

The acceptability and potential benefits of mindfulness-based interventions in improving psychological well-being for adults with advanced cancer: A systematic review

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ABSTRACT

Objective: In spite of supportive care for people affected by cancer being well recognized as a priority for research, there is little solid evidence of the effectiveness of psychological interventions using mindfulness for those with advanced cancer. This systematic review aims to describe, evaluate and synthesize the acceptability and potential benefits of mindfulness-based interventions (MBIs) for the psychological well-being of people with advanced cancers.

Methods: Eight databases were searched and terms related to advanced stages of cancer and mindfulness were combined systematically to identify relevant published literature. Inclusion criteria were studies with adults only and all types of cancer at stages III and IV. There was considerable variety in the MBI treatment packages including in the extent and centrality of mindfulness in the interventions.

Results: Of 312 identified studies, only 8 included MBIs for people with advanced cancer rather than their families or carers. Results from these studies suggests that MBIs are acceptable and beneficial to the advanced cancer population, improving quality of life, use of mindfulness skills, acceptance of their cancer situation and reduction in depression and anxiety. Some adaptations were recommended however regarding delivery, simplified briefer MBIs, abbreviated session time, flexibility concerning locality of treatment and a minimized questionnaire burden for this group.

Conclusions: MBI packages reviewed in this study had evidence of acceptability and of effectiveness, indicating potential benefit for this population. Individualized, including home-based interventions may be optimal to allow critically ill patients to participate in treatment. In future, MBIs adapted to the needs of various advanced cancer patients are recommended to address the gap in the field and improve health care.

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1. Introduction

Mindfulness meditation was initially developed and applied to those with significant medical conditions by Jon Kabat-Zinn in 1979, with the results published in 1982 [1]. Numerous subsequent studies have shown considerable evidence about the benefits of practicing mindfulness meditation for those who face a range of health problems [2–4]. Cancer is one of these conditions that often leads to mental distress, worries, fear for the future, shock, hopelessness, anger, a sense of unfairness, and sometimes denial [5]. For some people, avoidance of the implications of their diagnosis is the only way they see to keep living.

Denying the diagnosis does not change the fact that the cancer is present at an advanced stage so moving to a position of acceptance can be an important element of an active coping process. With an attitude of acceptance, the person can embrace all kinds of experiences, including the negative ones, though the concept of acceptance in this sense should not be confused with pessimism, giving-up or resignation [6].

Advanced cancer is by definition unlikely to be cured [7,8], and the diagnosis of a life-threatening illness has a significant impact on an individual's life. Apart from the physical suffering during the processes of surgery, chemotherapy and radiotherapy, emotional suffering is great, affecting not only the patient but their families, caregivers, partners, friends and community. Being diagnosed with advanced cancer is a very frightening experience; for some it may be a slowly progressing illness, for others it is more rapid [8]. Emotional reactions and existential questions arise when the patient becomes aware of the disease's progression. At the end of life, patients usually experience many physical changes, but in addition to that, a sense of loss, altered roles, difficulty in achieving goals, and awareness of the distress of loved ones, all compounding the levels of distress and suffering [9].

These symptoms and effects of the disease course, however, may be moderated by the use of adaptive coping strategies, the best outcome being a positive adjustment that allows for personal growth and resilient coping with a difficult situations [10]. In order to cope with stressful situations, mindfulness is increasingly being used for stress reduction. Mindfulness is *"the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment"* ([11] p145).

Through mindfulness practice a decentered perspective is reinforced, where a shift is made from perceiving negative thoughts as distressing or dangerous to being seen as impersonal and part of a process [12]. Mindfulness meditation also cultivates the ability to be in the present moment, in an accepting and non-judgmental

way [13]. The formal Mindfulness-Based Stress Reduction (MBSR) program, devised in the 1990s, has been widely adopted in clinical settings [14–18]. The program is an eight week course of 2.5 h of mindfulness sessions per week usually delivered in groups, and an 8-h retreat day of silent mindful practice, usually delivered in groups [19].

There are numerous studies of mindfulness-based interventions (MBIs) used for patients with different types of cancer, mostly in the early stages of the illness [16–18,20–29]. Very few of these studies, however, have involved patients with advanced stages of cancer, despite the fact that these patients are facing the greatest challenge in coping with incurable, end-stage cancer [30]. The complexity of undertaking research with this specific group has meant that until recently there has been little solid evidence of the effectiveness of psychological treatments for those affected by advanced stages of cancer [31].

Patients with advanced or incurable cancer have higher levels of need for support than patients whose cancer has stopped growing, therefore it is advantageous if psychological interventions are tailored to those patients who require them the most. In the United Kingdom, psychological adjustment to a diagnosis of incurable cancer has long been identified by the National Health Services research strategists as a priority area for research [32].

There is now an emerging body of research trials on the delivery of psychological interventions to advanced cancer populations. These include Dignity Therapy [33], Meaning and Purpose Therapy (MaP) [34] Meaning-Centered Psychotherapy Palliative Care version (MCP-PC) [35], Managing Cancer and Living Meaningfully (CALM) [36], Meaning-Centered Group Psychotherapy (MCGP) [37], Individual Meaning-Centered Psychotherapy (IMCP) [38,39]. None of these trials included mindfulness components.

