VOLUME I

RESEARCH VOLUME

MINDFULNESS AND CANCER:

A LITERATURE REVIEW AND EMPIRICAL STUDY

by

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Overview

This work comprises two volumes. Volume I contains two research papers on the topic of mindfulness and cancer. The first is a review of the literature on mindfulness-based interventions for cancer patients, which is intended for submission to *Integrative Cancer Therapies* (see Appendix A). The second is an empirical study examining the relationship between trait mindfulness and distress in adults hospitalised prior to stem cell transplantation (SCT), which is intended for submission to *Psycho-Oncology* (see Appendix B).

Volume II contains five Clinical Practice Reports (CPRs) based on work conducted on clinical placements during Clinical Psychology training. CPR 1 (psychological models) presents the case of a 13-year-old boy with symptoms of post-traumatic stress formulated from cognitive and systemic perspectives. CPR 2 (service evaluation) employed a qualitative methodology to evaluate an under-fives service offered by a Child and Adolescent Mental Health Service from the perspective of two psychologists offering the service and four health visitors who had used the service for consultation and joint working. CPR 3 (single case design) evaluated the impact of an ecological intervention on the frequency, severity and duration of angry outburst behaviours of a 12 year old girl with autism. CPR 4 presents a case study in which a cognitive-behavioural approach was employed in therapy with a 20 year old man experiencing difficulties with anger following his mother's diagnosis and treatment for cancer. CPR5 was presented orally, and a single page summary is included here; this report described the development, implementation and evaluation of a recovery-focused group in a mental health service for older people.

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I would like to thank my supervisors, Ruth Howard and Iñigo Tolosa; the staff of the Haematology department at the Queen Elizabeth Hospital, particularly Bryony Crook, Ann Bond and Charles Craddock, and the 54 individuals who took part in the study, without whom this research would not have been possible.

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LITERATURE REVIEW

DO MINDFULNESS-BASED INTERVENTIONS OFFER PSYCHOLOGICAL BENEFIT FOR CANCER PATIENTS?

A CONCEPTUALISATION AND SYSTEMATIC REVIEW OF THE LITERATURE

Abstract

This paper presents a new conceptualisation of how mindfulness-based interventions might be of psychological benefit to cancer patients and a review of the empirical literature evaluating the extent to which such benefits exist. The paper begins with an overview of mindfulness-based interventions, the mechanisms by which they are thought to have their therapeutic effects, and how they might apply to people dealing with the multiple challenges that cancer presents. This is followed by a review of the literature examining the effects of mindfulness-based interventions for cancer patients, specifically assessing how well the literature is currently able to address three key questions: 1. For whom is mindfulness helpful? 2. Does it matter how the intervention is packaged? 3. What kinds of benefits can mindfulness offer to cancer patients? A narrative synthesis of the literature finds some evidence that mindfulness-based interventions can offer psychological benefits to cancer patients but concludes that a preponderance of uncontrolled studies has led to prematurely strong conclusions in the literature. Finally, the paper suggests some implications of the review for clinicians, purchasers and researchers.

Introduction

Mindfulness-based interventions

The term *mindfulness* has been described by Bishop et al. (2004) as: “a nonelaborative, nonjudgemental, present-centred awareness in which each thought, feeling, or sensation that arises in the attentional field is acknowledged and accepted as it is”. The first psychological intervention to incorporate training in mindfulness was Jon Kabat-Zinn’s *Mindfulness-Based Stress Reduction* (MBSR) programme which began in 1979 in Massachusetts, described in *Full Catastophe Living* (Kabat-Zinn, 1990). This programme aims to train participants to approach their experiences with an attitude of mindfulness through formal meditation exercises, both in weekly classes and in daily home practice guided by audiotapes or CDs. Each meditation suggests a focal point for attention, such as the breath, sensations in the body, or sensory experiences such as sight or sound, any of which can help to anchor attention to the present moment. The original MBSR programme was designed for patients with chronic pain or stress-related physical disorders. More recently a *Mindfulness-Based Cognitive Therapy* (MBCT) programme was developed for individuals with a history of recurrent depression (Segal, Williams, & Teasdale, 2002). MBCT is based on the MBSR programme but incorporates more explicit cognitive elements and psycho-education alongside mindfulness teaching. The published empirical literature demonstrates that mindfulness-based interventions are continually being adapted and applied to a wide range of clinical groups (see Baer, 2003, for review), including cancer patients.

Why should mindfulness help cancer patients?

Teasdale, Segal and Williams (2003) argued that there may be many dimensions underlying the therapeutic effectiveness of mindfulness training and therefore advised formulation of how the different components match the processes maintaining a particular target problem. Cancer presents a complex set of physical, psychological and social challenges (Brennan, 2004), so a multi-faceted intervention might have the potential to confer multiple benefits through multiple routes. There is currently no consensus on the mechanisms by which mindfulness delivers its therapeutic effects, and the theoretical literature describes a number of closely over-lapping constructs with inconsistent terminology. Below is a description of four distinct purported mechanisms (Chambers, Gullone, & Allen, 2009), of which *metacognitive insight* is suggested as a primary mechanism from which *observing without judgement*, *experiential exposure* and *wise responding* are thought to develop (Shapiro, Carlson, Astin, & Freedman, 2006). The description includes examples of how each mechanism might be useful to cancer patients, and the conceptualisation is illustrated by the diagram in Figure 1.

Metacognitive insight. During mindfulness meditation, participants are encouraged to focus attention on a particular object, such as the breath, and to develop the skill of continually and intentionally bringing attention back to that point of focus. By observing the inevitable journeying of the mind as thoughts come and go, and by continually returning the focus of attention to the present moment, individuals are able to develop what Teasdale (1999) called *metacognitive insight*: a mode of mind in which thoughts and other mental events, including emotions and perceptions of physical sensations, are experienced as transient products of the mind rather than as direct representations of reality. Shapiro et al. (2006) suggested that this “re-

perceiving" (p. 377) of experience might be a meta-mechanism that facilitates change in other process variables, which might in turn mediate the impact of mindfulness training on outcomes such as symptom reduction or increased psychological wellbeing.

Observing without judgement. During mindfulness meditation, participants are encouraged to allow whatever arises in their awareness to exist without evaluating the experience as, for instance, good, bad, important or trivial. For example, if the breath is the focus of attention, the aim is to simply direct attention and awareness to the breath without judging whether or not this is a good way to be breathing, or whether a different way of breathing would be better. With practice, this exercise is thought to develop a person's ability to observe their experiences without getting caught up in thinking about the possible meanings of experiences or making predictions from them (Carmody, Baer, Lykins, & Olendzki, 2009). Cancer might be associated with many potentially distressing thoughts such as: *Why me? Did I get cancer because of something I did? Did I cause it through being stressed? Or through my lifestyle? Am I making it worse through my worry?* Similarly during remission, fears of recurrence might become overwhelming. Often such questions cannot be answered and trying to resolve them can lead to extensive *rumination*, a style of repetitive evaluative thought that has been shown to exacerbate and maintain low mood (see Watkins, 2008, for review), including in breast cancer patients (Segerstrom, Stanton, Alden, & Shortridge, 2003). Metacognitive insight allows a new perspective on thinking that appears to disrupt rumination (Shapiro, Oman, Thoresen, Plante, & Flinders, 2008) and allow potentially distressing thoughts or perceptions to be experienced without overwhelming distress.

Experiential exposure. Exposure to feared stimuli is a well-established therapeutic tool as an aspect of behavioural treatment for phobias. Some authors have suggested that the same mechanism can apply to internal aversive stimuli, such as distressing emotions (Hayes, Strosahl,

& Wilson, 1999; Linehan, 1993). Metacognitive insight allows the contents of the mind, including the perception of strong emotions or pain, to be observed as experiences that change from one moment to the next, thus providing the opportunity for greater exposure to and tolerance of unpleasant internal experiences (Carmody et al., 2009). This effect has been demonstrated in a study where participants given a mindful induction were more willing to look at aversive pictures and responded with less negative affect than experimental control participants (Arch & Craske, 2006). A similar process may apply to pain, whereby the practice of deliberately focusing attention on pain and its qualities as they change from moment to moment reduces the emotional response elicited by the physical sensations, even when the pain sensations themselves are not reduced (Kabat-Zinn, 1982; Perlman, Salomons, Davidson, & Lutz, 2010). For example, individuals may experience less anxiety associated with pain whilst they remain focused on the experience of the present moment rather than anticipating future pain or trying to determine the pain's meaning (Edwards, Bingham, Bathon, & Haythornthwaite, 2006; Zeidan, Gordon, Merchant, & Goolkasian, 2010). Furthermore, there is some evidence that focusing attention on experimentally-induced pain sensations can reduce participants' subjective ratings of the pain intensity itself, which may be a consequence of reduced anxiety (Grant & Rainville, 2009; Nouwen, Cloutier, Kappas, Warbrick, & Sheffield, 2006).

Cancer patients must deal with many unpleasant experiences, both physical and psychological, at different stages of the cancer journey. Treatment can involve high levels of pain, fatigue, weakness and nausea; in remission it might be necessary to accept long-term changes in body capabilities, body sensations and body image, and in its later stages, cancer will have its own debilitating effects on the body. On a psychological level, at any point cancer patients must face the challenge of an uncertain and possibly foreshortened future, and many

aspects of the disease and its treatment may be perceived as both unpredictable and uncontrollable. By increasing experiential exposure it is possible that mindfulness training could help to make all these experiences, both physical and psychological, more tolerable.

Wise responding. Metacognitive insight, in which emotional states are experienced as transient phenomena, can bring about greater freedom to choose wise action in response to difficult situations, rather than reacting automatically without conscious intention (Carmody et al., 2009). Physical sensations might be seen as messages that something is not right, so the more we pay attention to what is happening in our bodies, the more opportunity we have to notice what nourishes the body and what does it harm, and to take action when the body indicates a need. For instance, when dealing with cancer treatments and their physical consequences, there might be temporary or longer-term changes to lifestyle that can help with recovery, such as rest, healthy eating, or gentle exercise. In the social realm, many cancer patients face the challenge of dealing with the reactions of loved ones. Learning to be more aware of emotions and resisting the automatic reactions they invite can introduce greater freedom to choose responses with preferable consequences. Brennan (2004) argues that it is the need to attend to so many simultaneous challenges in different realms (physical, psychological and social) that can be overwhelming for cancer patients and create distress. Learning to be more ‘tuned in’ to changes in emotions can create the opportunity to respond earlier and more appropriately to emotional distress, rather than allowing the distress to escalate to a level where it becomes not only impossible to ignore but also more difficult to remedy.

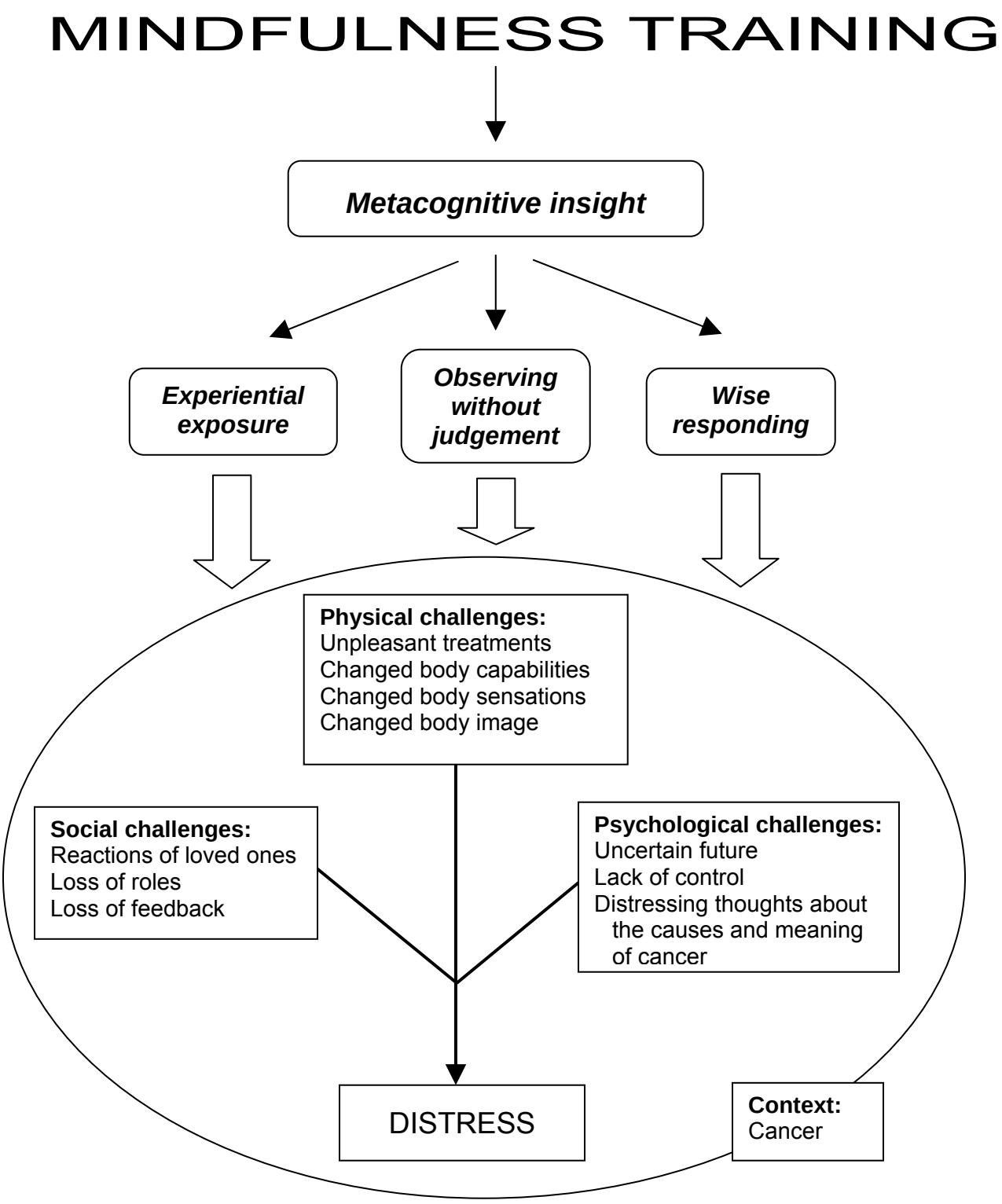

Figure 1. Diagram summarising the challenges of cancer that might be targeted by purported mechanisms of mindfulness training

Existing reviews of mindfulness-based interventions for cancer patients

A recent meta-analysis of MBSR for cancer patients (Ledesma & Kumano, 2009) concluded that MBSR is an effective intervention for the mental health of cancer patients, with a medium effect size (Cohen's $d = 0.48$). However, the analysis was limited in a number of ways. First, it did not take methodological quality into account in the inclusion criteria for the meta-analysis, other than specifying that the length of the MBSR intervention should be between 6 and 15 weeks, which puts the analysis at risk of bias (Wood et al., 2008). A meta-analysis that includes studies regardless of quality can give credence to poor quality studies and compound any errors or biases (Popay et al., 2006). The risk of bias was high because 6 out of 10 studies had no control group and therefore did not assess the true effect of the intervention beyond spontaneous change. Secondly, differences between post-treatment and pre-treatment scores from observational studies were combined with differences between groups in controlled studies to estimate one aggregate effect, thereby confounding gross and net effects of the intervention (Cook & Campbell, 1979). Thirdly, Field (2003) has argued that meta-analyses do not accurately predict population effect sizes when fewer than 20 articles are included. Fourthly, effect sizes were included from diverse outcome measures, so even if the aggregate effect size were reliable, it would be difficult to infer precisely what type of benefit mindfulness-based interventions can offer. Fifthly, because a meta-analysis must impose a narrow definition of the intervention under investigation, the review focused on MBSR and took no account of research into other mindfulness-based interventions. Finally, for the same reason, the meta-analysis included immediate post-intervention assessments only and excluded longer-term follow-ups.

