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ORIGINAL PAPER

The Effects of Mindfulness-Based Cognitive Therapy on Depressive Symptoms in Elderly Bereaved People with Loss-Related Distress: a Controlled Pilot Study

Maja O'Connor · Jacob Piet · Esben Hougaard

Abstract We examined the effects of mindfulness-based cognitive therapy (MBCT) on symptom severity of depression, complicated grief, posttraumatic stress, and working memory in elderly bereaved people with long-term bereavement-related distress. A non-randomized, controlled pilot design was used in a sample of elderly bereaved people (mean age=77 years) with long-term bereavement-related distress. Results were compared between MBCT intervention group completers (n=12), intervention group intention to treat (n=18), and wait list controls (n=18) at pre- and post-intervention and at a 5-month follow-up. Compared to wait list controls, MBCT reduced depressive symptoms significantly in intervention completers at follow-up (Hedges' g=0.84, p=0.04) with significant interaction between group and time (Hedges' g=0.88, p=0.02). No other significant outcome differences between groups were observed, although the interaction effect on working memory at post-intervention approached a significant level (Hedges' g=0.35, p=0.09). In the wait list group, 29 % had elevated depressive symptoms both before intervention and at follow-up. In the intervention group, 50 % of the completers had elevated depressive symptoms before intervention, but 0 % had elevated symptoms at follow-up. MBCT appears to reduce depressive symptoms in this sample of elderly bereaved people, but further studies of the effects of MBCT in this population are needed for firm conclusions.

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Introduction

Most bereaved persons go through an often painful but natural grieving process after the death of a loved one (Bonanno et al. 2008; Raphael 1977). However, approximately 15 % experience a more problematic grieving process with elevated symptoms of depression and/or posttraumatic stress symptoms (PTSS; Bonanno and Kaltman 1999). Bereaved people with such grief reactions often suffer from severe physical and mental health problems at great personal and socioeconomic cost (Stroebe et al. 2007). Due to cumulative losses in late life and potential age-related vulnerability (for instance due to physical illness, reduced physical function, reduced working memory capacity and other types of cognitive decline, and reduced size of social networks; Woods and Clare 2008), it is likely that elderly people who lose a spouse enter bereavement from a more problematic general health baseline compared to younger widows and widowers (Hansson and Stroebe 2007). Two months post-loss, it has been found that 16 % of elderly bereaved people had significant PTSS and that this frequency remained stable across the first 18 months post-loss (O'Connor 2010). While not the case for all elderly bereaved people, it appears that for a significant minority, the loss of a spouse in old age is related to severe psychological distress and that the level of distress remains high for a long time after the loss (Carr 2008; O'Connor 2010).

Mindfulness-based cognitive therapy (MBCT) (Segal et al. 2002) is a group-based clinical intervention used for depressive relapse prevention and reduction of psychological distress symptoms. MBCT integrates elements of cognitive–behavioral therapy (Beck 1976) with systematic training in mindfulness meditation (Kabat-Zinn 1990). The aim of MBCT is to teach

participants to become more aware of and relate differently to their thoughts, feelings, and bodily sensations (Segal et al. 2002). Through practicing mindfulness exercises, the participants are taught to turn toward and accept intense emotional distress and bodily sensations in a non-judgmental way. In particular, they are taught to discover automatic reactions as they arise, to detach their attention from the content of automatic thoughts, and regulate the attention back to experiences in the present moment, such as the breath or bodily sensations (Segal et al. 2002).

MBCT and other systematic mindfulness training programs have been shown to reduce psychological distress such as depression and anxiety among both younger (Hoffmann et al. 2010; Piet et al. 2010) and older adults (Splevins et al. 2009; Young and Baime 2010; mean age=65 years). One qualitative study investigated the effect of MBCT on symptoms of depression in older adults and found noteworthy reductions of depressive symptoms following intervention (Smith et al. 2007). Another study found significant effects of mindfulness-based stress reduction, an intervention from which MBCT was derived, on emotional distress in elderly people (Young and Baime 2010). The effect of MBCT on psychological distress may be mediated by improved attention control that again may lead to more efficient emotion regulation (Segal et al. 2004; Williams 2010). Increases in emotional regulation have been found to improve well-being (Ivanovski and Malhi 2007).