1.1. MBIs and their use in patients with advanced stages of cancer

The practice of mindfulness involves nonjudgmental observation of the constantly changing stream of stimuli as they arise, including thoughts, memories, bodily sensations, and emotions. That is, people learn to notice all of these events as they occur, without making judgments about their relative worth or importance [40].

Advanced cancer patients commonly appear to oscillate between their present life situation and the reality of their future [41]. Some sources of stress for cancer patients however relate to concerns about the past: these might include attributions about cancer causation or regrets about past decisions or weighing life priorities; other worries are related to the future. A fundamental aspect of mindfulness meditation that may have particular salience for

cancer patients is the 'here-and-now' orientation, that is, the "radical insistence" on paying attention to present-moment reality [15]. Regarding the fear that life could end at any moment, a study reported that cancer patients cope better with their situation by refraining from forming expectations and choosing to live one day at a time to avoid disappointment [5]. This ability to live one day at a time is consistent with cultivating the present moment practiced in MBIs. Other relevant mindful coping skills of potential benefit to the cancer population may include awareness of the present moment, constructive self-distraction and a non-judgemental acceptance of situation [42].

This systematic review aims to describe, evaluate and synthesize the peer-reviewed literature on the acceptability and potential benefits of MBIs on the psychological well-being of those with advanced stages of cancer, in order to contribute insights for further improvement in delivering psychological interventions to this group.

2. Methods

This review has utilized the PRISMA-P preferred reporting methods [43] and Gysels' methodology for conducting systematic reviews as the latter is used for palliative care research, relevant to the participant group in this review [31].

Systematic review registration number (Prospero): CRD42017067925.

2.1. Search strategy

The literature was thoroughly searched by the authors in consultation with an experienced librarian. A combination of key words was used for the concepts of advanced cancer and mindfulness-based interventions; the search terms are detailed below. Results were organized and classified in categories into an Excel table and duplicates were removed.

Additional papers were identified via hand searches in the reference list of key articles. The literature was searched between December 2016 and February 2017, and no publication year was delimited in order to reach the broadest number of papers existent in the literature.

2.2. Electronic database

To maximize coverage, eight electronic databases were searched: PubMed, AMED (Allied and Complementary Medicine), EBM Reviews - Cochrane Central Library, ERIC, Ovid Nursing Database, PsycINFO, Ovid MEDLINE(R) and EMBASE.

2.3. Search terms

To identify publications relating to MBIs for adults with advanced stages of cancer, the following search terms were combined: (*Mindfulness OR Acceptance and Commitment Therapy*) AND (*advanced cancer OR advanced stage cancer OR metastatic cancer OR terminal cancer OR cancer stage IV OR cancer stage III OR palliative care OR incurable cancer OR end stage cancer OR terminally ill*).

The search term "patient" was not used as studies often employ more general terms like "participants".

Inclusion criteria

- Mindfulness-based intervention
- All adults 18 years or older, of any ethnicity;
- Stage III and IV cancer of any type.
- Written in the English language

Exclusion criteria

- Studies including mixed participants, such as cancer patients and caregivers, partners or family members;
- Studies including MBIs provided for health care professionals;
- Unpublished studies, conference presentations, book chapters, dissertations and protocol studies;
- A number of papers using the same clinical trial were excluded where researchers published more than one paper based on the same sample; in this case the article closest in intent to the inclusion criteria was used.

No confidential data or patients' identification were included in this review, subsequently no ethical requirements were necessary.

2.4. Risk of bias (RoB) assessment

RoB assessment followed the Cochrane guidelines for randomized controlled trials [44] and the EPOC guidelines for other trials [45].

The RoB tool assessed random sequence generation of the allocation; concealment of allocation; blinding of outcome assessment and dealing with incomplete outcome data.

3. Results

3.1. Search strategy

Fig. 1 presents the results of the study selection procedure.

From the 312 papers initially identified, 133 were eliminated by removing duplicates, a further 61 were excluded after screening according to the inclusion criteria, and a further 110 were excluded by the exclusion criteria, as depicted in Fig. 1.

Eight MBI studies on adults with advanced stages of cancer were identified for inclusion in this literature review. The researchers examined different types of MBIs provided for adults with advanced stages of cancer (stage III and IV) of any type of cancer. A total of 456 advanced cancer patients participated across the eight studies included in this review, 263 were in the MBI arm. Details of the eight studies are shown in Table 1 with a narrative synthesis presented below.

3.2. Characteristics of included studies

3.2.1. Content and delivery aspects of the MBIs

The designs selected in the studies were mostly randomized controlled trials (RCT), but three studies used an open trial design [46–48]. This systematic literature review includes the open trials as well due to the paucity of RCT studies focused on this topic with this specific population.

The MBIs included in this review were heterogeneous in content and delivery. In order to deliver MBIs to people with different health conditions, some traditional courses were adjusted to offer shorter versions, and reduced session hours. Other interventions included mindfulness along with other components, for example, acceptance and art therapy.