Hofmann et al. (2010) published a larger meta-analysis of mindfulness-based interventions in a wide range of clinical populations and found similar, medium effect sizes on anxiety (Hedge's $g = 0.63$) and mood symptoms (Hedge's $g = 0.59$). This meta-analysis included 39 studies, of which 9 had cancer patient samples, of which 6 were uncontrolled. Again, the quality of the studies was not taken into account in the inclusion criteria. Given this quantity of studies, a meta-analytic approach to reviewing the literature on mindfulness-based interventions for cancer patients is premature.

Some narrative reviews of mindfulness-based interventions for cancer patients exist (Matchim & Armer, 2007; Ott, Norris, & Bauer-Wu, 2006), but the last systematic review to appear in a peer-reviewed journal was published in 2005 (Smith, Richardson, Hoffman, & Pilkington, 2005). This is a fast-growing field in which clinicians need to know the implications of the literature for their practice, and researchers need to understand the priorities for new studies. Therefore an updated review is merited.

Objective of the review

The aim of this review is to describe and synthesise the evidence that mindfulness-based interventions offer psychological benefit for cancer patients. In order to fully meet this objective, the review sought to answer the following questions: 1. For whom is mindfulness helpful? 2. Does it matter how the mindfulness intervention is packaged? 3. What kinds of benefits can mindfulness offer to cancer patients?

Review methods

Identification of studies

The following databases were searched for the period 1967 to May Week 1 2010: Psycinfo (Ovid), PubMed, International Bibliography of the Social Sciences, The Cochrane Library, The Cochrane Register of Trials, Cinahl (health and nursing), ASSIA (sociological abstracts) and Web of Science. The search terms used were: (*mindfulness* OR *mindfulness-based*) AND (*neoplasms* OR *oncology* OR *cancer*). In the Psycinfo database the terms *mindfulness, neoplasms* and *oncology* were searched as subject headings and as keywords. In the PubMed database, the term *neoplasms* was searched as a Medical Subject Heading (MeSH) major topic. There was no MeSH term for *mindfulness* so this was searched as a keyword, and relevant terms from the keyword index selected. The reference lists of retrieved papers were examined for further studies.

Study selection

Studies were selected for inclusion in the review if they were relevant to all three components of the review question: 1. the study population was cancer patients; 2. the intervention was described by the authors as including a *mindfulness* component; and 3. the study investigated outcomes that were psychological (e.g. distress, quality of life). Although there has been some research on the impact of mindfulness-based interventions on physical health outcomes such as immune system functioning, they were not included in this review. Qualitative studies were included.

Data extraction

The checklist in Appendix C was followed to ensure that sufficient data were extracted from each paper to provide evidence relating to the review questions.

Quality assessment

Because of the small number of studies available, all were included in the review, and efforts were made to differentiate between more or less rigorous studies in the synthesis of the data. The quality of each study was scrutinised using a list of questions derived from the Centre for Reviews and Dissemination's guidance for undertaking systematic reviews in health care (Centre for Reviews and Dissemination, 2009; see Appendix D).

Data synthesis

A quantitative meta-analysis was considered unsuitable because of the high proportion of uncontrolled studies and the considerable heterogeneity amongst studies in terms of methods, participants and interventions. Instead, the data were synthesised using a narrative approach based on guidance given by Popay et al. (2006).

Results of the review

The search of Psycinfo found 35 articles of which 16 were relevant and met the inclusion criteria. The search of PubMed produced 50 articles of which 19 were relevant, including 7 that had not been identified in the search of Psycinfo. No additional articles were found from the searches of the remaining databases. In total 23 articles were found that met inclusion criteria for the review. Two articles (Carlson, Speca, Patel, & Goodey, 2003, 2004) described the same study

with the same psychological outcome data, alongside different physiological measures. For the purposes of this review they are treated as one study. Similarly, two articles described findings from the same pilot study, of which one presented qualitative feedback from participants about the intervention (Fonteyn & Bauer-Wu, 2005) and the other presented quantitative data on outcomes (Bauer-Wu et al., 2008). Therefore the review includes 21 studies in total. Of the 20 studies with a quantitative methodology, 5 were Randomised Controlled Trials (RCTs), 3 were non-randomised controlled trials (NCTs), and 12 were uncontrolled. Two studies contained a qualitative component alongside a quantitative analysis and one used a purely qualitative methodology.

Data extracted from the articles are presented in Tables 1-3, broadly corresponding to each of the three review questions. In each table studies are divided according to design in the following categories: RCTs, NCTs, uncontrolled designs and qualitative methodology.

Synthesis

1. For whom is mindfulness helpful?

To address this question, the literature is considered regarding: a) cancer-related variables, and b) demographic variables. Data relevant to this question are presented in Table 1.

a) Cancer-related variables

No authors have suggested a priori reasons why the efficacy of mindfulness-based interventions would be expected to vary according to type of cancer and no studies specifically addressed this question. Sample sizes were small (largest $N = 130$) and therefore underpowered to make reliable group comparisons. Eight out of 20 quantitative studies included patients with a

diagnosis of breast or prostate cancer only but most, including three RCTs, had mixed diagnosis samples. There is therefore no reason at present to suggest that there are particular diagnostic groups for whom mindfulness-based interventions are not suitable, but whether these interventions are more or less suitable for particular diagnostic groups is not known.

The potential impact of cancer stage or time since diagnosis was also not addressed, but variation between study samples suggests that mindfulness-based interventions can offer benefits at different stages. Two controlled studies found benefits of MBSR specifically for women with early stage breast cancer, either soon after diagnosis (Witek-Janusek et al., 2008) or early in remission (Lengacher et al., 2009), whilst more than half of one RCT sample were diagnosed with late stage disease (Foley, Baillie, Huxter, Price, & Sinclair, 2010). Although most studies that described the treatment status of participants had samples not in active treatment, 74 of 111 participants in Monti et al.'s (2006) RCT were in active treatment, as were some patients in four uncontrolled studies (Ando et al., 2009; Bauer-Wu et al., 2008; Kieviet-Stijnen, Visser, Garssen, & Hudig, 2008; Tacon, Caldera, & Ronaghan, 2004). Of these, Kieviet-Stijnen et al. had a reasonably large sample (N = 93), however data relating to cancer treatments were reported only for the 47 participants who remained in the study at the 12 month follow-up. Overall the positive outcomes from these studies are consistent with a benefit of mindfulness training for patients in active treatment, but no studies assessed whether patients used their mindfulness skills specifically to cope with the physical challenges of treatment. Qualitative methodologies present a possibility to investigate this question without the need for large samples, but none of the three studies presenting qualitative findings reported including patients in active treatment (Brotto et al., 2008; Dobkin, 2008; 2010; Mackenzie, Carlson, Munoz, & Speca, 2007).

b) Demographic variables

No studies specifically addressed how demographic variables such as age, sex or level of education affect the benefits that mindfulness-based interventions can offer. However, biases towards particular demographic groups in the literature limit how well the findings might generalise to other demographic groups.

Of all participants in the studies included in this review, 87% were female. There is clearly a bias in the literature towards recruiting more women for mindfulness research, since 8 of 21 studies selected women only, including 3 of 5 RCTs and 2 of 3 NCTs. Even where studies were open to men as well as women, there was a skew towards more female participants (e.g. 77 and 79% women in the two RCTs open to men; 92% women in the only NCT open to men). The reason for this selection bias could be the relative ease of research access to breast cancer patients, but it is also possible that mindfulness appeals more readily to women than to men.

The average age of participants in studies of mindfulness-based interventions is 54 years and most samples had a mean age between 50 and 60. Importantly, the three largest RCTs included samples with wide age ranges (between 24 and 82 years) so there is no evidence to suggest that these interventions are not suitable or appealing for adults of different ages.

Data relating to levels of education were not described for all study samples (including 3 of 5 RCTs), but in the 14 studies where they were reported, participants had 15 years of education on average. This suggests another potential bias in the literature, towards cancer patients who are relatively highly educated. This bias could exist as a result of the level of intellectual ability required to participate in mindfulness research (e.g. to understand information about the study or to complete study questionnaires), and/or because these interventions appeal more to those with a

higher level of education. Importantly, Labelle et al. (2010) found that participants who dropped out had significantly fewer years of education than study completers.

Summary

In summary, there is no reason at present to suggest the benefits of mindfulness-based interventions are moderated by age, type or stage of cancer, time since diagnosis, or whether or not participants are in active treatment, since positive outcomes have been demonstrated with different groups. However, there is a bias in the literature towards females and individuals with a relatively high level of education, and it is not clear to what extent the differences might be due to the appeal or accessibility the approach holds for these groups.

Table 1

Sample description

Study	Sample description and study location	N at intake	N at follow-up	% female	Age	Education	Type of cancer (*n*)	Stage of cancer (*n*)	Time since diagnosis	Cancer treatment
Randomised Controlled Trials										
Foley et al. (2010)	Adult cancer outpatients (Australia)	115	107	77%	*M* = 55 *SD* = 10.6 Range: 24-78	Not reported	Mixed	I (16) II (37) III (34) IV (28)	Treatment group: *M* = 2 (*SD* = 2.6) years; Control group: M = 2 (SD = 4.1) years	Not reported
Monti et al. (2006)	Adult women with cancer (USA)	111	93	100%	*M* = 54 *SD* = 11.5 Range: 26-82	Not reported	Mixed	0 - II (57) III - IV (54)	Not reported	74 in active treatment (chemotherapy, radiation, treatment for side-effects)
Lengacher et al. (2009)	Women in remission from breast cancer (USA)	84	82	100%	*M* = 57.5 Range: 48-67	Not reported	Breast	0 - I (25) II - III (59)	All within 18 months of treatment completion (range 2 - 36 weeks)	No concurrent treatment. All had surgery with adjuvant radiation and/or chemotherapy
Speca et al. (2000)	Adult cancer outpatients (Canada)	109	90	79%	*M* = 51 Range: 27-75	*M* = 15 years of education	Mixed	I (21) II (37) III (23) IV (27) unknown (I)	Not reported	Not reported
Shapiro et al. (2003)	Women with stage II breast cancer in remission (USA)	63	54 41 49[a]	100%	*M* = 57 *SD* = 9.7 Range: 38-77	12 completed graduate school, 19 college graduates, 31 high school graduates	Breast	II	Months since end of treatment: *M* = 13, *SD* = 7, range 2 – 25	No concurrent treatment. All had surgery with adjuvant radiation and/or chemotherapy

Study	Sample description and study location	N at intake	N at follow-up	% female	Age	Education	Type of cancer (*n*)	Stage of cancer (*n*)	Time since diagnosis	Cancer treatment
Non-randomised controlled trials										
Garland et al. (2007) [b]	Adult cancer outpatients (Canada)	130	104	92%	*M* = 52 Range: 26-78	*M* = 15 years of education	Mixed	I-IV	Treatment group: *M* = 2.5 (range 0.1 to 31) years; Control group: M = 1.5 (range 0.3 to 15) year	Not reported
Labelle et al. (2010)	Adult women with cancer (Canada)	77	66	100	*M* = 53 (*SD* = 8.9)	*M* = 15 (*SD* = 2) years of education	Mixed	Not reported	*M* = 24 (*SD* = 33) months	Tamoxifen (42) or none
Witek-Janusek et al. (2008)	Women with early stage breast cancer (USA)	75	66	100%	*M* = 55 Range: 35-75	*M* = 16 years of education	Breast	0 (21) I (39) II (6)	Sample described as 'recently diagnosed' and 'at least 10 days after surgery'	None at time of study. 62 treated with breast-conserving surgery plus radiation therapy; 13 treated with surgery only
Uncontrolled studies										
Ando et al. (2009)	Adults in treatment for cancer (Japan)	28	28	86%	*M* = 60 *SD* = 9.2	Not reported	Mixed	0-II	Not reported	Chemotherapy, radiotherapy or medication
Bauer-Wu (2008); Fonteyn & Bauer-Wu (2005)	Hospitalised patients scheduled for Stem Cell Transplantation (USA)	20	15	75%	*M* = 51 *SD* = 10	50% college degree 25% higher degree	Mixed	Not reported	Not reported	Haematopoietic Stem Cell Transplantation
Birnie et al. (2009) [d]	Adults with cancer whose partners co-attended (Canada)	41	21	52%	*M* = 63 *SD* = 7	*M* = 14 (*SD* = 4) years of education	Mixed	Not reported	*M* = 2 (*SD* = 2.8) years Range 0.1 - 11.0 years	Not specified

Study	Sample description and study location	N at intake	N at follow-up	% female	Age	Education	Type of cancer (*n*)	Stage of cancer (*n*)	Time since diagnosis	Cancer treatment
Brotto et al. (2008)	Women diagnosed with acquired Female Sexual Arousal Disorder following hysterectomy (USA)	22	19	100%	*M* = 49 Range: 26-68	82% some post-secondary education	Cervical (13), Endometrial (9)	All in remission	Date of hysterectomy: *M* = 54 months before study (range 6 - 115 months).	11 receiving adjuvant oestrogen therapy
Brown and Ryan (2003)[d]	Adult early-stage cancer outpatients (Canada)	58	41	34%	*M* = 55 *SD* = 10	*M* = 15 (*SD* = 3) years of education	Breast (32), prostate (9)	I (14) and II (26)	*M* = 2 (*SD* = 2.2) years Range 0.4 - 10.0 years	None
Carlson and Garland (2005)	Adult cancer outpatients (Canada)	63	63	78%	*M* = 54 Range: 32-78	*M* = 16 years of education	Mixed	Not reported	Not reported	Not reported
Carlson et al. (2003, 2004)	Adult cancer outpatients (Canada)	59	42	83%	*M* = 55 *SD* = 11	*M* = 15 years of education	Breast (49), prostate (10)	I (21) II (38)	*M* = 2 (*SD* = 3.0) years Range 3 months - 20 years	Tamoxifen (17) or none
Carlson et al. (2007)	One-year follow-up of Carlson et al.'s (2003, 2004) sample	59	31	As above	As above	As above	As above	As above	As above	As above
Carlson et al. (2001)[d]	Six-month follow-up of Speca et al.'s (2000) sample	89	54	81%	*M* = 51 *SD* = 9	*M* = 15 (*SD* = 3) years of education	Mixed	I (12) II (18) III (14) IV (10)	*M* = 3.7 (*SD* = 5.7) years	Not reported

Study	Sample description and study location	N at intake	N at follow-up	% female	Age	Education	Type of cancer (*n*)	Stage of cancer (*n*)	Time since diagnosis	Cancer treatment
Dobkin (2008)	Women in remission from breast cancer (Canada)	13	13	100%	*M* = 54 Range: 34-70	11 university degrees	Breast	In remission	1-2 years since treatment completion	None
Kieviet-Stijnen et al. (2008)[d]	Adult cancer outpatients (The Netherlands)	93	77 47[c]	72%	*M* = 48 Range: 31-65	Not reported	Mixed	Not reported	<1 year (18), 1 - 2 years (8), >2 years (11), missing (3)	Hormonal (8) Chemotherapy (8) Radiotherapy (3) Other (3) Alternative / complementary (10) None (15)
Tacon et al. (2004)	Women with breast cancer (USA)	27	27	100%	*M* = 53 Range: 30-75	68% education beyond high school	Breast	Localised (23) Metastatic (4)	<1 year (4), 1-2 years (15), 3-5 years (8)	3 undergoing invasive treatment, 24 on oral medication
Qualitative study										
Mackenzie et al. (2007)	Adult cancer outpatients attending long-term MBSR (Canada)	9	9	78%	*M* = 61 Range: 43-77	Not reported	Mixed	Not reported	*M* = 8 years Range 4 – 31 years	Not reported

Note. [a]Numbers refer to size of sample assessed at post-intervention, 3-month and 9-month follow-ups respectively. [b]Demographic information provided for post-intervention sample only. [c]Numbers refer to size of sample assessed at post-intervention and 1-month follow-ups respectively. [d]Demographic information provided for final sample only.