Mindfulness training has also been shown to improve cognitive resources, i.e., working memory and executive strategies (Jha et al. 2010; Williams 2010; Zeidan et al. 2010), although not yet in elderly or bereaved populations. Interventions that can enhance working memory may be particularly pertinent to elderly people who can expect some degree of age-related cognitive decline, especially after the age of 70 years (Johanson 2008).

It has been suggested that mindfulness training could be a relevant intervention with problematic grief reactions (Kumar 2005), although to our knowledge there are no prior studies of mindfulness training for people with complicated grief (CG). Prigerson et al. (1995) defines CG as a maladaptive reaction to the loss of a loved one. CG is considered a psychiatric disorder specific to interpersonal loss and is characterized by symptoms of general and traumatic anxiety combined with loss-related distress such as yearning for the deceased and preoccupation with the loss (Prigerson et al. 1995). In the present study, we use this definition of CG.

The aim of this pilot study was to investigate the effect of MBCT on psychological distress and working memory in elderly bereaved people with long-term bereavement-related distress. Specifically, it was hypothesized that MBCT (compared to wait list controls) would significantly reduce depressive symptoms, CG, and PTSS and would also improve working memory function in a sample of elderly bereaved people.

Method

Participants

Participants were recruited through a 4-year follow-up to a questionnaire study of reactions to old age spousal bereavement. In the original study (O'Connor 2010), 330 persons aged between 65 and 80 years, who lived in the county of Aarhus, Denmark and who had lost their spouse during 2006, were contacted via the Danish Central Person Register (CPR) approximately 8 weeks after the death of their spouse. The CPR is a national person registration system containing personal information, e.g., regarding age, marital status, name of partner, and place of residence for all Danish inhabitants.

Approximately 4 years post-loss, a package was sent by mail to participants from the original study (O'Connor 2010), containing a follow-up questionnaire, a 50 DKK (approximately US $10) gift voucher, an information letter describing that people who were identified as still being in distress after the loss of their spouse would be invited to participate in MBCT, and a short description of the mindfulness training course (MBCT). Participants were identified as highly distressed and included in the study if they scored in the top third on one of the three measures of psychological distress related directly to the death of the spouse (see "Measures" section for further information). Participants who did not wish to be contacted with further information about MBCT reported this in the questionnaire. The procedure was approved by the local ethics committee, and the data were collected and stored at the Department of Psychology, Aarhus University, Denmark.

We received responses from 213 participants of which 140 potentially were available for the study (see flow chart, Fig. 1). Of these, a total 73 participants were identified as highly distressed and thus included in the study. The intervention group consisted of 37 participants chosen among persons who lived in or around Aarhus City, that is, nearby the place where the intervention took place. The wait list control group consisted of 36 participants who lived further away. We attempted to contact all participants by telephone. Of the 37 persons in the intervention group, four could not be reached and 15 declined, leaving 18 participants (55 %) to start the intervention. Of the 36 persons in the waiting list control group, eight could not be reached and ten declined participation, leaving 18 participants (64 %) in the control group. There were no significant differences between the two groups on inclusion measures or on age, gender, or educational years (see Table 1).

Six participants dropped out of MBCT before the fourth session leaving 12 participants to complete the intervention, while all 18 wait list participants completed the study. There were no significant differences on age, gender, public school,