In the papers reviewed there were several types of MBIs delivered to cancer patients that showed benefits and acceptability, but some logistical problems and limitations were reported depending on the target patient population receiving the MBI.

One study used Mindfulness-Based Stress Reduction (MBSR) which uses a combination of meditation practice with focus on the present moment, body scan, some yoga postures and body awareness to enhance self-management and coping [48]. Two studies used the Body Scan Meditation (BSM) from (MBSR), which

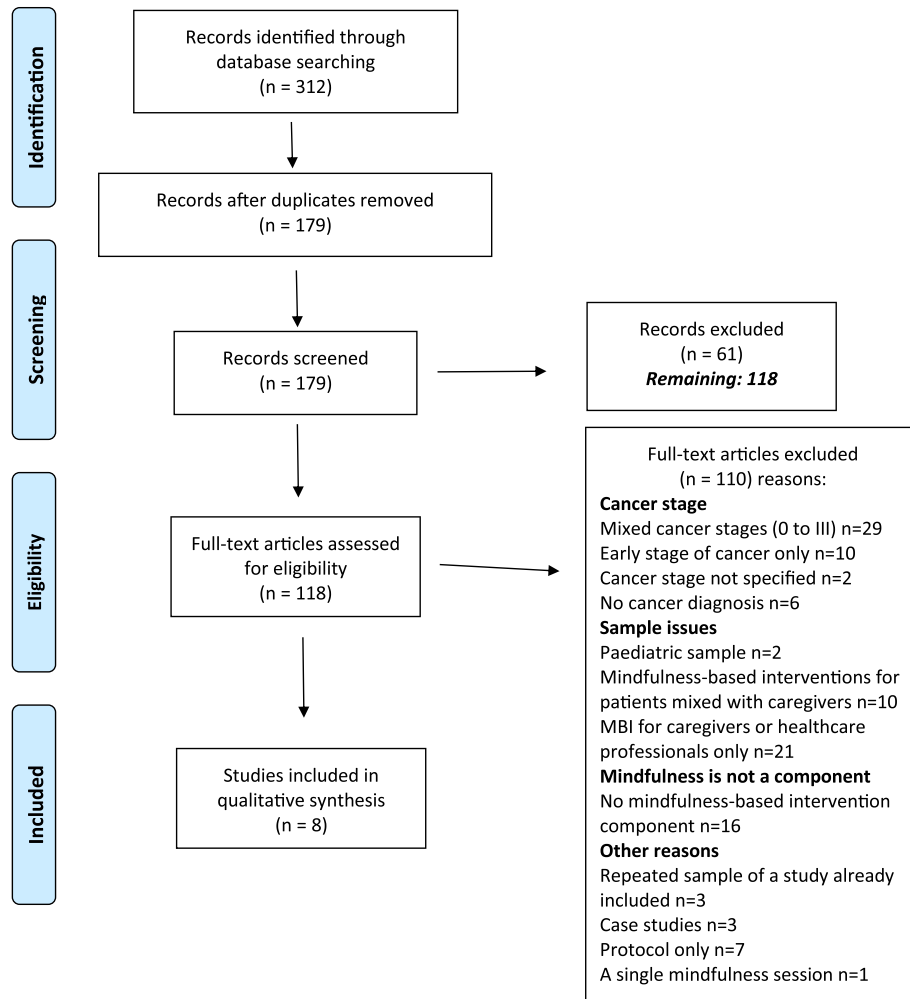


Fig. 1. Study selection procedure.

entails focusing one's attention on different regions of the body to obtain mindful awareness [49,50]. Two studies applied Mindfulness-Based Cognitive Therapy (MBCT) where people learn to decenter negative feelings and thoughts, letting the mind acknowledge automatic patterns of thoughts and responding to them in skillful ways with awareness of what is actually happening and meditation practice [47,51] and one study used Acceptance and Commitment Therapy (ACT) covering meditation practice, elements of acceptance of life events, including unwanted ones by just noticing and embracing them in order to clarify personal and meaningful values and to take action on them, the main goal is to develop psychological flexibility [52].

One study used the Lessons In Linking Affect and Coping (LILAC) intervention [53] where participants are taught specific skills designed to increase the frequency of positive emotions they experience in their daily lives, and one study introduced the Mindfulness Art Therapy Short Version [46], which consists of recorded meditations for learning and practicing mindfulness and after mindfulness practice, patients are provided with art materials (clay, collage materials, drawing materials, watercolors, and sketch books) to make art expressing their feelings or emotions freely. In this intervention, adaptation to significantly shorter mindfulness sessions from the original was made. Most of the MBIs use the traditional length and duration of an eight week course with home practice, using mindfulness CDs of 30–45 min practices per day [19].

Facilitators of the MBIs included a yoga specialist [46], health professionals trained in mindfulness [47,51], a MBSR teacher [48], a trained music therapist [50], interviewers trained for the study purpose [53] and a PhD level clinical psychologist [52]. One study did not report the facilitator's qualifications [49].