2. Does it matter how the mindfulness intervention is packaged?

To address this question, the literature is considered regarding five variables relating to the implementation of mindfulness-based interventions: a) the number and length of sessions; b) the amount of time participants spent practising mindfulness independently; c) the format and setting; d) the qualifications of facilitators, and e) the content of the intervention. Data relevant to this question are presented in Table 2.

a) Number and length of sessions

No studies specifically assessed the impact of number or length of sessions of mindfulness training offered. Although many studies report some data on attendance rates, only two papers reported the effects of attendance on outcomes, and results were inconclusive. Carlson et al. (Carlson et al., 2003, 2004) found no significant effects, whilst Speca, Carlson, Goodey and Angen (2000) reported a positive *r* value for the association between attendance and symptoms of stress, yet interpreted the result as indicating a greater reduction in stress symptoms with more sessions attended. It is not clear whether the discrepancy is due to a misprinting of the statistic or a misinterpretation.

In Kabat-Zinn's original MBSR programme (Kabat-Zinn, 1990), the intervention consists of 8 weekly sessions of 2.5 hours and a full day (7 hour) retreat between weeks 6 and 7, but researchers have varied the number and length of sessions without explanation, even when the intervention is described as *MBSR*. For instance, only two of five RCTs gave participants the full 8 sessions (Foley et al., 2010; Monti et al., 2006). Lengacher et al.'s (2009) study offered participants only 6 sessions and still found positive outcomes, suggesting 6 sessions are adequate.

However, because studies measured different outcomes, it is not possible to directly compare studies to assess whether or not a greater number of sessions yields greater benefit. Ando et al.'s (2009) pilot study with Japanese cancer outpatients gave participants only one 30-60 minute session of mindfulness training, with instructions to practise daily for 2 weeks. Even this small dose of mindfulness training was associated with a reduction in anxiety and depression symptoms, however average scores were not clinically significant before the intervention, and in the absence of a control group the change could have been spontaneous. In Fonteyn and Bauer-Wu's (2005) qualitative interviews, some participants reported a preference for sessions with a mindfulness teacher over practising meditation guided by a CD, suggesting that this aspect of the intervention is valued by participants.

b) Time spent practising mindfulness

More studies (including three RCTs) reported the relationship between home practice and outcomes than between attendance and outcomes, although results were similarly ambiguous. Lengacher et al. (2009) found that time spent practising was associated with reduced stress and improved physical functioning, but lower levels of optimism; Speca et al. (2000) reported an association with decreased mood disturbance, but not with change in symptoms of stress; one study found an association of informal (but not formal) mindfulness practice with a *sleep refresh* measure but not sleep efficiency or quality (Shapiro, Bootzin, Figueredo, Lopez, & Schwartz, 2003), whilst another found all outcomes to be independent of home practice, both post-intervention and one year later (Carlson, Speca, Faris, & Patel, 2007; Carlson et al., 2003, 2004).

c) Format and setting

The majority of studies, including all controlled studies, delivered the mindfulness-based intervention in a group format as in Kabat-Zinn's original MBSR programme, but three pilot studies demonstrated feasibility of an individual format (Ando et al., 2009; Bauer-Wu et al., 2008; Brotto et al., 2008). Similarly, whilst most interventions were delivered in outpatient settings, one pilot study used quantitative and qualitative data to endorse the feasibility of delivering a mindfulness-based intervention in an inpatient setting (Bauer-Wu et al., 2008). However, as the authors of this study say, it will require further research with a control group to assess the effectiveness of the approach, and such a study is underway (ClinicalTrials.gov, May 23, 2005).

Foley et al. (2010) adapted the format of MBCT sessions to accommodate patients in active treatment, dividing weekly classes into two 1-hour sessions and suggesting shorter periods of home practice. Carers were also invited to participate in classes and 32% accepted. No pilot work was described as a basis for making these adaptations, and no assessment was made of how successful or important the changes were for improving accessibility or effectiveness of the intervention. Birnie, Garland and Carlson (2009) found benefits for partners of cancer patients when they were invited to participate in MBSR groups in their uncontrolled study, but high attrition in this study increases the possibility of bias.

d) Qualification of facilitators

For the half of all papers in which facilitators were mentioned, most were described as trained and experienced in delivering MBSR, but generally without much detail. A variety of professions were represented in the role of mindfulness teacher, including nurses, psychologists,

a chaplain and a clinical social worker. All three RCTs that described their facilitators had a single teacher for all groups, so influence of therapist factors on outcome could not be assessed. In Foley et al.'s (2010) RCT for instance, all 14 groups were facilitated by Elizabeth Foley who is described as having more than a decade of personal mindfulness practice, training in delivering MBCT and MBSR, and experience of facilitating more than 15 mindfulness groups. In the case of Monti et al.'s (2006) study of mindfulness-based art therapy, the facilitator was trained in both MBSR and art therapy. If this level of training and experience is necessary to effectively deliver mindfulness-based interventions, patient access is likely to be limited.

e) Content of intervention

The MBSR programme uses 1) theoretical material related to meditation and the body-mind connection, 2) experiential practice of formal meditation during classes and at home, and 3) group reflection on mindfulness practice. According to Kabat-Zinn's (1990) recommendations, the formal meditations include a body scan meditation, mindfulness of breathing, hatha yoga, and sitting meditations that involve wider awareness of body sensations, sounds, thoughts and feelings, or no particular object. Participants are encouraged towards the end of the programme to choose their own practice depending on what they find most useful, with a view to continuing practice in the long term. Witek-Janusek et al.'s (2008) NCT was the only study that claimed to use an intervention described as MBSR based on Kabat-Zinn's programme without adaptations. Carlson and colleagues, whose research group based in Calgary in Canada published 9 of 21 studies in this review, referenced Speca et al.'s (2000) MBSR programme. This programme was described as specifically adapted for cancer patients on the basis of the clinical context and on feedback from patients in a pilot programme, and was most recently described as *Mindfulness-*

Based Cancer Recovery (Labelle et al., 2010). Shapiro et al. (2006) reported the addition of cognitive-behavioural coping tools to the MBSR programme but did not describe them, and Lengacher et al. (2009) labelled their intervention adapted for breast cancer patients as *MBSR(BC)* but despite a fairly detailed description of the programme it is not clear how it differed significantly from the original MBSR programme except for the smaller number of sessions. No studies evaluated whether or not their adaptations brought additional benefits to participants.

Foley et al.'s (2010) RCT was the only study evaluating MBCT as an intervention for cancer patients. They described including didactic information specific to the challenges commonly associated with cancer such as anxiety, depression, and pain. The positive outcomes from their study suggest that MBCT as well as MBSR can benefit cancer patients.

Monti et al.'s (2006) innovative intervention is unique in the literature, incorporating art therapy with MBSR to create *Mindfulness-Based Art Therapy* (MBAT). The authors describe this intervention as following a standardised format and agenda described in an unpublished manual, and as "intended to integrate verbal and non-verbal modes of information processing for the purpose of facilitating healthful self-regulation" (Monti et al., 2006, p.365). The programme was described thoroughly and appears to include many of the basic elements of MBSR with the addition of art tasks in which participants are directed to explore present moment experience. Through combining two forms of therapy, it is difficult to distinguish which part of the intervention had the most impact, or whether the art tasks added any advantages beyond those associated with MBSR.

Brotto et al.'s (2008) description of a psychoeducation programme for women with acquired Female Sexual Arousal Disorder following hysterectomy was the only intervention that did not

cite MBSR as an influence. The mindfulness component was not well described other than citing *The Miracle of Mindfulness* by Hahn (1976) as a source. The extent to which the benefits women took from this complex intervention can be attributed to the mindfulness component cannot be known, but the authors cite qualitative interviews in which participants reported that mindfulness helped them to 'tune in' to remaining genital arousal following surgery.

Summary

In summary, there is insufficient evidence to conclude whether there is an impact of number and length of sessions, amount of time spent practising mindfulness, qualification of facilitators, or specific content of interventions on the effects of mindfulness-based interventions for cancer patients. There is encouraging evidence that it is feasible to deliver mindfulness-based interventions in inpatient settings and in an individual format, and further research is underway to assess the effectiveness of these interventions more rigorously.

Table 2

Intervention details.

Study	Intervention content	Format	Number and length of sessions	No. sessions attended	Home practice directions	Home practice compliance	Facilitator(s)
Randomised controlled trials							
Foley et al. (2010)	*MBCT*: Based on Segal et al.'s (2002) programme, modified for cancer patients to include didactic information specific to cancer and graded practice for body scan. Carers invited (32% participated).	Group	8 weekly classes each divided into 2 x 1 hr sessions	≥ 6	Up to 1hr daily	*Post-intervention: M* = 30 min (*SD* = 11.8) daily. *3 months*: 34/49 regular practice; 17/49 occasional practice.	Facilitator described as trained and highly experienced in delivering MBCT
Monti et al. (2006)	*Mindfulness-Based Art Therapy (MBAT)* Followed standardised unpublished manual. Includes elements of MBSR and art tasks.	Group	8 x weekly 2.5 hr sessions	*M* = 5 (*SD* = 2.6)	30 min daily	Not reported	Registered art therapist / MBSR instructor
Lengacher et al. (2009)	*MBSR:* Based on Kabat-Zinn's programme, modified by study authors.	Group	6 x weekly 2 hr sessions	34/40: ≥ 4	15-45 min formal, 15-45 min informal practice per day	28/40: ≥75% homework assigned	Psychologist certified and trained in MBSR
Speca et al. (2000)	*MBSR*: Based on Kabat-Zinn's programme adapted by the authors. Included: 1. theoretical material; 2. experiential practice, and 3. group process (support).	Group	7 x weekly 1.5 hr sessions	*M* = 6 (*SD* = 1.0)	Time period not specified	*M* = 30 min daily	Not reported
Shapiro et al. (2003)	*MBSR:* Based on Kabat-Zinn's programme, modified by study authors to include didactic material on stress and cognitive-behavioural coping tools.	Group	6 x weekly 2 hr sessions and one 6 hr silent retreat	2/30: 4, 24/30: ≥ 4	Not reported	Data used in analyses but not reported	Not reported

Study	Intervention content	Format	Number and length of sessions	No. sessions attended	Home practice directions	Home practice compliance	Facilitator(s)
Non-randomised controlled trials							
Garland et al. (2007)	*MBSR*: Based on Kabat-Zinn's programme adapted by programme leaders	Group	8 x weekly 1.5 hr sessions plus 3 hr silent retreat	Not reported	45 min daily	Not reported	All instructors trained and experienced in teaching MBSR
Labelle et al. (2010)	*MBSR*: Based on Kabat-Zinn's programme adapted by Speca et al. (2000)	Group	8 x weekly 1.5 hr sessions plus 6 hr silent retreat	*M* = 8	45 min 6 days a week	*M* = 73.3%	Not reported
Witek-Janusek et al. (2008)	*MBSR*: Based on Kabat-Zinn's programme	Group	8 x weekly 2.5 hr sessions plus full day session	27/38: 7-8 10/38: 5-6 1/38: 4	Time period not specified	Not reported	Clinical psychologist trained in MBSR
Uncontrolled studies							
Ando et al. (2009)	Modified *MBSR* Includes yoga and breathing meditation	Individual	Single session 30-60 min	Not reported	Daily practice for 2 weeks	Not reported	Nurse or clinical psychologist with ≥ 3 hr training
Bauer-Wu (2008); Fonteyn & Bauer-Wu (2005)	Based on *MBSR* adapted for individual format Includes guided exercises and affirmations	Individual	Instruction 1 or 2 times per week, approx. 30 min	79% 'completed intervention'	17 min daily	95% practised 3 times per week, 55% practised 'every day or nearly every day'	Registered nurses, psychologist, chaplain, trained in MBSR
Birnie et al. (2009)	*MBSR,* following description in Speca et al. (2000)	Group	8 x weekly 1.5 hr sessions plus 6 hr weekend silent retreat	≥ 6	Not specified	Not reported	Not reported
Brotto et al. (2008)	Embedded in psychoeducational intervention for acquired Female Sexual Arousal Disorder following hysterectomy Mindfulness component not fully described	Individual	3 sessions, 1 hr each, 4 weeks apart	19 / 22: all	5-7 hrs per month	Homework compliance rated 82-90% average	Not reported