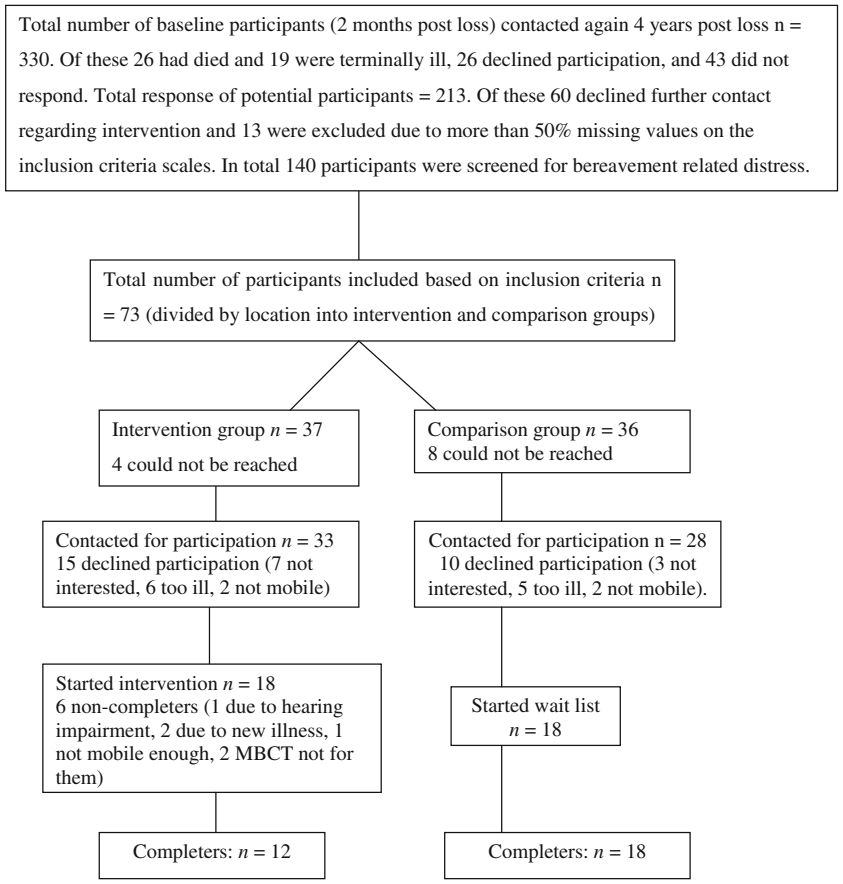

Fig. 1 Flow of participants trough the trial

educational years, or on inclusion measures between the intervention and wait list group or between completers and non-completers in control and wait list group (see Table 1). Analyses were carried out on both intention to treat (ITT)—using the last observation carried forward for the six dropouts in the intervention group (total n= 18)—and on completers only (total n=12). Because in this pilot study we were mainly interested in potential effects of MBCT on the elderly bereaved people who actually completed the intervention, these results are presented and discussed first.

Intervention

MBCT was carried out according to the manual by Segal et al. (2004)) with some minor adaptations to meet the special needs of this group of elderly people. Thus, the sessions of the 8-week program were reduced from 2½ to 2 h per session, and the psycho-educational parts of the program focused on general negative affect instead of depressive symptoms. The main treatment components were mindfulness meditation techniques such as the body scan, gentle mindful yoga exercises, and sitting meditations. We recommended that participants

Table 1 Demographic variables, depressive symptoms, and inclusion criteria scores of all, intention to treat, and completers in the intervention and wait list group at time of inclusion

	Intervention group			Wait list group		
	All *M* (SD)	Intent to treat *M* (SD)	Completers *M* (SD)	All *M* (SD)	Intent to treat *M* (SD)	Completers *M* (SD)
Gender (% male (*n*))	32 (12)	28 (5)	25 (3)	33 (12)	33 (6)	33 (6)
Age	77.7 (4.5)	76.7 (4.5)	76.8 (4.9)	77.4 (4.5)	77 (4.1)	77 (4.1)
Years in public school	8.7 (1.7)	8.2 (1.7)	8.7 (1.8)	8.0 (1.7)	8.2 (1.7)	8.2 (1.7)
Further education years	3.3 (2.6)	4.1 (3.2)	3.0 (2.8)	2.6 (2.3)	3.4 (2.9)	3.4 (2.9)
PTSS	32.5 (6.5)	32.8 (8.2)	33.3 (8.6)	31.3 (7.3)	31.6 (6.4)	31.6 (6.4)
Complicated grief	32.7 (8.2)	32.2 (10.3)	31.7 (11.3)	32.7 (11.8)	33.6 (11.5)	33.6 (11.5)
Depressive symptoms	10.1 (7.0)	9.9 (8.0)	10.9 (7.9)	11.7 (8.8)	12.5 (8.7)	12.5 (8.7)

spend approximately 40 min a day on homework exercises of mindfulness. For homework exercises, a mindfulness CD was given to the participants. The program was followed up by two booster sessions, one at 3 and one at 6 months post-intervention. Participants in the wait list group were offered the same MBCT program after the final assessment at follow-up. The MBCT intervention was conducted by the first and second authors of this paper, who are both experienced mindfulness instructors with formal professional training. Assessment was provided at three data points: (1) 1 to 2 weeks before intervention (pre-intervention), (2) 1 week after (post-intervention), and (3) 5 months after completing the intervention (follow-up).