3.2.2. Recruitment

The majority of studies recruited participants from local hospitals/oncology units. The MBIs were mostly delivered to participants in group formats [47–51,53], and only two studies provided the sessions individually [46,52].

The mindfulness session delivery settings were not reported in three studies [46,47,49]. The remaining studies delivered the MBI at a hotel facility [48]; hospital palliative care unit [50]; university cancer centre [53] and via telephone/teleconference [51], in the last case the participants must have participated from their own homes. One intervention was delivered at four different places: the experimenter's clinical office, the chemotherapy treatment room, an inpatient hospital room and a physical exam room [52].

3.3. Review of study outcomes

Outcomes relevant to this review included quality of life (mental components), mental health (anxiety, depression, distress), and aspects related to mindfulness. Four studies did not report mindfulness outcomes [46,49,50,52].

Table 1

Studies included in the review that include a MBI for advanced cancer.

Study and location	Study design	Sample	Intervention type, Group or individual and settings.	Length	Facilitator	Wellbeing related outcomes	Acceptability	Dropout % (reasons)	Results
Study 1 Tsang et al. (2012) [49] China	RCT	Trial n = 48 MBI arm n = 28	BSM from MBSR Group	Length not reported 2 sessions: 90 min of BSM + 45 min of BSM audio + home practice	Not reported	Mental Component Summary (MCS): Role Emotion, Vitality, Social Function, Mental Health	Not reported	30% (Participants admission to hospital and died)	Better vitality, less influence by their emotions, became more peaceful, happy and calm, improved general health
Study 2 Eyles et al. (2015) [48] UK	Open trial	End stage cancer Trial n = 19 MBI arm n = 19	Setting not reported MBSR Group.	8 weeks 6 sessions: 2 to 2½ h each + 4½ h meditation day + home practice 30 min/day	MBSR teacher	Fatigue, anxiety, depression, quality of life, mindfulness and disease specific quality of life	Intervention was acceptable supported by qualitative data	0.05% (Treatment length, patients too ill to participate, travel issues and session clashed with other treatment)	Improvement in anxiety, ability to sleep, quality of life. Became more accepting and able to cope with life and relationships and improved mindfulness skills in decentering
Study 3 Chambers et al. (2017) [51] Australia	RCT	Metastatic breast cancer Trial n = 190 MBI arm n = 94 Advanced prostate cancer	At a hotel facility. MBCT Group Via teleconference.	8 weeks 8 sessions: 1.25 h each	Oncology health professionals trained in MBCT	Psychological distress, cancer specific distress, prostate-specific antigen anxiety, quality of life, benefit finding and mindfulness skills	72% rated MBCT very to extremely helpful	24% (Being physically unwell, finding it too time intensive and died)	No improvement in psychological distress neither in mindfulness skills. Tele-based MBCT was considered not efficacious
Study 4 Ando et al. (2016) [46] Japan	Open trial	Trial n = 10 MBI arm n = 10 Advanced cancer (IV)	MATSV Individual Setting not reported	3 weeks 2 sessions: 1 h each	Yoga specialist trained in MBSR and a counsellor pastoral care worker	Spiritual wellbeing (meaning of life and religious issues)	Not reported	0% dropout	Increase in vigour
Study 5 Rost et al. (2012) [52] USA	RCT	Trial n = 47 MBI arm n = 25 Stage III or IV ovarian cancer	ACT Individual At the experimenter's clinical office, chemotherapy, inpatient hospital, exam room	16 weeks 12 sessions: 1 h each	PhD level clinical Psychologist.	Depression, anxiety, distress, emotional control, thoughts suppression, quality of life, acceptance and mental disengagement	Not reported	40% (Transferred to home base hospice care, travel issues and died)	Decrease in psychological distress, depression, anxiety and experiential avoidance. Higher quality of life, became more accepting of their situation
Study 6 Chambers et al. (2012) [47] Australia	Open trial	Trial n = 19 MBI arm n = 19 Advanced prostate cancer	MBCT Group Setting not reported	8 weeks 8 sessions: 1 h each + 4 h meditation day	Psychologist with experience in oncology, trained in MBCT	Anxiety, depression, cancer-related distress, prostate cancer-specific quality of life and mindfulness skills	Program reported to be "quite a bit" or "very" helpful (84.6%) and participants would recommend it	36% (Symptom burden, completing treatment demands, did not engage with the therapy approach and died)	Increased usage of mindfulness skills and acceptance of their cancer situation
Study 7 ^a Warth et al. (2015) [50] Germany	RCT	Trial n = 84 MBI arm n = 42 Malignant tumour disease	BSM from MBSR Group At Palliative Care unit from hospital	4 days 2 sessions: 30 min each	Trained music therapist	Relaxation, general wellbeing, acute pain and quality of life	High acceptability	1% (Anxiety, pain, scheduling clashes, rapid deterioration and died)	Improvement in overall quality of life
Study 8 Cheung et al. (2016) [53] USA	RCT	Trial n = 39 MBI arm n = 26 Stage IV breast cancer	LILAC Group At a University Cancer Centre	5 weeks 5 sessions: 1 h each + home practice	Experienced interviewers trained for the study purpose	Depression, positive/negative emotion, cancer specific quality of life and positive coping (mindfulness, positive affect skills, self-compassion and	High acceptability	27% (Distance and/or time constraints, feeling too ill/fatigued to	Reduced depression and negative affect, increased mindfulness, positive affect skills and self-compassion