Study	Intervention content	Format	Number and length of sessions	No. sessions attended	Home practice directions	Home practice compliance	Facilitator(s)
Brown and Ryan (2003)	*MBSR*: Based on Kabat-Zinn's programme adapted by Speca et al. (2000)	Group	8 x weekly 1.5 hr sessions plus 3 hr silent retreat	41 / 58 'completed intervention'	Not specified	Not reported	2 clinical psychologists, 1 clinical social worker, experienced in MBSR
Carlson & Garland (2005)	*MBSR*: Based on Kabat-Zinn's programme adapted by Speca et al. (2000)	Group	8 x weekly 1.5 hr sessions plus 3 hr silent retreat	5-8	45 min 6 days a week	Not reported.	2 clinical psychologists, 1 clinical social worker
Carlson et al. (2003, 2004)	*MBSR*: Based on Kabat-Zinn's programme as described by Speca et al. (2000), adapted further to be more consistent with Kabat-Zinn's format.	Group	8 x weekly 1.5 hr sessions plus 3 hr silent retreat between weeks 6 and 7	*M* = 8 2/42: <7	Daily	*M* = 24 min/day meditation and 13 min/day yoga	Not reported
Carlson et al. (2007)	See Carlson et al. (2003, 2004)	Group	See Carlson et al. (2003, 2004)	See Carlson et al. (2003, 2004)	See Carlson et al. (2003, 2004)	*6 months*: (*N* = 31): *Mdn* 7.4 hr/month. *12 months*: (*N* = 30): *Mdn* 5.6 hr/month.	See Carlson et al. (2003, 2004)
Carlson et al. (2001)	See Speca et al. (2000)	Group	See Speca et al. (2000)	See Speca et al. (2000)	See Speca et al. (2000)	Data not collected on continued practice at 6 month follow-up	See Speca et al. (2000)
Dobkin (2008)	Described as *MBSR* - no details given	Group	Not specified	Not reported	Not specified	*1 month*: 11/13 practising, 5 daily, 6 ≥3 times per week	Not reported
Kieviet-Stijnen et al. (2008)	*MBSR*: Based on Kabat-Zinn's programme with added cognitive elements e.g. 3 min breathing space	Group	8 x weekly 1.5 hr sessions plus 8 hr silent retreat	Not reported	45 min daily	Not reported	Two therapists, one trained in MBSR
Tacon et al. (2004)	*MBSR*: Based on Kabat-Zinn's programme, adapted for cancer patients e.g. teaching participants to use mindfulness techniques during procedures / treatment for cancer	Group	8 x weekly 1.5 hr sessions	Not reported	Daily	*Post-intervention:* not reported. *3 months*: 24/27 practising. 13 ≥5 times; 7 approx. 3 times; 4 <3 times per week.	Not reported

Study	Intervention content	Format	Number and length of sessions	No. sessions attended	Home practice directions	Home practice compliance	Facilitator(s)
Qualitative study							
Mackenzie et al. (2007)	*MBSR*: Based on Kabat-Zinn's programme	Group	Weekly drop-in group for 1-6 years	Attendance described as regular	Not reported	Not reported	Not reported

3. What kinds of benefit can mindfulness offer to cancer patients?

To address this question, the literature is considered regarding: a) outcome variables, and b) process variables. Data relevant to this question are presented in Tables 3a-c.

a) Outcome variables

Mindfulness-based interventions were associated with reductions in both depressive and anxiety symptoms compared with waiting-list control groups in 2 RCTs (Foley et al., 2010; Lengacher et al., 2009). Foley et al.'s finding on depression was particularly convincing because there was a high level of depression in the sample at baseline, a large effect was demonstrated (*d* = 0.83) according to Cohen's (1988) criteria, and improvements were maintained after 3 months. One NCT found a reduction in depressive symptoms following MBSR compared with a waiting-list control group (Labelle et al., 2010) although symptoms were significantly higher in the treatment group at baseline and similar across groups at follow-up. Three small uncontrolled studies reported reductions in depressive symptoms (Ando et al., 2009; Bauer-Wu et al., 2008; Tacon et al., 2004), and no studies reported contradictory findings. All studies used self-report, time-limited measures (e.g. asking only about symptoms experienced in the previous week) and none were diagnostic. Monti et al.'s (2006) RCT found lower levels of *distress* in cancer patients following MBAT compared with a waiting list control group, but patients with a current mood disorder were excluded from this study. In terms of more cancer-specific anxiety, Lengacher et al. found reduced fear of recurrence in their sample of breast cancer survivors following MBSR(BC) relative to a waiting list control group.

The Symptoms of Stress Inventory (Leckie & Thompson, 1979) is a self-report measure that assesses physiological, behavioural and cognitive symptoms of stress. The Calgary research group used this measure in most of their studies and more recently published their own shorter version (Carlson & Thomas, 2007). Significant reductions in stress symptoms were reported in one RCT (Speca et al., 2000), one NCT (Garland, Carlson, Cook, Lansdell, & Speca, 2007) and three uncontrolled studies (Brown & Ryan, 2003; Carlson & Garland, 2005; Carlson et al., 2003, 2004). In two studies these benefits were maintained over a follow-up period of 6 months (Carlson, Ursuliak, Goodey, Angen, & Speca, 2001) or one year (Carlson et al., 2007) but with no control group at follow-up. Tacon et al. (2004) also reported reduced stress on a single item scale following MBSR. However, Birnie et al. (2009) found no significant change in stress symptoms in their uncontrolled study of cancer patients and their partners.

The Calgary research group also used an assessment tool that measures transient mood states, the Profile of Mood States (Shacham, 1983), as a primary outcome measure in most of their studies, with mixed results. Speca et al.'s (2000) RCT found that overall mood disturbance decreased following MBSR relative to a waiting list control group, but drop-outs had higher mood disturbance at baseline than participants who remained in the study. The benefits appeared to be maintained after 6 months (Carlson et al., 2001), but there was no comparison group at follow-up. Similarly, one NCT (Garland et al., 2007) and two uncontrolled studies (Birnie et al., 2009; Carlson & Garland, 2005) found significant improvement in mood disturbance following MBSR, but note that low mood disturbance in Birnie et al.'s sample at all time points diminishes generalisability. Null findings were reported post-intervention in three uncontrolled studies (Brown & Ryan, 2003; Carlson et al., 2003, 2004; Kieviet-Stijnen et al., 2008), and although Kieviet-Stijnen et al. reported improvements one year later, mindfulness practice was not

measured in the follow-up period so in the absence of a control group this result is difficult to interpret.

Kabat-Zinn (1990, p.1) states that MBSR was designed to help participants “move toward greater levels of health and wellbeing”. Consistent with this aim, a number of studies have found significant improvements in quality of life following mindfulness-based interventions, including two RCTs (Lengacher et al., 2009; Monti et al., 2006), one NCT (Witek-Janusek et al., 2008) and three uncontrolled studies (Brotto et al., 2008; Carlson et al., 2003, 2004; Kieviet-Stijnen et al., 2008). In Carlson et al.’s sample, the increase in quality of life was lost at 6 months and seemingly recovered at 12 months (Carlson et al., 2007), however, drop-outs reported lower quality of life than those remaining in the study and this was not accounted for in the analysis. On other positive outcome measures, Garland et al. (2007) found that MBSR was associated with an increase in spirituality and post-traumatic growth, whereas Lengacher et al.’s (2009) RCT found no impact on spirituality or optimism, and Kieviet-Stijnen et al. (2008) reported an increase in *joy in life* following MBSR in their uncontrolled study.

Evidence of mindfulness-based interventions having an impact on physical outcomes was limited. Shapiro et al. (2003) concluded from their RCT that MBSR is a promising intervention to improve the quality of sleep in women with breast cancer. However, this conclusion may not be merited since sleep quality improved an equivalent amount in a comparison intervention group where participants were given a stress management workbook with no formal instruction. Furthermore, neither intervention led to any changes in sleep efficiency. Interpretation is further complicated by the fact that baseline assessments were made post-randomisation, and significant differences were found between groups in the outcome measures at baseline, effectively recasting this study as a non-equivalent groups design. In an uncontrolled study Carlson and Garland

(2005) found that sleep quality and fatigue significantly improved following MBSR, but again this cannot be attributed to the intervention in the absence of a control group, particularly as their sample had unusually high levels of sleep disturbance at baseline, which makes regression to the mean a plausible explanation. There were provisional suggestions from uncontrolled studies that mindfulness-based interventions could offer benefits for improving perceived physical symptoms (Kieviet-Stijnen et al., 2008), pain (Bauer-Wu et al., 2008) and sexual dysfunction (Brotto et al., 2008), but larger, controlled studies are required to validate these findings.

b) Process variables

Only one study tested a mediation model in cancer patients: Labelle et al. (2010) demonstrated that changes in rumination mediated the impact of MBSR on depressive symptoms, a finding that supports the validity of the mechanism *observing without judgement* as described in the introduction to this review. Increases in mindfulness (Birnie et al., 2009; Dobkin, 2008; Foley et al., 2010; Labelle et al., 2010) and no change (Brown & Ryan, 2003; Witek-Janusek et al., 2008) were reported, with only one study demonstrating an association between mindfulness and outcomes (Brown & Ryan, 2003) and another demonstrating no association (Labelle et al., 2010).

Some authors investigated the impact of mindfulness-based interventions on other potentially mediating variables with similarly inconclusive results. Witek-Janusek et al. (2008) found only one of eight coping styles – optimistic coping – changed significantly following MBSR, and interpreted this result as suggesting that MBSR specifically gives participants a more positive outlook on their experience of cancer. However, this post hoc interpretation of an isolated finding is questionable without an a priori reason for expecting mindfulness-based interventions to lead to greater optimism. Carlson et al.'s (2003; 2004) finding that participants

reported less caffeine intake and more exercise following MBSR could relate to the purported mechanism *wise responding*. Similarly, a small uncontrolled study (Tacon et al., 2004) found an increase in internal locus of control and a reduction in chance locus following MBSR, suggesting that participants felt able to take more responsibility for their own health. These are interesting preliminary findings that would need replicating in larger controlled studies.

Grossman (2008) argued for the use of qualitative methodologies in the early stages of understanding therapeutic mechanisms because they limit the risk of prematurely narrowing researchers' understanding of what mindfulness is and what it does. Mackenzie et al. (2007) interviewed cancer outpatients who attended weekly mindfulness groups over an extended period (1-6 years), and were therefore not representative of cancer patients who take part in a 6-8 week course of mindfulness-based therapy, but were selected to be information-rich. The authors identified five major themes from the data: *opening to change*, *self-control*, *shared experience*, *personal growth*, and *spirituality*. It is interesting to consider that the social aspect of taking part in a group – a factor not specific to mindfulness-based interventions – might carry a significant proportion of the therapeutic effect. The theme *opening to change* might map onto the concept of *experiential exposure* as described in the introduction to this review paper, whilst *self-control* might be similar to *wise responding*. Similar themes were found in Dobkin's (2008) study in which participants had only recently taken part in their first mindfulness group. These themes similarly reflected purported mechanisms: *acceptance* (similar to *experiential exposure*), *self-care* (similar to *wise responding)*, *control*, and *awareness* (similar to *metacognitive insight*). Tacon et al. (2004) reported qualitative feedback from mindfulness participants which suggested that many women with breast cancer preferred yoga exercises to sitting meditation exercises because they helped to improve flexibility and comfort in the upper body and arms.

Summary

In summary, there is reasonably good evidence that mindfulness-based interventions can lead to improvements in depression and anxiety as well as more broadly-defined constructs of distress or stress symptoms. More mixed results have been found for a measure of transient mood states. Amongst positive outcome measures, there is reasonably good evidence that mindfulness-based interventions can lead to improved quality of life, but on other measures of positive psychological wellbeing the evidence is inconclusive. There is not yet sufficient evidence to determine whether or not mindfulness-based interventions can have a positive impact on physical symptoms such as sleep or pain for cancer patients. With respect to process variables, one promising finding supports rumination as a mediator, but overall it is not clear how mindfulness-based interventions are producing their effects on outcomes, since even measures of mindfulness did not consistently change post-intervention. Qualitative studies identified some themes that are consistent with the theoretical mechanisms by which mindfulness-based interventions are intended to offer psychological benefits to cancer patients.

Table 3a.

Outcomes (controlled trials)

Study	Design	n_m	n_c	Control group	Outcome measures	Findings (effect sizes in parentheses where available)
Randomised-controlled trials						
Foley et al. (2010)	RCT plus 3 month follow-up (intervention group only)	55	60	Waiting-list	HAM-D, HAM-A, DASS, FACT-G, FMI.	Significant improvements in depression (0.83), anxiety (0.59) and distress (0.53) in MBCT group compared with control group. Quality of life improved at level of a trend (0.30). Mindfulness increased in MBCT group compared with control group (0.55). Treatment gains maintained at 3 month follow-up.
Monti et al. (2006)	RCT plus 8 week follow-up (intervention group only)	56	55	Waiting-list	SCL - 90-R, SF-36.	Psychological distress decreased and mental-health related quality of life increased over the 8 week course in the MBAT intervention group compared with the control group. Treatment gains maintained at 16 week follow-up.
Lengacher et al. (2009)	RCT	41	43	Waiting-list	CARS, STAI, CES-D, Life Orientation Test (optimism), PSS, SF-36, MOS Social Support Survey, Spirituality (2 Likert items).	Significant reductions in fear of recurrence, anxiety, and depression, and significant improvement in quality of life, in MBSR group compared with control group. No significant changes found in social support, optimism, perceived stress or spirituality. More home practice was associated with greater reduction in perceived stress (r = 0.33), but lower optimism (r = -0.32).
Speca et al. (2000)	RCT	53	37	Waiting-list	POMS, SOSI.	Significant improvements in total mood disturbance (0.83)[a] and symptoms of stress (0.61)[a] in the MBSR group compared with the control group. More home practice was associated with greater reduction in mood disturbance (r = -0.39). [Change in SOSI scores appears to be positively correlated (r = 0.30) with number sessions attended, but authors interpret as a negative effect.]
Shapiro et al. (2003)	RCT plus 3 and 9 month follow-ups	31	32	*Freely Choose:* Stress management workbook. No formal training or instruction.	POMS, BDI, PENN, STAI, FACIT-B, SCI, SOC. SLEEP DIARY: sleep efficiency (time asleep divided by time in bed); sleep quality and sleep refresh (10 point rating scales).	Both groups improved on the sleep quality and sleep refresh measures but not on sleep efficiency. No differences between MBSR and FC groups on any sleep-related variables. No relationship between mindfulness practice and sleep efficiency or sleep quality. Significant interaction between informal mindfulness practice and time on the sleep refresh measure.

Study	Design	n_m	n_c	Control group	Outcome measures	Findings (effect sizes in parentheses where available)
Non-randomised controlled trials						
Garland et al. (2007)	Nonequivalent Groups Pretest-Posttest Design	60	44	*Healing Arts Programme.* 6 x 2 hr weekly sessions plus homework	PTGI-R, FACIT-Sp, SOSI, POMS	Post-traumatic growth increased following both interventions (no significant difference between groups). Spirituality (0.34) [a], perceived stress (0.25) [a] and mood disturbance (0.34) [a] all improved significantly in the MBSR group compared with the HA group.
Labelle et al. (2010)	Nonequivalent Groups Pretest-Posttest Design	46	31	Waiting-list	CES-D, MAAS, RRQ – rumination subscale	Intention to treat analysis with imputed scores for drop-outs post-intervention: depressive symptoms (0.67) and rumination (0.62) decreased and mindfulness increased (0.38) in the MBSR group compared with the control group. Rumination but not mindfulness mediated the effect of MBSR on depressive symptoms.
Witek-Janusek et al. (2008)	Nonequivalent Groups Pretest-Posttest Design plus 1 month follow-up	44	31	Assessment only	Quality of Life Index Cancer Version III, JCS, MAAS	Quality of life improved on 2 (*psychological-spiritual* and *family*) out of 4 domains in the MBSR group compared with the control group. Of 8 coping styles assessed, only *optimistic coping* increased in the MBSR group more than the control group. Mindfulness did not change or differ between groups.

