two other participants who commented about finding the bell used to begin the meditation unpleasant. Participant 23 said "It makes me jump every time and then I feel all jittery". Participant 57 also said "At the beginning it made me jump but I did get used to it after a few days."

There were also comments made by those in the control group and the control recording appeared to be received positively. Participant 30 stated "That's the kind of thing I like listening to anyway so I enjoy it" and another, participant 6, stated "That's exactly what I expected it to be like".

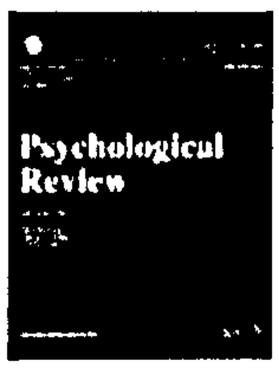
Comments made by participants generally indicated that they had not known what to expect from mindfulness techniques e.g. "It took some getting used to" (19) and "I didn't expect it to be like that" (participant 37).

Only one participant made any positive statement about any effect they had noticed from listening to the CDs, most others commented on challenges of finding time to listen to it or on other practicalities. However, participant 13 said at the four-week test point "I've slept better than I've slept for years".

Appendix K

Instructions to Authors for Psychological Review

APA Journals



Psychological Review

Editor: Keith Rayner
ISSN: 0033-295X
Published Quarterly, beginning in January

Instructions to Authors

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Editor
Department of Psychology
Tobin Hall
University of Massachusetts
Amherst, MA 01003

General correspondence may be directed to the Editor's office.

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References. References should be listed in alphabetical order. Each listed reference should be cited in text, and each text citation should be listed in the References. Basic formats are as follows:

> Johnson-Laird, P. N., Girotto, V., & Legrenzi, P. (2004). Reasoning from inconsistency to consistency. *Psychological Review, 111,* 640–661.
>
> Thagard, P. (2000). *Coherence in thought and action*. Cambridge, MA: MIT Press.
>
> Kenny, D. A., & Zautra, A. (2001). Trait-state models for longitudinal data. In L. M. Collins & A. G. Sayer (Eds.), *New methods for the analysis of change: Decade of behavior* (pp. 243–263). Washington, DC: American Psychological Association.

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Appendix L

CD Versions of Mindfulness Techniques