Table 1 (continued)

Study and location	Study design	Sample	Intervention type, Group or individual and settings.	Length	Facilitator	Wellbeing related outcomes	Acceptability	Dropout % (reasons)	Results
						tendency to be kind and understanding)		participate and died)	

^a On study number 7 the MBI was applied on control group, for this reason results reported in this paper are from control group. BSM: Body Scan Meditation; MBSR: Mindfulness-Based Stress Reduction; MBCT: Mindfulness-Based Cognitive Therapy; MATSV: Mindfulness Art Therapy Short Version; ACT: Acceptance and Commitment Therapy; LILAC: Lessons In Linking Affect and Coping.

3.3.1. Attrition/treatment engagement

Poor health was a major reason for dropout. One study reported that treatment uptake was only 20% of those approached [48]. Dropout ranged from less than 1%–40% of participants. There were diverse reasons for not completing treatment including: health deterioration, being transferred to hospice or hospital, and passing away during the study period, although other logistical reasons were also mentioned including clashing treatment appointments or travel issues (see Table 1). Three studies reported that participants dropped out due to the length of the treatment/intervention [47,48,51]. All of those studies used full length versions (8 weeks) of MBIs.

3.4. Acceptability

A narrative review of acceptability of the included trials is presented in Table 2. Five studies reported participants found the MBI to be acceptable and helpful [47,48,50,51,53]. Potential benefits reported include: positive emotions, less emotional reactivity, reduced symptoms, improvement in quality of life and better coping. Participants also reported improved mindfulness skills. Three studies did not measure or report the interventions' acceptability [46,49,52].

3.5. Risk of bias

Risk of bias was systematically assessed for all included studies (see Table 3). Four of the included studies presented low risk of bias [50–53], for two studies the risk of bias was unclear [46,48] and the remaining two studies presented high risk of bias [47,49]. Further information about the risk of bias assessment of included studies is available in Supplementary Table 1.

3.6. Pre-post effect size for studies outcomes

Effect sizes for key outcomes of MBIs are presented in Table 3. Effect sizes were provided by the authors [46,52,53] or calculated from data provided in the original tables [47,48,50,51]. In one study the means and standard deviation were not provided and no effect size could be calculated [49].

The studies varied greatly in the effect sizes noted. In general the effect sizes were small for most outcomes with the exception of the Rost et al. study [52] which had large to very large effect sizes for all variables examined here.

A large and medium to large effect was also presented in patients' cancer specific quality of life, self-compassion and tendency to be kind and understanding [53] nonreactivity to inner experience [47], depression, mindfulness in decentering, anxiety [48] and vigor-activity [46]. A medium effect was shown in reducing participants' negative emotions, increased mindfulness and positive affect skills [53], increased general well-being and relaxation [50], acting with awareness [47], overall mood [46] and cognitive and

emotional function in quality of life [48]. Four studies did not report mindfulness outcomes [46,49,50,52].

The remaining emotional/psychological outcome domains had small, very small or negligible effect size.

4. Discussion

This systematic review identified eight studies utilising a range of MBIs, and found evidence of acceptability and benefits for these interventions in addressing the psychological well-being of advanced cancer patients. Feasibility issues were identified related to recruitment, delivery settings and duration of interventions.

All but three studies had significant methodological problems and the unclear overall risk of bias means that caution is needed in interpreting the findings, however, several interventions from the studies reviewed in this paper demonstrated potential benefits such as improved general mental health, reduction in cancer pain, improvement in anxiety, and impacting positively on participants' quality of life. Participants are reported to have been more accepting and able to cope with their life and relationships. All the benefits cited by participants demonstrate the helpfulness of the MBIs utilized for this population.

The quality of Rost et al.' study was generally sound, but it is likely that some additional factors contributed to their strong results relative to the other studies. The central acceptance-oriented element of ACT in this MBI may have been the most effective element in improving participants' quality of life, acceptance attitude, level of depression, distress and emotional control. A gender influence may be considered as the sample was 100% female. The study facilitator was a Ph.D. level clinical psychologist, which may have had an impact on the way the intervention was delivered.

The second issue was that the number of studies identified in this systematic review was notably small, despite the importance of psychological/emotional support being highlighted [54–56] for patients with advanced stages of cancer.

Patients at the end of life require constant care, support, the feeling of love and connection to others [57]. Despite this obvious need, the advanced cancer population has been reported as a neglected group without proven interventions to determine effective ways of reducing the psychological distress they experience [51].

While researchers stress the need for further research on mindfulness meditation for terminally ill cancer patients [58], a number of interventions using mindfulness for this target population had as exclusion criteria of patients with cancer in their final/terminal phase [50,59,60] or bed bound patients [48]; another study included only patients with a recent diagnosis of advanced cancer not yet referred to a hospice [30].