Note. n_m = no. participants in mindfulness intervention group; n_c = no. participants in control group; Ham-D = Hamilton Depression Scale; Ham-A = Hamilton Anxiety Scale; DASS = Depression, Anxiety, Stress Scale - short form; FACT-G = Functional Assessment of Cancer Therapy – General; FMI = Frieburg Mindfulness Inventory (short form); SCL-90-R = Symptom Checklist-90 revised; PSS = Perceived Stress Scale; SF-36 = Medical Outcomes Survey Short Form-36 (measures quality of life); CARS = Concerns About Recurrence Scale; State-Trait Anxiety Inventory; CES-D = Center for Epidemiological Studies Depression Scale; MOS = Medical Outcomes Survey; POMS = Profile of Mood States; SOSI = Symptoms of Stress Inventory; CES-D-10 = Center for Epidemiological Studies Depression Scale – 10 items; MAAS = Mindful Attention Awareness Scale; RRQ = Rumination-Reflection Questionnaire; BDI = Beck Depression Inventory; PENN = Penn State Worry Questionnaire; FACIT-B = Functional Assessment of Cancer Treatment – Breast; SCI = Shapiro Control Inventory; SOC = Sense of Coherence. PTGI-R = Post-traumatic growth inventory revised; FACIT-Sp = Functional Assessment of Chronic Illness Therapy – Spirituality; JCS = Jalowiec Coping Scale. [a]Effect size calculated from data given in paper.

Table 3b. Outcomes (uncontrolled quantitative studies)

Study	Design	Outcome measures	Findings
Ando et al. (2009)	One-group Pretest-Posttest Design	HADS, FACIT-Sp: Meaning of Life Domain, Caregiving Consequence Inventory: Appreciation Domain, Benefit Finding Scale: Psychological Growth, 10-point rating scales of physical symptoms / pain	Anxiety and depression significantly decreased. No significant changes on any other outcome measures.
Bauer-Wu (2008); Fonteyn and Bauer-Wu (2005)	One-group Longitudinal Design 6 time-points: pre-transplant, days 2 and 10 of admission, discharge, 30 and 100 days after discharge	VAS (comfort, anxiety, mood, pain) before and after each session with instructor, HADS, SES, Qualitative interviews	Feasibility: 79% completed intervention. Efficacy: significant improvements on relaxation, comfort, pain and happiness (VAS); improvements in anxiety and depression. Qualitative data suggested some modifications for planned RCT e.g. adding an attention control condition, providing more than one track on CD.
Birnie et al. (2009)	One-group Pretest-Posttest Design	POMS, C-SOSI, MAAS	Significant improvement in mood disturbance and increase in mindfulness in both patients and partners. No significant change in overall stress symptoms.
Brotto et al. (2008)	One-group Pretest-Posttest Design	FSFI, FSDS, BDI , SF-36, Qualitative interviews	Significant improvements in sexual functioning and distress, depression, and quality of life. Qualitative data suggest 'mindfulness' exercises helped women to 'tune in' to remaining genital arousal after surgery.
Brown & Ryan (2003)	One-group Pretest-Posttest Design	POMS, C-SOSI, MAAS, EORTC QLQ	Significant improvement in stress; no overall improvement in mood disturbance or mindfulness. Greater mindfulness was associated with lower mood disturbance and stress (before and after intervention), and increase in mindfulness was associated with decrease in these outcomes, after controlling for pain and fatigue.
Carlson & Garland (2005)	One-group Pretest-Posttest Design	PSQI, SOSI, POMS	Significant improvements in sleep quality, stress, mood disturbance and fatigue.
Carlson et al. (2003, 2004)	One-group Pretest-Posttest Design	Health Behaviors Form, EORTC QLQ-C30, POMS, SOSI	Significant improvements in health behaviours (sleep quality, caffeine intake, exercise), stress, and quality of life. These changes were not correlated with mindfulness practice or session attendance. No change in mood disturbance.
Carlson et al. (2007)	6 and 12 month follow-ups of Carlson et al. 2003, 2004 sample	EORTC QLQ-C30, POMS, SOSI	Reduction in stress symptoms maintained at 1 year, independent of home practice. Improvements in quality of life lost at 6months, regained at 12months. No change in mood over 12 months.
Carlson et al. (2001)	6 months follow-up of Speca et al., 2000 sample	POMS, SOSI	Improvements in mood disturbance and stress had not declined at 6 months follow-up.

Study	Design	Outcome measures	Findings
Dobkin (2008)	One-group Pretest-Posttest Design	CES-D, MSCL, PSS, CHIP, Orientation to Life Questionnaire, MAAS, Qualitative focus group 1 month after last class	Significant improvement in stress and increase in mindfulness. Effect sizes suggest changes on depression and MSCL but sample size too small to achieve statistical significance. Qualitative data suggests themes of acceptance, self-care, control and awareness.
Kieviet-Stijnen et al. (2008)	One-group Longitudinal Design (12 months follow-up)	VAS: overall quality of life, RSCL, POMS, HDI ('joy in life subscale'), 'Experienced meaning in life' (4 questions developed by authors)	Significant improvements post-intervention in quality of life, joy in life, and physical symptoms, but no significant changes in meaning of life or total mood disturbance. At 1 year follow-up, improvements were maintained and mood disturbance had also significantly decreased. Continued mindfulness practice was not assessed in the follow-up period.
Tacon et al. (2004)	One-group Pretest-Posttest Design	Stress (single item scale 1-10), STAI, MAC, MHLC, Qualitative measures of preferences for different components of MBSR	Improvements in stress and state anxiety. Adjustment: Improvements in helplessness-hopelessness and anxious preoccupation; no significant change in fighting spirit or fatalism. Locus of control: increased internal locus less 'chance', no change in 'powerful others'. More than 50% preferred yoga because of improved flexibility and comfort in upper body and arms.

Note. HADS = Hospital Anxiety and Depression Scale; FACIT-Sp = Functional Assessment of Chronic Illness Therapy – Spirituality; VAS = Visual Analogue Scale; SES = Symptom Experience Scale; POMS = Profile of Mood States; C-SOSI = Calgary Symptoms of Stress Inventory; MAAS = Mindful Attention Awareness Scale; FSFI = Female Sexual Function Index; FSDS = Female Sexual Distress Scale; BDI = Beck Depression Inventory; SF-36 = Medical Outcomes Survey Short Form-36 (measures quality of life); EORTC QLQ = European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire; PSQI = Pittsburgh Sleep Quality Index; PSS = Perceived Stress Scale; MSCL = Medical Symptom Checklist; CHIP = Coping with Health Injuries and Problems; RSCL = Rotterdam Symptom Checklist; HDI = Health and Disease Inventory; MAC = Mental Adjustment to Cancer Scale; MHLC = Multi-dimensional Health Locus of Control Scale.

Table 3c.

Outcomes (qualitative study)

Study	Methodology	Themes
Mackenzie et al. (2007)	Qualitative focus group Themes developed through Grounded Theory and validated by second focus group with 7 of the 9 original participants	Opening to change Self-control Shared experience Personal growth Spirituality

Discussion

In this review of research evaluating the psychological benefits of mindfulness-based interventions for cancer patients, many questions that might exist for clinicians and purchasers of services for cancer patients remain unanswered. It is hoped that in exposing the gaps in the evidence, future research will attempt to usefully address these questions.

Quality of the evidence

A notable feature of the body of literature on mindfulness-based interventions for cancer patients is the lack of well controlled studies with rigorous methodologies. Only eight studies had a control group, of which five were cited as RCTs. Of these, only three made baseline assessments before randomisation (Foley et al., 2010; Lengacher et al., 2009; Speca et al., 2000); only two described the process of randomisation (Foley et al; Speca et al.); only one reported that assessors were blind to group allocation at follow-up (Foley et al.), and one study made assessments of facilitators' performance (Lengacher et al., 2009).

Uncontrolled pilot studies are a useful, inexpensive precursor to larger scale research, but there is a danger in publishing so many studies without comparison groups that the body of literature starts to look impressive on the basis of its quantity, not its quality. Equally concerning is the strength of conclusions that some authors made when interpreting their findings from uncontrolled studies. Similar deficiencies have been suggested in the research literature on other mind-body interventions for cancer patients (Coyne, Lepore, & Palmer, 2006).

A further criticism is that specific outcome measures were rarely given explicit justification in relation to the purported mechanisms of mindfulness-based interventions. A particular case in

point is the Profile of Mood States: it is not clear why a measure of transient mood states would be expected to change as a result of mindfulness training, which is not intended to help people to feel less emotion but to develop a different relationship to emotions (Kabat-Zinn, 1990). This issue is related to a lack of clear rationale for why mindfulness-based interventions might be expected to be of benefit to cancer patients; in most papers this question has been allocated a few lines at most.

No studies offered a true long-term picture of the continuing effects of mindfulness-based interventions: amongst studies that made longitudinal assessments, none included a control group at follow-up. Keeping a control group waiting for an intervention is clearly an ethical issue, but one which must be weighed against the ethical issue of involving patients in research that is not sufficiently rigorous to answer important questions about the lasting effectiveness of the intervention.

The validity of measuring mindfulness through self-report questionnaires has been questioned (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Grossman, 2008), partly because of the complexity and ambiguity of the mindfulness construct itself. For example, Grossman argues that since different mindfulness scales are often poorly correlated with each other, they perhaps measure different constructs. Furthermore, Grossman cites evidence that respondents inexperienced in mindfulness meditation practice have a different understanding of scale items from those with mindfulness experience. In the absence of a consensus on how mindfulness should be operationalised, attempts to assess the impact of mindfulness-based interventions on mindfulness skills are inherently difficult to interpret. Perhaps this is why few researchers included measures of mindfulness in their studies of effectiveness, and why those that did presented a mixed picture.

Strengths and limitations of the review

The conclusions on outcomes broadly tally with those made by Ledesma and Kumano (2009) in their meta-analytic review of mindfulness-based interventions. However, a strength of the narrative approach adopted in the current review is that it afforded greater opportunity to examine more complex issues regarding participant and intervention variables, as well as to make more subtle distinctions between different outcome measures. This synthesis therefore provides greater scope for deriving implications for clinicians, purchasers and researchers. By structuring the synthesis in terms of the kinds of questions that might be important to clinicians, the review focused primarily on the priorities for clinical practice rather than intellectual understanding for its own sake.

An important limitation of the review is the possibility of publication bias, since no attempts were made to include unpublished studies. The file drawer problem (Rosenthal, 1979) – that studies with null findings are much less likely to be published than studies with statistically significant results – demands even greater caution in making any conclusions based on the published literature. A second limitation is that the review was conducted by a single researcher and might therefore be open to greater bias in interpretation than if data were extracted by more than one researcher and opinions shared on quality. Attempts were made to minimise bias by following checklists for data extraction and quality assessment.

Conclusions

The review tentatively concludes that mindfulness-based interventions might have a positive impact on the psychological wellbeing of cancer patients in terms of reducing emotional distress and improving quality of life. There is currently no evidence to suggest that these effects vary

according to type of cancer, recency of diagnosis, or whether or not participants are in active treatment. The mechanisms of change by which the interventions deliver these benefits are, however, far from clear, particularly given the lack of evidence for an association between time spent practising mindfulness and outcomes. This is at odds with research on a non-cancer sample which found that time spent practising mindfulness outside of classes was significantly related to improvements in psychological functioning mediated by increases in mindfulness (Carmody & Baer, 2008). Evidence of an impact on physical symptoms such as pain and sleep was lacking, and the bias in the literature towards women with a high level of education raises the question of how narrow the accessibility and appeal of mindfulness-based interventions might be. At present there is little evidence to distinguish between efficacies of mindfulness-based interventions in its various manifestations (MBSR, MBCT, MBAT), nor to determine the impact of variations in class contact time (cf. Carmody & Baer, 2009). Questions remain as to what would constitute a minimum 'dose' of mindfulness, or how much training and experience is required to teach it effectively.

Implications for clinical practice

For clinicians and purchasers, this review suggests that mindfulness-based interventions might be a useful and appealing intervention for some cancer patients, whether in active treatment or in remission. There is little empirical basis for choosing between models for treatment. The most easily accessible is Kabat-Zinn's (1990) MBSR programme, but Foley et al.'s (2010) adapted MBCT programme might be more suitable for patients with higher levels of depression. In practical and economic terms, MBAT has a default disadvantage because of the extra training needed to deliver it, since facilitators may need training in both mindfulness

teaching and art therapy. It is possible that teaching mindfulness skills in an individual format is feasible, but the evidence is currently in its early stages. It is difficult to judge at this point whether the cost of training personnel to deliver mindfulness-based interventions would be outweighed by the benefits of providing these interventions, since the research evidence to date is based on studies using facilitators with high levels of training and experience.

Implications for further research

There are many potential implications from this review for researchers; a few of the most important are presented here. First, a note of caution, that when citing previous research on mindfulness-based interventions for cancer patients, care should be taken not to perpetuate unmerited conclusions made by study authors. Secondly, findings from studies without a comparison group are highly ambiguous and should therefore only be used when piloting a new form of mindfulness-based intervention or when correlational analyses are planned. Thirdly, it is important to have a rationale for the selection of outcome variables and a theoretical understanding of why mindfulness-based interventions might be expected to lead to changes on those outcome variables. The conceptualisation presented in the introduction to this review paper might form a starting point for such a rationale. Fourthly, it is important to choose reliable and valid tools for assessing outcome measures. For instance, interview-based assessments might present a more convincing assessment of changes in depression and anxiety than relying on self-report screening instruments that focus on a short time-period. Fifthly, the evidence on the mechanisms by which mindfulness-based interventions can be helpful to cancer patients is scant. Even when an intervention is shown to be associated with a change in a particular outcome variable relative to a control condition, it does not indicate what aspect of the intervention is

causing the change (Johansson & Høglend, 2007). Given the relatively high proportion of therapeutic outcomes that can be attributed to non-specific factors (Martin, Garske, & Davis, 2000), for a new intervention to be invested in, particularly when it is a resource intensive intervention, it is important to establish the mechanisms by which it is effective (Shapiro et al., 2006). In particular, valid data on the time participants spend practising mindfulness and analyses that measure the association between practice and outcomes is highly valuable. Finally, on a more practical level, it would be useful for clinicians if research addressed the questions of how accessible mindfulness-based interventions are to the average cancer patient (and perhaps how they could be made more accessible). Further research on the level of training and experience required for effective delivery of mindfulness-based interventions is important because of the relatively high demands from authors at present (Crane, Kuyken, Hastings, Rothwell, & Williams, 2010) and the implications this has for access to these interventions.