Measures

The following assessment and outcome measures were used:

The *Beck Depression Inventory* (BDI II) is a 21-item self-report measure, which assesses symptoms of depression (Beck et al. 1988). Each item consists of a set of statements. Respondents choose the sentence that best describes how they have felt during the past 2 weeks (item range 0–3), with a higher score indicating higher levels of depression (scale range 0–63). The internal consistency of the BDI on the three time points in the present study was acceptable (α= 0.68–78).

The *Harvard Trauma Questionnaire—Part IV* (HTQ; Mollica et al. 1992) was used to estimate the occurrence of PTSS. The first 16 items of the HTQ correspond to symptoms of PTSD in the DSM-IV. The total HTQ score in this study was based on the first 16 items. Participants responded to the HTQ based on the death of their spouse and in relation to how they felt in the past month. HTQ ratings according to the DSM-III-R diagnostic criteria of PTSD showed an 88 % concordance with interview-based estimates of PTSD (Mollica et al. 1992). The internal consistency of the PTSS scale on the three time points in the present study was acceptable (α=0.77–83). Participants who scored in the top third of this scale with a total score≥30 were invited to participate in this study.

The Inventory of Complicated Grief—Revised (ICG-R; Prigerson et al. 1995; Jacobs et al. 2000) consists of 15 items focusing on separation distress and traumatic distress related to the loss and rated on a five-point Likert scale (range 15–75; Prigerson et al. 1995). The scale has been found to have good internal consistency (Jacobs et al. 2000), and this was also found across the three time points in the present study high (α=0.89–0.92). Participants who scored in the top third of this scale with a total score≥28 were invited to participate in this study.

The *Centrality of Event Scale* (*CES*) was designed "to measure the extent to which a memory for a stressful event forms a reference point for personal identity and for the attribution of meaning to other experiences in a person's life" (Berntsen and Rubin 2006, p. 220). In this study, the scale was answered with reference to the death of the spouse. The CES consists of seven items rated on a five-point Likert scale and has been found to correlate positively with severity of posttraumatic stress symptoms (Berntsen and Rubin 2006) as well as measures of CG (Boelen 2009). The internal consistency of the scale across the three time points in this study was high (α=0.83–0.92). Participants who scored in the top third of this scale with a total score≥25 were invited to participate in this study.

The HTQ, ICG-R, and CES were the three measures of spousal-death-related psychological distress used for inclusion in the study. CES was used for this purpose alone.

Letter–number sequencing (LNSeq; Wechsler 1997) is designed to assess working memory capacity and consists of seven levels of difficulty. Each level contains three tasks with the same number of digits, starting with two and progressing to seven digits (scale range 0–21). In each task, numbers and letters were presented alternating in a random order, and participants recalled them. This test was administered by telephone according to instructions in the WAIS III Manual (Wechsler 1997). Each participant was instructed to sit in a chair with no table in front facing the nearest door and with no pen and paper within reach. The examiner then orally presented letters and numbers, after first instructing the participant to recall all items, first naming the numbers in ascending order, then naming the letters in alphabetic order. The same items were used at all three test sessions. LNSeq has previously been shown to be reliable and precise when administered by phone as well as in person (Unverzagt et al. 2007).

Statistical Methods

Analyses of change were performed using mixed 2×3 ANOVA's with group (intervention versus wait list) as the between subjects factor and the three time points (pre-, post-intervention, and follow-up) as the within subjects factor. Mixed 2×2 ANOVAs with group as the between-subjects factor and the two first time points as the within subject factor were also performed. Finally, the data were analyzed by means of *t* test to identify significant group differences across time. The dependent variables for these analyses were scores of depressive symptoms (BDI II), working memory (LnSeq), PTSS (HTQ), and CG (ICG-R).

The magnitude of change was estimated using Hedges' *g*. Hedges' *g* is a variation of Cohen's *d* (Cohen

1988) correcting for potential bias due to small sample sizes (Hedges and Olkin 1985). According to Cohen's (1988) effect size conventions, the magnitude of Hedges' g can be expressed as small (0.2), moderate (0.5), and large (0.8).