There are obvious practical and ethical challenges to research involving participants living with a life-threatening illness, including participants' health conditions affecting their disposition to travel to participate in mindfulness sessions, and to commit to

Table 2
Studies outcomes measures and assessment time points.

Study	Outcome measures	Time Point
Tsang et al. (2012) [49]	<ul style="list-style-type: none"> • Short Form Health Survey (SF 36) • Physical Component Summary (PCS) • Mental Component Summary (MCS) Treatment duration: Not reported	<ul style="list-style-type: none"> • Pre-treatment • Week 1 post treatment • Week 4 post treatment
Eyles et al. (2015) [48]	<ul style="list-style-type: none"> • Brief Fatigue inventory (BFI) • Hospital, Anxiety and Depression Scale (HADS) • EuroQol Five Dimensions Questionnaire (EQ-5D) • Toronto Mindfulness Scale (TMS) • European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30) Treatment duration: 8 weeks	<ul style="list-style-type: none"> • Pre-treatment • Week 4 during treatment • Week 8 during treatment • Week 16 post treatment • Week 24 post treatment
Chambers et al. (2017) [51]	<ul style="list-style-type: none"> • Brief Symptom Inventory (BSI) • Impact of Event Scale (IES) • Prostate Specific antigen Anxiety (PSA) • Functional Assessment of Cancer Therapy-Prostate (FACT-P) • Post-traumatic Growth Inventory (PTGI) • Five Facet Mindfulness Questionnaire (FFMQ) Treatment duration: 8 weeks	<ul style="list-style-type: none"> • Pre-treatment • 12 weeks post treatment • 24 weeks post treatment • 36 weeks post treatment
Ando et al. (2016) [46]	<ul style="list-style-type: none"> • Profile of Mood States (POMS) • Functional Assessment of Chronic Illness Therapy-Spiritual wellbeing (FACIT-Sp) Treatment duration: 2 weeks	<ul style="list-style-type: none"> • Pre-treatment • Post-treatment
Rost et al. (2012) [52]	<ul style="list-style-type: none"> • Beck Depression Inventory II (BDI-II) • Beck Anxiety Inventory (BAI) • Profile of Mood States (POMS) • Courtland Emotional Control Scale (CECS) • White Bear Thought Suppression Inventory (WBTSI) • COPE Inventory • Functional Assessment of Cancer Therapy-General (FACT-G) Treatment duration: 16 weeks	<ul style="list-style-type: none"> • Pre-treatment • End of the 4th session • End of the 8th session • End of 12th session
Chambers et al. (2012) [47]	<ul style="list-style-type: none"> • Hospital Anxiety and Depression Scale (HADS) • Revised Impact of Events Scale (IES-R) • Memorial Anxiety Scale Prostate Cancer (MAX-PC) • Expanded UCLA Prostate Cancer Index (EPIC) • Functional Assessment of Cancer Therapy Prostate (FACT-P) • Five Facet Mindfulness Questionnaire (FFMQ) Treatment duration: 8 weeks	<ul style="list-style-type: none"> • Pre-treatment • Week 8 post-treatment • Week 12 post-treatment
Warth et al. (2015) [50]	<ul style="list-style-type: none"> • Visual Analog Scale (VAS) from 0 to 10 self-rated relaxation, general well-being and acute pain • European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C15-PAL) Treatment duration: 4 days	<ul style="list-style-type: none"> • Before session 1 • After session1 • Before session 2 • After session 2
Cheung et al. (2016) [53]	<ul style="list-style-type: none"> • Center for Epidemiologic Studies Depression Scale (CES-D) • Differential Emotions Scale (modified version) • Multidimensional Quality of Life Scale (cancer) • 12 items mindfulness scale derived from the Kentucky Inventory of Mindfulness Skills (KIMS) and the Southampton Mindfulness Questionnaire (SMQ) • Positive effect scale (developed for the purpose of the study) • Self-Compassion Scale Short Form Treatment duration: 8 weeks	<ul style="list-style-type: none"> • Pre-treatment • Week 1 post-treatment • Week 4 post-treatment

treatment over a significant period of time, leading to dropping out of the interventions.

The third issue is the duration of MBIs, repeatedly reported as a barrier for this population, highlighted during recruitment when many eligible patients declined participation due to the time, level of commitment required [48,51] and completing treatment demands [47]. For those with a life-threatening disease, time becomes very important; patients with advanced cancer have referred to time metaphorically as “the bomb’s ticking” and often rationalize time in proximity to death [41]. For some advanced cancer patients, the risk of being hospitalized means losing time with relatives and things that they treasure, and consideration of ‘time being short’

can even make them postpone contacting the hospital for essential care [61]. Undertaking an additional mindfulness treatment during the course of a demanding chemotherapy regime, for example, may be overly taxing for some patients, and treatment schedules that coincide with the MBIs program attendance are sometimes difficult or impossible to alter [15].

In this review, the studies using short versions of MBIs [46,49,50] reported fewer problems with dropout. Although the practice of mindfulness is considered beneficial, the advantage of obtaining better mental health to cope with the disease could only be acquired according to one research group [49] by continuous practice, for at least one month, for patients with terminal cancer.