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EMPIRICAL PAPER

MINDFULNESS AND SELF-COMPASSION IN PATIENTS UNDERGOING HAEMATOPOIETIC STEM CELL TRANSPLANTATION

Abstract

This paper describes a study investigating mindfulness and self-compassion in 54 adult patients hospitalised prior to haematopoietic stem cell transplantation (SCT). SCT is an increasingly successful treatment for some acquired malignancies that involves prolonged periods in hospital, causes unpleasant side-effects, and has been associated with clinically significant distress. Mindfulness and self-compassion have been found to correlate inversely with distress in a number of physical and mental health samples, but this association has not yet been demonstrated for SCT patients. Consistent with hypotheses, the study found that both mindfulness and self-compassion correlated negatively with self-reported distress and that participants who reported a clinically significant level of distress were less mindful and less self-compassionate than those who did not. These findings provide preliminary support for offering mindfulness-based interventions to SCT patients.

Introduction

Haematopoietic Stem Cell Transplantation (SCT) is an increasingly successful treatment for a number of acquired malignancies including leukaemia, lymphoma and myeloma. The treatment is highly demanding of patients as it involves long periods of hospitalisation, much of which must be spent in isolation, and often causes high levels of nausea and pain. As well as coping with feeling physically unwell, patients must deal with the uncertainty of the treatment's outcome: although potentially curative, SCT can cause long-term side effects such as neurocognitive impairment, sterility, and graft-versus-host disease, which can be debilitating and even fatal. It is perhaps not surprising then that clinical levels of distress, anxiety and depression have been reported in approximately one third of SCT patients (Jenks Kettmann & Altmaier, 2008; Sherman, Simonton, Latif, Spohn, & Tricot, 2004). The need for screening and treatment of distress in SCT patients is not only a quality of life issue: several studies have found that depression is associated with higher mortality rates following SCT (see Hoodin, Uberti, Lynch, Steele, & Ratanatharathorn, 2006, for review). For example, a study of 199 SCT patients by Prieto and colleagues suggested that a diagnosis of major depression early in the course of SCT was an independent risk factor for a poorer prognosis 1 and 3 years post-transplant (Prieto et al., 2005). These findings have led to urgent calls for greater attention to the identification and treatment of depression in SCT patients (Andrykowski, 2005).

Mindfulness-based interventions

Although the argument for providing psychosocial interventions for SCT patients has been increasingly validated by the evidence base, few attempts have been made to develop appropriate

and timely interventions for this vulnerable population. There are certainly practical difficulties in offering psychosocial interventions to patients undergoing high intensity treatments that suppress the immune system and sap both physical strength and the capacity for concentration. In an attempt to overcome this challenge, a recent pilot study assessed the feasibility of offering a mindfulness-based intervention aimed at reducing symptoms of anxiety and depression to patients undergoing SCT (Bauer-Wu et al., 2008). Mindfulness has been described as "a nonelaborative, nonjudgemental, present-centred awareness in which each thought, feeling, or sensation that arises in the attentional field is acknowledged and accepted as it is" (Bishop et al., 2004). Focusing attention on the present moment, with a gentle curiosity and non-judgemental acceptance of all aspects of experience, is thought to interrupt brooding on past events and worry about the future, and is incompatible with maladaptive avoidance behaviours. There are a number of reasons why such an approach might be helpful to someone undergoing SCT. For example, strong physical sensations such as pain might be less overwhelming if, instead of trying to analyse the meaning of the pain, or worrying about how long it can be tolerated, it is experienced directly as sensations that change from moment to moment (Ott, Norris, & Bauer-Wu, 2006). Similarly, distressing thoughts, such as subjective interpretations of body sensations or attempts to predict the future, can lose their power if they are experienced as transient phenomena and not as direct representations of truth.

Interventions that aim to engender greater mindfulness incorporate regular experiential practice of mindfulness meditation exercises during classes and at home, alongside a psycho-education element that is usually tailored to the client group (e.g. Foley, Baillie, Huxter, Price, & Sinclair, 2010; Speca, Carlson, Goodey, & Angen, 2000). Mindfulness-based interventions have been shown to have benefits for a number of clinical populations (Grossman, Niemann, Schmidt,

& Walach, 2004; Hofmann, Sawyer, Witt, & Oh, 2010), including those suffering with anxiety, (Kabat-Zinn et al., 1992), depression (Ma & Teasdale, 2004), chronic pain (Shigaki, Glass, & Schopp, 2006), and cancer patients (Foley et al., 2010; Ledesma & Kumano, 2009).

Although mindfulness-based interventions are usually offered in a group setting, Bauer-Wu et al. (2008) adapted Kabat-Zinn's (1990) *Mindfulness-Based Stress Reduction (MBSR)* programme for delivery to hospitalised SCT patients in an individualised format. The intervention involved one-to-one sessions with an instructor once or twice weekly and a 17-minute guided practice CD which participants were encouraged to listen to daily. The first session with the instructor happened before admission to hospital and the intervention continued throughout hospitalisation. Out of 20 patients who participated in the pilot programme, 16 completed the intervention and for these patients there was a significant reduction in reported emotional distress over the course of the intervention. The study supported the feasibility of the intervention and its findings were consistent with a potential benefit for SCT patients. However, without a control group it was not possible to tell whether the mindfulness intervention was effective beyond spontaneous recovery from emotional distress. Even if the intervention were presumed to have a causal role in the change, it could not be inferred that it was specifically the mindfulness element of the intervention that had mediated its beneficial effects.

Mindfulness, as measured by the *Mindful Attention Awareness Scale (MAAS)*, has been shown to correlate with lower levels of distress in cancer outpatients (Brown & Ryan, 2003; Carlson & Brown, 2005). Furthermore, Brown and Ryan (2003) found that participants who exhibited an increase in mindfulness following MBSR were more likely to reap a greater benefit from the intervention in terms of a reduction in stress symptoms. In a non-cancer sample, mindfulness was shown to mediate the impact of MBSR on perceived stress (Shapiro, Oman,

Thoresen, Plante, & Flinders, 2008). Therefore, if it can be shown that mindfulness is associated with less distress in SCT patients, it might be expected that this population could benefit from interventions that engender greater mindfulness, such as that piloted by Bauer-Wu et al. (2008). At present there is no evidence of such an association in the specific and highly vulnerable population of hospitalised patients anticipating SCT, and it is possible that an avoidant approach might be a more effective short-term solution to the emotional challenges facing this population. The current study was therefore designed to address the question: is mindfulness associated with lower levels of psychological distress amongst patients admitted to hospital prior to SCT?

Self-compassion

Neff (2003) described self-compassion as comprising three parts: 1. kindness and understanding for oneself; 2. seeing one's experiences as part of the larger human experience, and 3. having awareness of painful thoughts and feelings without over-identifying with them. These ideas are integral to the MBSR programme (Kabat-Zinn, 1990) and feature prominently in the psychotherapist Elana Rosenbaum's account of how mindfulness has helped her to live with cancer (Rosenbaum, 2007). Furthermore, MBSR has been shown to engender self-compassion (Birnie, Speca, & Carlson, 2010). Although self-compassion is not explicitly taught in the *Mindfulness-Based Cognitive Therapy (MBCT)* programme (Segal, Williams, & Teasdale, 2002), it has been implicated as a mediator in the process by which MBCT has its effects on preventing relapse in recurrent depression (Holden, 2009). In experimental research, self-compassion has been found to be associated with lower levels of anxiety and higher levels of psychological well-being when faced with challenging events (Neff, Kirkpatrick, & Rude, 2007). It might be that SCT patients can add to their own suffering with unreasonable expectations of their own ability

to “put on a brave face” and cope with the challenges confronting them. As a secondary line of enquiry, the current study therefore examined the association between self-compassion and levels of distress in patients anticipating SCT.

Study hypotheses

In summary, the current study was designed to test the following hypotheses:

1. Mindful attention/awareness will be associated with lower levels of distress in SCT patients.
2. Those with clinically significant levels of distress will be less mindful on average than those whose distress is below the threshold of clinical significance.
3. Self-compassion will be associated with lower levels of distress in SCT patients.
4. Those with clinically significant levels of distress will have less self-compassion on average than those whose distress is below the threshold of clinical significance.

Research has shown that for patients undergoing SCT, the time of greatest distress is around the time of admission to hospital prior to the beginning of treatment (Fife et al., 2000). Siston et al. (2001) found that a quarter of SCT patients reported clinical levels of psychosocial maladjustment prior to admission for SCT and concluded that pre-transplant processes are critical to understanding the psychosocial impact of SCT. For this reason, the current study focused on the time of admission to hospital prior to the commencement of SCT.

Transplants can be *autologous* where the transplanted stem cells are the patient’s own or *allogeneic* where the cells are taken from a donor. Although the experience of treatment will vary between these two groups, research suggests that distress and depression follow a similar course

for patients receiving both types of transplant (Hjermstad et al., 1999). Therefore patients receiving both types of transplant were included in the current study.

The study employed a cross-sectional design to test the four hypotheses in a sample of patients within 24 hours of admission to hospital before beginning SCT.

Method

Power calculation

The sample size was calculated using the power calculation software *G Power 3* (Faul, Erdfelder, Lang, & Buchner, 2007). From Brown and Ryan's (2003) report of the development and validation of the Mindful Attention Awareness Scale (MAAS), which was used to measure mindfulness in the current study, the sizes of correlation between the MAAS and two distress-related measures were -.43 and -.40. Carlson and Brown (2005) found similar sized associations (-.39 and -.41). Assuming an average effect size of .40 and given $\alpha = .05$, the sample size required to detect this effect is 59. From Neff's (2003) report of the development and validation of the SCS, the effect sizes of the association between the SCS and measures of depression and anxiety were .5 and .6 respectively, which would require sample sizes of 34 and 21 respectively. The aim was therefore to recruit approximately 59 participants. However, within the time constraints of the designated recruitment period, the final sample was 5 participants short of this target.

Participants

Fifty-four adult patients (32 male and 22 female) were recruited to the study within 24 hours of admission to hospital for SCT. Participants gave their informed consent before completing the

questionnaire pack. Inclusion criteria for the study were: (a) admitted to hospital for SCT within 24 hours of recruitment; (b) over the age of 18 years, and (c) sufficient grasp of the English language and sufficient literacy skills to complete the questionnaires. Between 20th July 2009 and 26th March 2010 approximately 71 patients meeting inclusion criteria were admitted to the Queen Elizabeth Hospital in Birmingham, UK. Seven of these patients were not approached because researchers did not manage to visit within the first 24 hours of admission. The majority of those missed (n = 6) were patients scheduled for an autologous transplant, for whom the day of admission was less strictly regularised and less predictable. Out of the 64 patients who were approached, 10 declined to take part in the study. Thus the response rate was 84% and the study sample was 76% of all patients meeting inclusion criteria. The reasons given by patients declining to participate included feeling too tired or unwell, or dislike of the questionnaires.

Measures

Demographics and diagnostic data. A custom-made form (see Appendix E) collected the following information: date of birth, marital status, ethnicity, diagnosis and type of transplant (autologous or allogeneic).

Predictor variables. To assess mindful awareness, the *Mindful Attention Awareness Scale* (MAAS; Brown & Ryan, 2003; see Appendix F) was administered. Respondents were asked to rate a list of 11 statements on a 6-point scale from *Almost always* to *Almost never*. According to Brown and Ryan's report, this measure demonstrated acceptable reliability in a sample of undergraduate students (intraclass correlation coefficient = .81), and showed a pattern of correlations with other measures that supported its convergent and discriminant validity (e.g. negative associations with rumination and social anxiety). The measure has been validated in a

cancer population (Carlson & Brown, 2005), with a factor structure that was equivalent to that found in a general adult sample.

To assess self-compassion, the *Self-Compassion Scale* (SCS; Neff, 2003; see Appendix G) was administered. Respondents were asked to rate 26 statements on a 5-point scale from *Almost never* to *Almost always*. This measure consists of 6 sub-scales: *self-kindness*, *self-judgement*, *common humanity*, *isolation*, *mindfulness*, and *over-identification*, which can be combined to give an overall score of self-compassion. In her original paper Neff calculated the SCS total score by summing the 6 sub-scales (Neff, 2003), but has since recommended taking the average of the sub-scales to produce an overall score (Neff et al., 2007). The scale has been shown to have good test-retest reliability (ranging from .80 to .93 for the sub-scales). Its validity is supported by the lack of significant correlation with a social-desirability measure and significant association with measures of psychological well-being without being associated with measures of narcissism (as self-esteem has been). A study is ongoing at the University of Birmingham, UK, to validate this measure in a large sample of cancer outpatients (K. Ainsworth, personal communication, 15th March 2010).

Outcome variables. To assess levels of psychological distress, the *Hospital Anxiety and Depression Scale* (HADS; Zigmond & Snaith, 1983; see Appendix H) was administered. This is a widely-used, brief measure, specifically developed for assessing levels of depression and anxiety in a hospitalised population. Respondents are asked to select which of 4 statements most closely applies to them, on each of 14 items, which score 0-3. These scores are summed to produce a total score between 0 and 42 for overall distress and sub-scores between 0 and 21 for depression and anxiety. A review of 747 studies that used the HADS (Bjelland, Dahl, Haug, & Neckelmann, 2002) found the measure to perform well in assessing the symptom severity and

caseness of anxiety disorders and depression in somatic, psychiatric and primary care patients as well as in the general population. A factor analysis of the HADS structure in a heterogeneous cancer population of 1474 patients found a two factor structure corresponding to anxiety and depression subscales which were highly correlated (.52) and a single higher order factor corresponding to psychological distress (Smith et al., 2002). On the basis of previous research examining the specificity and sensitivity of this measure when screening for major depression and adjustment disorder in cancer patients, an overall score of ≥13 was taken to indicate a clinically significant level of distress (Razavi, Delvaux, Farvacques, & Robaye, 1990), and ≥8 was taken to indicate clinically significant levels of anxiety or depression on the two sub-scales (Bjelland et al., 2002).

As a further measure of psychological distress, the *Distress Thermometer* (DT; Roth et al., 1998; see Appendix J), was administered. This is a brief screening tool which asks patients to indicate their levels of distress on a scale of 1-10 represented on a picture of a thermometer. The measure has been validated against standardised, multi-item measures of depression and anxiety in a population of patients undergoing SCT (Ransom, Jacobsen, & Booth-Jones, 2006) and is recommended by the National Comprehensive Cancer Network-US as a routine screening tool for early detection of distress in cancer patients.

Procedure

Each patient meeting study criteria admitted to hospital for SCT was approached on the ward by one of two researchers who described the study and asked the patient if they would be interested in participating. If an individual was interested in taking part in the study they were given the patient information sheet (see Appendix K) and a pack containing a consent form (see

Appendix L) and the questionnaire measures described above. Patients were given the opportunity to discuss the information sheet and ask questions about the study. Those agreeing to participate were asked to sign the consent form and complete the questionnaires before their treatment began. The researcher collected the pack as soon as possible, so that each participant had an opportunity to offer feedback about the questionnaires and ask further questions about the study.

The study was approved by Coventry Ethics Committee (see Appendix M).