There were few missing values on the outcome variables at each time point (intervention group=0–1 %, wait list=1–6 %), but due to the three measurement points, list-wise deletion would still critically reduce number of participants in the analysis. Therefore, missing values were replaced using a substitution with the mean method based on recommendations from (Schafer and Graham 2002). For cases with large proportions of missing values (>50 %), last observation carried forward was used on the total scale scores in question. This was necessary only in one case on the BDI and two cases on the working memory test, all in the wait list group. No significant post-intervention differences appeared between completers and ITT.

Results

Mean statistics and effect sizes for comparing groups on the outcome variables are reported in Table 2 for completers and in Table 3 for ITT. For intervention group completers compared to the control group, there was a significant main effect of time on depressive symptoms ($F(2, 56)=4.28$, $p=0.02$). This main effect was qualified by a significant interaction between group and time ($F(2, 56)=4.51$, $p=0.02$, Hedges' $g=0.88$). This interaction reflected a significant drop across the three time points in depressive symptoms in the intervention group ($F(1, 11)=4.4$, $p<0.05$, Hedges' $g=0.84$) but not in the wait list group ($F(1, 17)=0.82$, $p=0.46$, Hedges' $g=0.07$; see Fig. 2). At time 3, but not at the first two time points, there was a significant difference in depressive symptoms between the two groups ($t(28)=-2.24$, $p=0.03$). Repeating these analyses using ITT for inclusion in the intervention group, there was a close to significant main effect of time on depressive symptoms ($F(2, 68)=2.78$, $p=0.077$), and interaction between group and time ($F(2, 68)=2.98$, $p=0.065$, Hedges' $g=0.49$), and a significant drop across the three time points in depressive symptoms in the intervention group ($F(1, 17)=3.63$, $p<0.05$, Hedges' $g=0.61$).

No other significant between group interactions were found, although the interaction effect for working memory between time 1 and time 2 in completers approached a significant level ($F(2, 56)=3.17$, $p=0.09$, Hedges' $g=0.35$; see Fig. 3). There was a significant increase in working memory from pre- to post-intervention in the intervention group ($F(1, 11)=5.42$, $p=0.04$, Hedges' $g=0.62$), but not in the wait list group ($F(1, 17)=0.17$, $p=0.69$, Hedges' $g=$

Table 2 Mean profile and ANOVA statistics of intervention and wait list group completers pre-, post-, and follow-up intervention

			Pre–post effects		Pre–post-follow-up
	Pre-intervention	Post-intervention	Hedges' g	Follow-up	Hedges' g
Depressive symptoms					
Interaction effects			0.11		0.88[a]
Intervention (n=12)	11.7 (6.47)	10.9 (7.5)	0.17	6.8 (3.95)	0.84[a]
Wait list (n=18)	11.39 (5.86)	9.9 (4.95)	0.28	11.1 (5.71)	0.07
PTSS					
Interaction effects			0.25		0.24
Intervention (n=12)	30.3 (7.56)	27.8 (7.30)	0.38	27.6 (6.84)	0.39
Wait list (n=18)	32.6 (5.69)	31.8 (6.25)	0.18	31.4 (5.85)	0.26
Working memory					
Interaction effects			0.35		0.09
Intervention (n=12)	9.0 (3.07)	10.4 (3.60)	0.62[a]	9.8 (4.39)	0.26
Wait list (n=18)	7.2 (3.35)	7.4 (3.24)	0.11	7.7 (2.49)	0.18
Complicated grief					
Interaction effects			0.14		0.02
Intervention (n=12)	27.5 (7.67)	30.2 (11.24)	0.35	26.4 (6.91)	0.21
Wait list (n=18)	31.2 (9.49)	32.3 (10.85)	0.22	30.0 (9.17)	0.27

Descriptive statistics and group differences (n, mean (SD)) on completers only. Pre-follow-up effects were analyzed using two-by-three repeated measures ANOVAs. Pre–post effects were analyzed using two-by-two repeated measures ANOVAs. Effect sizes were reported using Hedges' g with –= indicating effects in the opposite direction from the intervention group

[a] Significant

Table 3 Mean profile and ANOVA statistics of intervention and wait list groups (ITT) pre-, post-, and follow-up intervention