Table 3

Pre-post effect size in emotional/psychological outcomes domains of mindfulness-based interventions.

Study	Study design	Risk of bias	Sample	Age	Outcome & measure instruments	Pre-post intervention within group Effect size (CI)	Magnitude
Eyles et al. (2015) [48]	Open trial	Unclear	100% Female	Range 37–65 Average not reported	Anxiety Depression (HADS) Quality of life (EQ5D) • Role function in QoL • Emotional function in QoL • Cognitive function in QoL • Social function in QoL Mindfulness in decentering (TMS)	$d = 0.77$ $d = 1.16$ $d = 0.12$ $d = 0.50$ $d = 0.61$ $d = 0.29$ $d = -0.97$	Medium-large Large Very small Medium Medium Small Large
Chambers et al. (2017) [51]	RCT	Low	100% Male	70.19 years Means (SD): 8.71 Average not reported	Psychological distress (BSI) Quality of life (FACTP) Benefit finding (PGI) Mindfulness skills (FFMQ) • Observing • Describing • Acting with awareness • Nonjudging of inner experience Nonreactivity to inner experience	$d = 0.03$ $d = 0.04$ $d = 0.03$ $d = -0.13$ $d = -0.30$ $d = 0.01$ $d = -0.03$ $d = -0.12$ $d = -0.11$	Negligible Negligible Negligible Very small Negligible Negligible Negligible Very small Very small
Ando et al. (2016) [46]	Open trial	Unclear	100% Female	Range 37–73 Average 56 years	Spiritual wellbeing (FACIT-Sp) Domains of mood state (POMS) • Tension-Anxiety • Vigour-Activity • Confusion-Bewilderment • Overall mood Depression-Dejection	Reported no change $d = -0.35$ $d = 0.78$ $d = -0.45$ $d = -0.50$ $d = -0.36$	No change. Small Medium-large Small Medium Small
Rost et al. (2012) [52]	RCT	Low	100% Female	Range 32–74 Average 56 years	Depression (BDI-II) Anxiety (BAI) Distress (POMS) Emotional control (CECS) Thoughts suppression (WBSI) Quality of life (FACT-G) Acceptance (subscale from COPE) Mental disengagement (subscale from COPE)	$d = 3.31$ $d = 0.98$ $d = 1.06$ $d = 3.76$ $d = 1.97$ $d = 3.31$ $d = 1.59$ $d = 1.58$ $d = 1.83$	Very large Large Large Very large Very large Very large Very large Very large Very large
Chambers et al. (2012) [47]	Open trial	High	100% Male	Range 58–83 Average 67 years	Anxiety (HADS) Depression (HADS) Cancer-related distress (MAX-PC) • Cancer prostate anxiety • Fear of recurrence Prostate cancer-specific quality of life (FACTP) • Social/family well-being • Emotional well-being • Functional well-being Mindfulness (FFMQ) • Observing • Describing • Acting with awareness • Nonjudging of inner experience • Nonreactivity to inner experience	$d = 0.33$ $d = 0.12$ $d = 0.3$ $d = -0.03$ $d = 0.07$ $d = -0.29$ $d = 0.29$ $d = -0.41$ $d = 0.04$ $d = 0.5$ $d = 0.25$ $d = -0.87$	Small Very small Small Negligible Very small Small Small Small Very small Medium Small Large
Warth et al. (2015) [50]	RCT	Low	28.6% Male 71.4% Female	Range not reported Average 63 years	Relaxation General wellbeing Quality of life	$d = 0.62$ $d = 0.56$ $d = 0.31$	Medium Medium Small
Cheung et al. (2016) [53]	RCT	Low	100% Female	Range 30–73 Average 53 years	Depression Positive emotion Negative emotion Cancer-specific quality of life Positive coping • Mindfulness • Positive affect skills Self-compassion and tendency to be kind and understanding	$d = -0.37$ $d = 0.32$ $d = -0.69$ $d = 0.90$ $d = 0.65$ $d = 0.65$ $d = 0.77$	Small Small Medium Large Medium Medium Medium-large

This table contains the studies which provided means and standard deviation for Cohen's d calculation, outcomes shown above are pre and post intervention, no follow ups are measured. In one study the means and standard deviation were not provided and no effect size was able to be calculated [36]. HADS: Hospital, Anxiety and Depression Scale; EQ5D: Euro Quality of Life 5 Dimensions; QoL: Quality of Life; TMS: Toronto Mindfulness Scale; BSI: Brief Symptom Inventory; FACT-P: Functional Assessment of Cancer Therapy Prostate; PGI: Post-traumatic Growth Inventory; FFMQ: Five Facet Mindfulness Questionnaire; FACIT-Sp: Functional Assessment of Chronic Illness Therapy – Spiritual wellbeing; POMS: Profile of Mood States; BDI-II: Beck depression inventory II; BAI: Beck anxiety inventory; CECS: Courtland Emotional Control Scale; WBSI: White Bear Thought Suppression Inventory; FACT-G: Functional Assessment of Cancer Therapy; MAX-PC: Memorial Anxiety Scale Prostate Cancer.