Results

Of the 54 participants, 32 were male and 22 were female. The age of participants ranged from 19 to 71 (M = 51.3, SD = 12.7). Participants were predominantly white British (n = 48); others were Asian Pakistani (n = 2), white Irish (n = 1), white other (n = 1), Asian Indian (n = 1), and black British (n = 1). The majority of participants were married or co-habiting (n = 33).

Twenty participants were scheduled for an autologous transplant and 34 for an allogeneic transplant. Twenty-six participants had a diagnosis of leukaemia (acute myeloid leukaemia [n = 20], chronic myeloid leukaemia [n = 2], acute lymphoblastic leukaemia [n = 2], chronic lymphoblastic leukaemia [n = 2]), 10 participants had a diagnosis of lymphoma, (Non-Hodgkin's lymphoma [n = 7], Hodgkin's lymphoma [n = 3]), 12 participants had a diagnosis of myeloma, 4 had myelodysplastic syndrome and 2 had amyloidosis.

Description of the data

Descriptive statistics for the predictor and outcome variables are presented in table 1. Of the 54 participants in the study, 18 (33%) exceeded the threshold for clinically significant distress

(≥13) on the HADS; 10 (18.5%) exceeded the threshold for clinically significant depression, and 19 (35%) exceeded the threshold for clinically significant anxiety.

Table 1

Descriptive statistics for predictor and outcome variables

Predictor variables	Mean	SD	Range
MAAS score	4.66	0.97	1.80 – 6.0
SCS score	3.36	0.71	1.11 – 4.83
Self-kindness	2.94	0.86	1.2 – 5.0
Self-judgement	2.70	0.97	1.0 – 5.0
Common humanity	3.26	0.96	1.0 – 5.0
Isolation	2.57	1.10	1.0 – 5.0
Mindfulness	3.60	0.92	1.0 – 5.0
Over-identification	2.38	1.00	1.0 – 5.0
HADS total score	11.07	7.10	0 – 31
Depression	4.24	3.85	0 – 16
Anxiety	6.83	3.99	0 – 16
Distress (thermometer)[a]	3.80	2.63	0 – 9

[a] $N = 49$ due to missing data from 6 participants. $N = 54$ for all other statistics.

There were no differences between patients scheduled for an autologous or allogeneic transplant on any of the predictor or outcome measures. No measures correlated with age. Female participants scored higher than males on the distress thermometer ($M = 4.9$, $SD = 2.7$ and $M =$

3.07, *SD* = 2.4 respectively; $p = .02$, $d = 0.71$) but did not differ significantly on the HADS or any other measures.

Comparing the scores in the current sample with data reported in previous research, when the SCS score was calculated in the same way as in Neff's (2003) paper ($M = 20.15$), it fell between the two means reported by Neff for a Buddhist and an undergraduate sample in (23.19 and 18.26 respectively). The MAAS mean score was higher than that reported by Carlson and Brown (2005) for a cancer sample ($M = 4.08$, $SD = 0.74$, $p < .001$, $d = 0.71$), and higher than that reported by Brown and Ryan (2003) for a cancer sample ($M = 4.27$, $SD = 0.64$, $p = .03$, $d = 0.46$). Neither SCS nor MAAS scores have been reported for SCT patients before. The mean HADS score was comparable with that reported by Sherman et al. (2004) for a sample of myeloma patients ($M = 10.74$, $SD = 7.27$, no significant difference).

Testing the hypotheses

In support of hypothesis 1, MAAS scores were negatively correlated with distress as measured by the overall HADS score ($r = -.64$, $p < .001$) and with the depression ($r = -.55$, $p < .001$) and anxiety ($r = -.60$, $p < .001$) subscales. Similarly, MAAS scores were negatively correlated with distress measured by the DT ($r = -.49$, $p < .001$, $N = 49$).

In support of hypothesis 2, an independent samples t-test found that a sub-sample of participants whose scores on the HADS indicated clinically significant distress (≥13) were less mindful ($M = 4.04$, $SD = 1.1$, $n = 18$) than those who scored below this threshold ($M = 4.97$, $SD = 0.72$, $n = 36$; $t_{(52)} = 3.20$, $p = .004$, $d = 0.89$).

In support of hypothesis 3, SCS scores were negatively correlated with distress as measured by the overall HADS score ($r = -.68$, $p < .001$) and with the depression ($r = -.64$, $p < .001$) and

anxiety (r = -.58, p < .001) subscales. Similarly, SCS scores were negatively correlated with distress measured by the DT (r = -.46, p < .001, N = 49).

In support of hypothesis 4, an independent samples t-test found that the sub-sample of participants who scored 13 or higher on the HADS were less self-compassionate (M = 2.89, SD = 0.75, n = 18) than those who scored lower than 13 (M = 3.59, SD = 0.57, n = 36; $t_{(52)}$ = 3.84, p < .001, d = 1.06).

Discussion

In support of all hypotheses, this study found that higher levels of mindful attention and awareness and higher levels of self-compassion were both associated with lower levels of distress in hospitalised patients immediately prior to SCT, and participants whose scores suggested a clinically significant level of distress were less mindful and less self-compassionate than those who scored under the threshold. These effects were large as well as statistically significant. Although causation cannot be assumed from this cross-sectional design, the findings provide convincing evidence that mindfulness and self-compassion are associated with less distress amongst patients hospitalised for SCT. In other words, those patients who experienced the lowest levels of distress tended to focus more on the present moment, to be more aware of the physical and emotional sensations they were experiencing, and to experience suffering without judging themselves harshly for doing so.

The study was strengthened by a high response rate which increases the likelihood that the results would generalise to other SCT patients. There was a higher proportion of allogeneic than autologous transplant patients in the study because their admission times were more predictable. However, this is unlikely to have affected the results since the two groups did not differ on any

measured variables. It is important to note that nothing is known about the relative levels of mindfulness, self-compassion or distress in the 10 patients who declined to take part in the study. Caution is merited by the possibility that these individuals might be the most distressed and/or the most avoidant of SCT patients.

Questions have been raised in the literature as to the relative merits of different self-report tools for the measurement of mindfulness (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). The MAAS was chosen for the current study because it targets a relatively specific aspect of mindfulness (attention and awareness) and because, unlike other measures, it has been shown to elicit valid responses from individuals who are not familiar with mindfulness meditation. It is the measure with the smallest correlation with self-compassion (Baer et al., 2006) which was important for the current study to allow for separate analysis of this construct. However, future research might validate the current study's findings by replicating the result with other mindfulness measures.

The SCS is the only published measure of self-compassion. Anecdotally, a small number of participants in the current study struggled with some questions on the SCS, saying that they did not understand what the questions meant and that they did not usually think about such things. Since the SCS was developed in the USA and has not previously been used in a cancer population, a study is currently underway to assess the validity of the SCS in a UK cancer population (K. Ainsworth, personal communication, 15th March 2010). The outcome of that study might have implications for the interpretation of the current study's findings in relation to self-compassion.

An important limitation of the study is that distress was measured using brief self-report measures that take a snap-shot of current symptoms of distress. Although thresholds have been

identified for the HADS that indicate clinically significant levels of overall distress scores and depression and anxiety sub-scores, these thresholds do not indicate a diagnosis of psychiatric disorder. Therefore although it is possible that the study's findings would have implications for SCT patients with diagnoses of major depression or anxiety disorders, this would need to be investigated further with the use of diagnostic assessment interviews.

Research implications

Brown and Ryan (2003) and Carlson and Brown (2005) reported only medium effect sizes when assessing the association between mindful attention/awareness and mood disturbance or stress symptoms in samples of cancer outpatients. It is possible that stronger associations were found in the current study because of how much individual participants in this study had in common with each other compared with a heterogeneous sample of cancer outpatients, since they all completed the measures at a specific time: when recently hospitalised, and anticipating a highly imminent, challenging medical procedure with uncertain outcome. Given the suggestion from previous research that the time of hospital admission is the point of greatest distress for SCT patients (Fife et al., 2000), one interpretation of the current study's result is that mindfulness is particularly beneficial at times of greater stress. An alternative interpretation is that mindful attention/awareness and self-compassion are qualities that individuals are more able to possess when they are experiencing lower levels of distress. To distinguish between these interpretations would require longitudinal research in which the same sample is assessed before, during and after hospitalisation, to establish whether mindful attention/awareness and self-compassion measured prior to hospitalisation could predict levels of distress during hospitalisation and after discharge.

The findings of this study are consistent with the possibility that interventions focused on engendering mindfulness and self-compassion could benefit patients undergoing SCT, particularly in the context of other findings in the literature: Bauer-Wu et al.'s (2008) pilot study, which suggested that a mindfulness-based intervention for SCT patients was both feasible and beneficial; Brown and Ryan's (2003) finding that increase in mindfulness is associated with a beneficial effect of a mindfulness-based intervention on stress symptoms in cancer patients, and Shapiro et al.'s (2008) finding that mindful attention and awareness mediated the benefits of MBSR on perceived stress in a non-cancer sample. Taken together with the current study, these findings support the rationale for further, larger-scale research assessing the efficacy of mindfulness-based interventions for SCT patients (Fonteyn & Bauer-Wu, 2005).

Clinical implications

Although the current study is not sufficient basis in itself for directing clinical practice, it might have implications in the context of the wider literature on mindfulness and self-compassion. Mindfulness-based interventions might be of value to SCT patients, and this will be further assessed by future research. Although the results of the study do not indicate the direction of causation between mindfulness and distress, a possible implication is that paying attention to thoughts, feelings, and bodily sensations might be beneficial in terms of reducing distress, rather than attempting to distract attention away from current experiences, even in a group as vulnerable as those anticipating SCT. If this interpretation is supported by future research, it suggests that clinicians concerned with the psychosocial wellbeing of SCT patients should not be afraid of asking patients about their physical and mental experiences, since paying attention to these experiences might alleviate, not increase, their distress. Similarly, normalising strong emotions

might help patients to treat themselves with greater compassion and thereby reduce the distress associated with self-judgement. Perhaps offering mindfulness-training to the medical staff that care for SCT patients could help them develop their own ability to attend compassionately to patients' distress, rather than colluding with attempts to cognitively avoid unpleasant experiences.

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PUBLIC DOMAIN BRIEFING

MINDFULNESS AND CANCER

Mindfulness and Cancer

The past decade has seen a growing interest in psychosocial interventions for cancer patients that incorporate training in *mindfulness* skills. Mindfulness has been defined as: “paying attention in a particular way: on purpose, in the present moment, and non-judgementally” (Kabat-Zinn, 1990). Paying attention in this way is thought to increase our awareness of thoughts, feelings and bodily sensations, which in turn creates greater opportunities to respond wisely to difficulties, rather than reacting automatically. Focusing on the present moment is thought to interrupt repetitive patterns of thought, such as dwelling on past events or worrying about the future, which tend to be associated with low mood or anxiety. Taking a non-judgemental stance encourages us to experience life more fully and directly, without looking for a meaning in every change in mood or sensation.

So could mindfulness skills help someone to face the multiple psychological challenges that cancer presents? The present work aimed to address this question in two ways. First, the literature on mindfulness-based interventions for cancer patients was reviewed in order to evaluate the quality of evidence in support of mindfulness-training for cancer patients. Second, a research study was conducted to determine whether people who were more mindful were also less distressed at a specific point during treatment in a specific population – in this case adult cancer patients in hospital awaiting a Stem Cell Transplant (SCT).

Do mindfulness-based interventions offer psychological benefit to cancer patients?

A review of the literature found 21 studies of mindfulness-based interventions for cancer patients. These interventions aimed to help people learn the skills of mindfulness through formal

meditation practice, both in weekly group classes and at home with the help of guided practices on CD. There was some evidence to suggest that mindfulness-based interventions were helpful in reducing distress or stress symptoms, and specifically symptoms of anxiety or depression. Benefits were found for cancer patients in both the early and the late stages of disease, and for those in active treatment as well as those whose cancer was in remission. The longer-term effects are not known; when studies re-assessed participants some time later they did not include control groups for comparison. Women, mostly with breast cancer, made up the vast majority (87%) of participants in research on this topic. It is not clear whether this is because the interventions appealed more to women or simply because breast cancer patients were easier to recruit for research. Participants tended to have a relatively high level of education, which possibly raises another question about how easy it is to understand what mindfulness is about. There was very little research on *how* mindfulness-based interventions work or why they help people with cancer. The authors of mindfulness-based interventions suggest that people need to be committed to practising the techniques involved in mindfulness interventions, and the people who facilitate them need to be highly trained. However, research has not yet shown whether or not this level of practice and training is necessary. The review concluded that more research is needed of a high quality to validate the use of mindfulness-based interventions for cancer patients.

Is mindfulness associated with less distress in SCT patients?

SCT is an increasingly successful treatment for some types of cancer such as leukaemia or lymphoma, but one that can present quite a physical and psychological ordeal for patients, as it involves spending a long time in hospital, often in isolation, and unpleasant side-effects such as pain and nausea, at the same time as dealing with uncertainty about the treatment's outcome.

Despite these challenges, there has been little research on psychosocial interventions for this vulnerable group. Although mindfulness-based interventions are usually delivered in a group format, one research team has adapted the approach for use with individual inpatients and published results of a pilot study with SCT patients (Bauer-Wu et al., 2008). This pilot study showed that the approach was feasible; however, although patients taking part in the study reported less distress over time, it was not possible to be sure that this change was due to the intervention because there was no control group for comparison, so the change might have happened anyway. It was not clear whether mindfulness would be helpful to people undergoing SCT, when distraction techniques might be a more effective way of coping with unpleasant physical symptoms, thoughts and feelings in the short-term.

In order to find out whether being mindful is helpful to people undergoing SCT, 54 adult patients admitted to hospital for SCT were asked to complete questionnaires, some of which measured qualities that mindfulness interventions are supposed to enhance (*mindful attention/awareness* and *self-compassion*) and some of which measured distress. The period of time in hospital immediately before treatment started was chosen because previous research had shown that this was when patients felt most distressed. An analysis of the questionnaire scores showed that people who were more “mindful” and more “self-compassionate” were also less distressed. These findings supported the idea that teaching mindfulness skills to SCT patients might help to reduce their distress. As this study looked at one time point only, further research is needed to find out how helpful mindfulness skills are in the longer-term. Ultimately a clinical trial in which SCT patients are randomly allocated to either a mindfulness-based intervention or *treatment as usual* will be needed to understand fully the effectiveness of the approach.

References

Bauer-Wu, S., Sullivan, A. M., Rosenbaum, E., Ott, M. J., Powell, M., McLoughlin, M., & Healey, M. W. (2008). Facing the challenges of hematopoietic stem cell transplantation with mindfulness meditation: A pilot study. *Integrative Cancer Therapies, 7*(2), 62-69.