			Pre–post effects		Pre–post-follow-up
	Pre-intervention	Post-intervention	Hedges' *g*	Follow-up	Hedges' *g*
Depressive symptoms					
Interaction effects			0.11		0.49
Intervention (*n*=18)	11.1 (7.9)	10.6 (8.4)	0.14	7.9 (6.8)	0.61
Wait list (*n*=18)	11.4 (5.9)	9.9 (5.0)	0.28	11.1 (5.7)	0.07
PTSS					
Interaction effects			0.15		0.12
Intervention (*n*=18)	31.3 (7.7)	29.6 (7.8)	0.32	29.4 (7.6)	0.28
Wait list (*n*=18)	32.6 (5.7)	31.8 (6.3)	0.18	31.4 (5.8)	0.25
Working memory					
Interaction effects			0.26		0.02
Intervention (*n*=16)	8.4 (3.1)	9.4 (3.60)	0.50	8.9 (4.2)	0.21
Wait list (*n*=18)	7.2 (3.4)	7.4 (3.2)	0.06	7.7 (2.5)	0.18
Complicated grief					
Interaction effects			0.06		0.05
Intervention (*n*=18)	29.4 (8.2)	31.2 (10.3)	0.22	28.7 (7.9)	0.17
Wait list (*n*=18)	31.2 (9.5)	32.3 (10.9)	0.19	30.0 (9.2)	0.29

Descriptive statistics and group differences (*n*, mean (SD)). Pre-follow-up effects were analyzed using two-by-three repeated measures ANOVAs. Pre–post effects were analyzed using two-by-two repeated measures ANOVAs. Effect sizes were reported using Hedges' *g* with –=indicating effects in the opposite direction from the intervention group

0.11). A significant difference on working memory between the two groups was identified at time 2 ($t(28)=2.4$, $p=0.02$), but not at the other two times of measurement. Repeating these analyses using ITT for inclusion in the intervention group, the working memory interaction between time 1 and time 2 approached a significant level ($F(2, 64)=2.06$, $p=0.16$, Hedges' $g=0.26$), with a significant increase in working memory from pre- to post-intervention in the intervention group ($F(1, 15)=4.9$, $p=0.044$, Hedges' $g=0.50$).

To investigate the clinical relevance of our findings relating to improved depressive symptoms, we divided completers from the intervention group into those showing elevated depressive symptoms vs. non-elevated depressive symptoms at pre-intervention using BDI cutoff of 14 as recommended by Beck et al. (1996). This approach was chosen based on reviews on effects of MBCT that indicate significant effects of MBCT on populations with elevated depressive symptoms and anxiety, but much smaller effects on non-clinical populations (e.g., Hoffmann et al. 2010). We conducted focused analyses on these participants from the intervention group. We first compared pre- and post-intervention scores for the six participants in the intervention group that qualified for elevated depressive symptoms at pre-intervention ($n=6$; $t(5)=1.03$, $p=0.35$, Hedges $g=0.36$) and then compared pre-intervention and follow-up scores in the same group ($F(1, 5)=26.52$, $p=0.005$, Hedges $g=2.16$). Then, we conducted a mixed 2×2 ANOVA (depressive symptoms × time point) on the intervention group using elevated vs. non-elevated depressive symptoms at pre-intervention as grouping variable and depressive symptoms at pre-intervention and follow-up as the outcome measures. We identified a significant interaction between pre-intervention depressive symptoms and time point: The elevated depressive symptom group showed a much sharper reduction in depression scores (T1 $M=17.2$, T3 $M=8.6$) than the non-elevated depressive symptom group (T1 $M=6.2$, T3 $M=5.0$; $F(2, 10)=5.62$, $p=0.03$; see Fig. 4). A similar analysis for the wait list control yielded no significant interaction between groups with elevated and non-elevated depressive symptoms within this wait list group ($F(2, 15)=1.63$, $p=0.23$).