As a result, a number of researchers have conducted MBSR interventions with cancer patients where the session time was reduced [14,22,62,63] when compared to the traditional MBSR program. In adopting this measure, researchers display flexibility and consideration for the circumstances of this group who are very unwell and daily weigh competing priorities around their condition and psychological well-being.

The fourth issue noted is that the majority of studies used group delivery of MBI as mentioned previously. The effectiveness of the MBIs, however, is likely to depend, at least in part, on how useful patients find the particular techniques within the program structure, depending on individual needs, background and personality [15]. These personal needs may be most effectively addressed in individual sessions instead of group sessions, as a facilitator would be more able to pay attention to individual participants' necessities or discomfort and follow up with the treatment at participants' own pace. When measuring patterns of adaptation in improving psycho-spiritual wellbeing for advanced cancer patients, individualized coping interventions may benefit this group more [30], it is also important to consider the burden of participation in group interventions which require higher levels of commitment than individual low-intensity intervention, the longer the duration of the interventions the lower the uptake and adherence for patients with metastatic cancers [64]. In the Rost et al. study [52], the MBI was delivered individually, and this practice may be one of the elements that contributed to the results of 'very large' and 'large' effect sizes of the outcomes measured.

Our narrative review notes as the fifth issue that the delivery settings may influence the way participants receive the treatment. Issues arise around maintenance of privacy and the risk of interruptions if session are convened in clinical settings. Flexibility in facilitation is to be considered.

In that regard, a client-centered approach would work better than a group intervention delivered at a hospital unit/room. For example, in home-based individualized interventions, patients may feel more comfortable and there is no need to travel to attend the treatment. Research demonstrates that when cancer patients do not manage to cope adequately with the disease at home, there is a high risk of hospital readmission [65]. Therefore, if a psychological intervention can enable patients to better cope at home, some admissions may be avoided or reduced.

The sixth issue is related to the questionnaires used by researchers. The Toronto Mindfulness Scale (TMS) [48] was reported as problematic, and some participants advised that they did not understand some of the questions in their context. Most studies used numerous questionnaires (up to 7) [51–53] and some administered these at four to five different time points [48,51]. Considering the potential vulnerability and compromised health of this group, the quantity of questionnaires could be considered a burden, therefore we recommend efforts be made to reduce participant obligations.

This review identified that MBIs are acceptable for adults coping with advanced stages of cancer and provide several benefits in improving psychological well-being. Although the overall risk of bias for all studies was rated unclear, only two studies had a high risk of bias, suggesting that these findings can be accepted, albeit with some caution. However, some adjustments to the delivery of MBIs, particularly the length, should be considered according to the frail health of this population.

Finally, this field is a growing area of research with all studies in this review published between 2012 and 2017. If palliative care patients are to receive the best possible care, there is a need for more clinical trials to increase the evidence base for 'what works' for psychological coping [66]. Further research in the field of advanced stages of cancer should take account the patients'

perspectives in the evaluation of palliative care service delivery [41].

4.1. Limitations

Potentially a narrative style review is limiting. A quantitative meta-analysis was considered, but remained inappropriate as the MBIs reported used different types of interventions, the outcome measures/instruments differ between studies, and some necessary data to perform this analysis could not be obtained [31]. For example, omitted information was the facilitator qualification, the programs acceptability to participants and delivery settings.

Moreover, only four of eight studies measured mindfulness, and those that did use mindfulness scales did not necessarily use the same scales, posing a challenge for comparison between interventions. Failure to use a mindfulness measure was not an a priori exclusion criterion. Those studies that did not measure mindfulness [49] [50] [52] [46] were using an abbreviated mindfulness intervention as part of a broader package. Unfortunately, failure to include a mindfulness measure means that the extent of change in mindfulness, and any conclusions about it being an effective element of those treatments in those studies is unknown.

This review focused on published articles, and did not access the grey literature. Papers were searched in the English language only. Using other search terms might have resulted in more potential studies than the 312 identified however we consider that those chosen were sufficiently broad to capture all relevant studies that used mindfulness in this target group, and that the limited results reflects limited studies in this specific area of interest.

4.2. Clinical implications

The clinical implications of these findings are that some adaptations to the MBIs must be considered given the target population's needs, including use of simplified MBIs: shorter session duration, shorter treatment course duration; and more flexibility of the facilitator in delivery and setting; where individualized home-based interventions may be optimal to allow patients facing life-limiting cancers to participate in this kind of treatment.

The practice of MBIs with terminal patients as well as research with this population needs, to take into consideration the ethical and methodological obstacles identified in this review.

5. Conclusion

In conclusion, this review suggests that MBIs are acceptable to and potentially beneficial for people with advanced cancer, and further MBIs adapted to the needs of advanced cancer patients are encouraged to address the issue in the field and to improve the psychological support options provided for people with advanced cancer by health care services.

Conflicts of interest

The authors report no conflict of interest.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.ctcp.2017.12.014>.

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