Kabat-Zinn, J. (1990). *Full Catastrophe Living: How to Cope with Stress, Pain and Illness Using Mindfulness Meditation.* New York: Delacorte

Appendix A

Instructions to authors for Integrative Cancer Therapies

Appendix B

Instructions to authors for Psycho-Oncology

Appendix C

Data Extraction Checklist

Data Extraction Checklist

- Study reference
- Study design
- Number and timings of assessment points
- Data relating to sample:
  - Sample description
  - N at intake
  - N at follow-up
  - Percentage female
  - Data relating to age of sample (e.g. mean, standard deviation, range)
  - Data relating to level of education of sample
  - Types of cancer
  - Time since diagnosis
  - Current or recent cancer treatment
- Data relating to intervention:
  - General description of intervention e.g. MBSR
  - Details of adaptations of content
  - Format (i.e. group or individual)
  - Number and length of sessions
  - Attendance data
  - Directions for home practice
  - Home practice compliance data
  - Facilitators of intervention (profession, training and experience)
- Data relating to outcomes:
  - Measures of psychological outcomes
  - Findings relating to psychological outcomes including effect sizes where available
- Data relating to process:
  - Measures of potential mediators e.g. mindfulness, coping styles
  - Findings relating to process including effect sizes where available
- For studies with a control group:
  - Number of participants allocated to each group
  - Details of comparison group treatment

Appendix D

Quality Assessment Checklist

Quality Assessment Checklist

- Is the study design appropriate to the research objective?
  - Is there a control group?
    - Is allocation random?

For RCTs:
- Was the method used to generate random allocations adequate?
- Was the allocation adequately concealed?
- Were the groups similar at the outset of the study?
- Were participants blind to group allocation at baseline?
- Were assessors blind to group allocation?
- Were there any unexpected imblanaces in drop-outs between groups? Is so, were they explained or adjusted for?
- Did the analysis include an intention to treat analysis?

For all studies:
- Quality of intervention:
  - Is the intervention standardised?
  - Has the intervention been appropriately implemented?
  - Were the facilitators of the intervention trained to do so?
  - Was the performance of facilitators measured?
  - Was the intervention delivered as planned? (e.g. were sessions attended, did participants comply with home practice)
- Are the outcomes measured relevant and meaningful?
- Are the outcome measures standardised, reliable and valid?
- Are the statistical analyses appropriate?
- Can observed effects be attributed to the intervention?
- Are the authors' interpretations of the findings valid? Are they over-stated?
- How generalisable are the results to other cancer patients?

Appendix E

Demographics form

Demographics

DATE:……

1) NAME

First name……. Last name……

2) DATE OF BIRTH……..Age:…….

3) SEX:

☐ Male ☐ Female

4) MARITAL STATUS:

☐ Married ☐ Divorced/Separated ☐ Widow(er)

☐ Single ☐ Cohabiting

5) DO YOU HAVE CHILDREN?

☐ No ☐ Yes If Yes, how many?.....

6) WHAT IS YOUR ETHNIC BACKGROUND

☐White British	☐White Irish	☐White other	☐Asian Indian
☐Asian Pakistani	☐Asian Bangladeshi	☐Asian Other	☐Black British
☐Black Caribbean	☐Black African	☐Black Other	☐Chinese

Other Ethnic group……..

7) TYPE OF TRANSPLANT

☐ Autologous ☐ Allogenic

MEDICAL STATUS/DIAGNOSIS……..
……
……

Appendix F

Mindful Attention and Awareness Scale

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 what I'm doing.	1	2	3	4	5	6
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

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

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 G

Self-Compassion Scale

HOW I TYPICALLY ACT TOWARDS MYSELF IN DIFFICULT TIMES

Please read each statement carefully before answering. In the box to the right of each item, indicate how often you behave in the stated manner, using the following scale:

Almost never				Almost always
1	2	3	4	5

1. I'm disapproving and judgmental about my own flaws and inadequacies.	
2. When I'm feeling down I tend to obsess and fixate on everything that's wrong.	
3. When things are going badly for me, I see the difficulties as part of life that everyone goes through.	
4. When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world.	
5. I try to be loving towards myself when I'm feeling emotional pain.	
6. When I fail at something important to me I become consumed by feelings of inadequacy.	
7. When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am.	
8. When times are really difficult, I tend to be tough on myself.	
9. When something upsets me I try to keep my emotions in balance.	
10. When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.	
11. I'm intolerant and impatient towards those aspects of my personality I don't like.	
12. When I'm going through a very hard time, I give myself the caring and tenderness I need.	
13. When I'm feeling down, I tend to feel like most other people are probably happier than I am.	
14. When something painful happens I try to take a balanced view of the situation.	
15. I try to see my failings as part of the human condition.	

Almost never				Almost always
1	2	3	4	5

16. When I see aspects of myself that I don’t like, I get down on myself.	
17. When I fail at something important to me I try to keep things in perspective.	
18. When I’m really struggling, I tend to feel like other people must be having an easier time of it.	
19. I’m kind to myself when I’m experiencing suffering.	
20. When something upsets me I get carried away with my feelings.	
21. I can be a bit cold-hearted towards myself when I'm experiencing suffering.	
22. When I'm feeling down I try to approach my feelings with curiosity and openness.	
23. I’m tolerant of my own flaws and inadequacies.	
24. When something painful happens I tend to blow the incident out of proportion.	
25. When I fail at something that's important to me, I tend to feel alone in my failure.	
26. I try to be understanding and patient towards those aspects of my personality I don't like.	

Appendix H

Hospital Depression and Anxiety Scale

HADS

Please indicate in every box below the statement which best describes your feelings during the **past week.** Try to avoid thinking too long about your answers.

I feel tense or 'wound up':

- ○ Most of the time
- ○ A lot of the time
- ○ From time to time, occasionally
- ○ Not at all

I still enjoy the things I used to enjoy:

- ○ Definitely as much
- ○ Not quite so much
- ○ Only a little
- ○ Hardly at all

I get a sort of frightened feeling as if something awful is about to happen:

- ○ Very definitely and quite badly
- ○ Yes, but not too badly
- ○ A little, but it doesn't worry me
- ○ Not at all

I can laugh and see the funny side of things:

- ○ As much as I always could
- ○ Not quite so much now
- ○ Definitely not so much now
- ○ Not at all

Worrying thoughts go through my mind:

- ○ A great deal of the time
- ○ A lot of the time
- ○ From time to time, but not too often
- ○ Only occasionally

I feel cheerful:

- ○ Not at all
- ○ Not often
- ○ Some of the time
- ○ Most of the time

I can sit at ease and feel relaxed:

- ○ Definitely
- ○ Usually
- ○ Not often
- ○ Not at all

I feel as if I am slowed down:

- ○ Nearly all the time
- ○ Very often
- ○ Sometimes
- ○ Not at all

I get a sort of frightened feeling like 'butterflies' in the stomach:

- ○ Not at all
- ○ Occasionally
- ○ Quite often
- ○ Very often

I have lost interest in my appearance:

- ○ Definitely
- ○ I don't take as much care as I should
- ○ I may not take quite as much care
- ○ I take just as much care as ever

I feel restless as I have to be on the move:

- ○ Very much indeed
- ○ Quite a lot
- ○ Not very much
- ○ Not at all

I look forward with enjoyment to things:

- ○ As much as I ever did
- ○ Rather less than I used to
- ○ Definitely less than I used to
- ○ Hardly at all

I get sudden feelings of panic:

- ○ Very often indeed
- ○ Quite often
- ○ Not very often
- ○ Not at all

I can enjoy a good book or radio or TV program:

- ○ Often
- ○ Sometimes
- ○ Not often
- ○ Very seldom

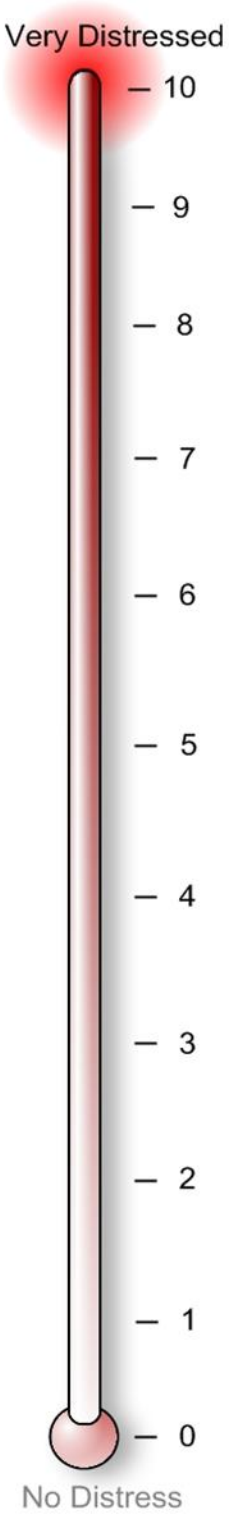
Appendix J

Distress Thermometer

Patient Concerns Checklist

Pan-Birmingham NHS
Cancer Network
Cancer Psychology Services

Using the thermometer, please circle a number that best describes how much distress you have felt in the past week, including today.



Next, please tick any of the following concerns that has been a cause of distress for you in the past week, including today.

Practical / Social Concerns:

- ❑ Child Care
- ❑ Housing
- ❑ Insurance / Finances
- ❑ Getting to places
- ❑ Work / College / School issues
- ❑ Feeling isolated
- ❑ Housework / Shopping
- ❑ Washing / Dressing
- ❑ Walking / Getting around
- ❑ Preparing meals / Drinks
- ❑ Sexual functioning

Family / Relationship Concerns:

- ❑ Children
- ❑ Partner
- ❑ People close to you
- ❑ Looking after parents
- ❑ Intimacy

Emotional Concerns:

- ❑ Depression
- ❑ Fears / Worries
- ❑ Sadness / Grief
- ❑ Anger
- ❑ Panicky
- ❑ Restlessness / Unable to relax
- ❑ Nervousness
- ❑ Confusion / Understanding
- ❑ Unable to make plans
- ❑ Loss of interest in usual activities
- ❑ Too much / little information
- ❑ Conflicting / confusing information

Physical Concerns:

- ❑ Nose dry/congested
- ❑ Breathing difficulties / Coughing
- ❑ Mouth sores / Oral Health
- ❑ Eating / Drinking (swallowing)
- ❑ Nausea / Vomiting
- ❑ Indigestion
- ❑ Changes in bowel / Constipation or Diarrhoea
- ❑ Changes in urination
- ❑ Fatigue / Tiredness
- ❑ Fevers / Temperature changes
- ❑ Swelling
- ❑ Tingling in hands/feet
- ❑ Changes to skin/nails/hair
- ❑ Pain / Changes in sensation
- ❑ Poor sleep
- ❑ Memory / Concentration
- ❑ Body Image
- ❑ Genital / Gynaecological
- ❑ Fertility
- ❑ Weakness
- ❑ Weight Loss
- ❑ Wound Care
- ❑ Balance
- ❑ Hearing
- ❑ Seeing
- ❑ Speech

Spiritual / Religious Concerns:

- ❑ Loss of faith
- ❑ Loss of meaning / purpose in life
- ❑ Relating to God
- ❑ Why me?

Other problems:

Appendix K

Patient Information Sheet

University Hospital Birmingham NHS Foundation Trust

Patient Information Sheet

Study title: Coping and resilience in patients undergoing Bone Marrow or Stem Cell Transplant

You are being invited to take part in a research study. Before you decide whether or not you would like to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and talk to others about the study if you wish. Feel free to ask us if there is anything that is not clear or if you would like more information.

The purpose of the study
This research is being conducted as part of a Clinical Psychology Doctorate qualification with the University of Birmingham. In this research we want to find out whether certain ways of thinking are helpful to patients undergoing a Bone Marrow or Stem Cell Transplant. Previous research has shown that particular ways of thinking have been helpful to people going through other types of difficult life events. A Bone Marrow or Stem Cell Transplant can be a particularly difficult experience for a number of different reasons, so we want to know whether the same ways of thinking will help people to cope with it.

Why have I been chosen?
You are being asked to take part in this research because you have been admitted to hospital to undergo a Bone Marrow Transplant or Stem Cell Transplant. We are hoping to have 60 patients take part in our study altogether.

Do I have to take part?
No. It is up to you to decide whether or not to take part. If you do, you will be given this information sheet to keep and you will be asked to sign a consent form. You are still free to withdraw from the study at any time without giving a reason. If you decide not to take part or to withdraw from the study, it will not affect your treatment in any way.

What will happen to me if I take part?
If you agree to take part in the study, you will be asked to fill in five forms. The first form asks for some background information about you. The others are questionnaires that ask about different ways of thinking, or about how you have been feeling. It should take around 30 to 40 minutes to finish the questionnaires.

What do I have to do?
You will be asked to fill in the questionnaires before you start your treatment. You might choose to do this the evening before your treatment starts or first thing in the morning. The researcher will try to visit you to collect the questionnaires before you start your treatment. This will be an opportunity for you to give any feedback about the study or ask any questions you might have.

What are the possible disadvantages and risks of taking part?
As some of the questionnaires ask you about how you are feeling you might become more aware of negative, sad or anxious feelings. If this happens, you may contact the researcher (details below) or talk to your GP, Oncologist, or Clinical Nurse Specialist. You can also ask for a referral to the Cancer Psychology Service for extra support.

What are the possible benefits of taking part?
For you personally, there is no direct benefit of taking part in this study. However, by taking part in this research you could benefit future patients like yourselves. We hope that the results of the study will improve our understanding of what might be helpful to patients undergoing Bone Marrow or Stem Cell Transplant.

What if there is a problem?
If you have a concern about any aspect of this study, you should contact the researchers who will do their best to answer your questions (contact details below).
If you remain unhappy and wish to complain formally, please contact:
Dr Brendan Laverty, Assistant Director, Research & Commercial Services,
Aitchison Building, University of Birmingham, Edgbaston, B15 2TT,
Tel: 0121 414 7618

Will my taking part in the study be kept confidential?
Yes. All information which is collected about you during the course of the research will be kept confidential. Any information about you which leaves the hospital will have your name and address removed so you cannot be recognised from it. If you consent to take part in the study, your GP and other doctors treating you will be told that you are taking part. By signing the consent form you are agreeing for this to happen.

What will happen to the results of the research study?
A report of the study will be submitted to a scientific journal for publication. We will also produce a short written summary of our findings for participants. If you would like to receive a copy of this, please contact the researcher. You will not be identified in any report or publication of the study.

Who has reviewed the study?
This study has been approved by Coventry Research Ethics Committee.

Contact Details

Name of researcher: **Emily Holden**
Company: School of Psychology, University of Birmingham
Telephone: [redacted]
Mobile telephone: [redacted]

Appendix L

Consent Form

Consent Form

Title of Project: Coping and resilience in patients undergoing bone marrow or stem cell transplant

Name of Researcher: Emily Holden

I confirm that I have read and understand the information sheet dated 2nd April 2009 (version 2) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.

I understand that relevant sections of any of my medical notes and data collected during the study, may be looked at by responsible individuals from the University of Birmingham, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.

I agree to my GP being informed of my participation in the study.

I agree to take part in the above study.

Name _____ Signature_____ Date _____

Researcher _____ Signature _____ Date_____

Name of Person taking _____ Signature_____ Date_____
consent (if different from researcher)

Appendix M

Letter confirming Ethical Approval