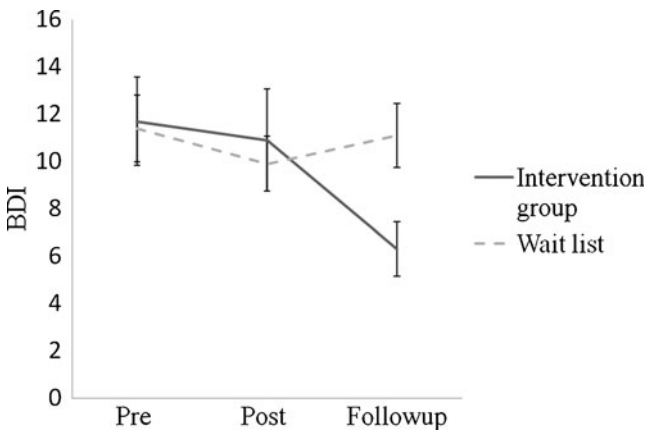

Fig. 2 Depressive symptoms in the intervention and wait list group completers

That is, there was no significant reduction of depressive symptoms across time in the intervention non-elevated depressive symptoms group, or in the wait list elevated and non-elevated depressive symptoms groups. Pre-intervention 29 % of the completers (five persons) in the wait list group and 50 % (six persons) in the intervention group qualified as having elevated depressive symptoms. At follow-up, 29 % (five persons) in the wait list group and none in the intervention group qualified as having elevated depressive symptoms.

Discussion

This controlled pilot trial was performed to investigate the potential effectiveness of MBCT for elderly people with long-term bereavement-related distress, several years after the death of their spouse. In this study, we found a significant interaction effect of MBCT on depressive symptoms at follow-up between the intervention and the wait list group (Hedges' g=0.88), which reflected a significant decrease of depressive symptoms in the intervention group, but not in the wait list group. The effect sizes in both completers (Hedges' g =0.84) and ITT (Hedges' g=0.61) were comparable to the effects of MBCT on depressive symptoms reported in previous meta-analyses (Piet et al. 2012; Hedges' g=0.42; Hoffmann et al. 2010; Hedges' g=0.59). Furthermore, post hoc analyses indicated that the frequency of elevated depressive symptoms went from 50 % post intervention to 0 % at follow-up in the intervention group completers, while the frequency of elevated depressive symptoms remained stable at 29 % in the wait list group. Selecting participants with elevated depression scores could increase the risk of bias due to regression towards the mean. On the other hand, the overall BDI mean in all groups was relatively low (see Table 1) and thus increase the risk of bias due to a floor effect. The elevated vs. non-elevated depressive symptoms analyses therefore, due to the relatively small sample size and the post hoc nature of these results, should be regarded as preliminary and consequently must be interpreted with caution. The results are, however, interesting in relation to generating hypotheses for future research. The findings of this study provide initial support for the hypothesis that MBCT may be an effective way of reducing depressive symptoms in elderly bereaved people, especially those with clinically relevant depressive symptoms. No other significant results were found (e.g., for distress symptoms), but there was an overall, non-significant trend toward a decrease in psychopathology more generally from pre-intervention to follow-up in the intervention group.

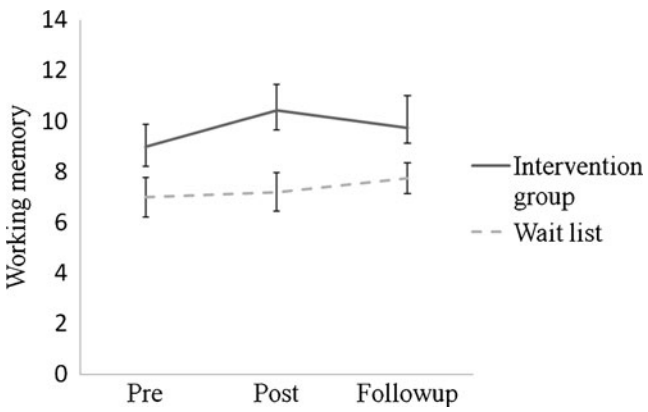

Fig. 3 Working memory in the intervention and wait list group completers

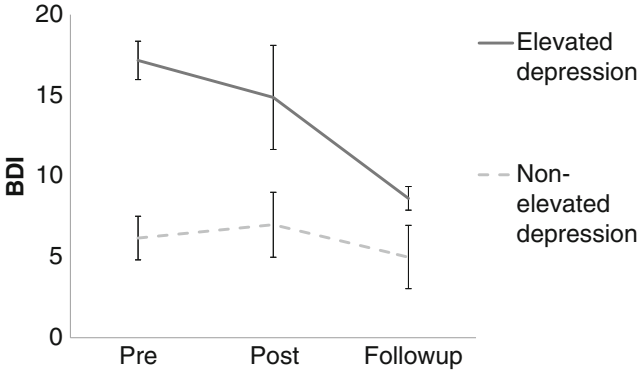

Fig. 4 Depressive symptoms in intervention group completers with pre-intervention elevated vs. non-elevated depressive symptoms

The effect of the intervention on working memory approached significance at post-intervention but not at follow-up, and there was a medium effect size (Cohen 1988) for working memory improvement post-intervention in the intervention group (Hedges' g=0.50). The results regarding working memory are therefore not clear cut, and this study does not have the statistical power for any firm conclusions. However, the results did suggest the possibility that MBCT may improve working memory in elderly people. Because reduction of fluid memory capacity, of which working memory is one example, is common in old age and because low working memory function is often is related to lower overall function, interventions that target working memory improvements are particularly important when working with this population. Future research on the effect of MBCT on working memory in elderly bereaved people and potentially other subgroups of elderly people is therefore warranted.

One possible explanation for the temporary effect of the intervention on working memory may be that the attention training, which is a core component of MBCT, improves attention and other memory functions as long as mindfulness exercises are performed on a daily basis. At the 3-month booster sessions, only a few of the participants stated that they had continued daily formal mindfulness practice after termination of the group meetings. This discontinuance

of daily practice may account for the only temporary improvement on working memory.

While our findings regarding a significant drop in depressive symptoms for the intervention group were clear, these significant changes were not evident until follow-up 5 months post-intervention. This was somewhat surprising, given the more immediate effects seen in previous studies of MBCT with younger populations (e.g., Hoffmann et al. 2010), but there may be valid explanations for this finding. The delayed effect of the MBCT may reflect that elderly people take a longer time to change behaviors and mindsets compared to younger populations, due to reduced working memory capacity and other types of age-related decreases in processing speed generally evident from approximately 70 years of age (Johanson 2008). Participants in previous studies of mindfulness training for older people had a mean age of 65 years (Splevins et al. 2009; Young and Baime 2010), while the participants in the current study were 77 years old on average. Furthermore, this study targeted long-term distress still persistent 4–5 years post-loss. Psychological interventions with chronic distress are known to be more time-consuming and challenging than interventions targeting more recent reactions (Litz and Maguen 2008), and interventions with chronic distress may take a longer time to have full effect. Thus, mental change may take longer time in this population compared to younger and less chronically distressed populations. Finally, previous research on effects of anti-depressive medical treatment on emotional processing found that early change in cognitive processing speed can predict later effects on depressive mood (Harmer et al. 2009; Papadatou-Pastou et al. 2012). Thus, it is possible that both the early effect on working memory and the delayed effect on depressive symptoms can be explained by these findings.

In the ITT analysis, the results revealed a similar pattern as in the completers' analysis, but the effects were no longer statistically significant. Medium effect sizes (Cohen 1988) were observed for reductions of depressive symptoms in the intervention group (Hedges' g=0.61), the interaction effect of MBCT on depressive symptoms at follow-up (Hedges' g= 0.49), and for working memory improvements for the intervention group at post-intervention (Hedges' g=0.50).

This study has a number of limitations, of which major a major one was the small sample size. Due to challenges in recruitment and a large attrition rate in the intervention group, we did not achieve the sample size and therefore the statistical power we aimed for in this pilot study and thus may be prevented in discovering significant findings masked by the small sample. Despite this limitation, our results regarding depressive symptoms were relatively clear. Secondly, the study used only one brief, telephone-based working memory test. Larger samples and more comprehensive cognitive tests would be necessary in future studies. Thirdly, MBCT is a group-based intervention, and the design did not allow us to control for potential social effects. As a result, some of the intervention effect may be explained by the fact that the well-being of the participants in the intervention group improved by meeting others in the same situation. Yet, the significant effect of intervention on depressive symptoms was only identified after termination of the 8-week program, which speaks against significant effects from meeting weekly face to face. Also the non-randomized group assignment where intervention group participants were systematically recruited from the more urban area near the intervention site may pose a potential bias in this study. Finally, participants in this study were systematically selected for potential inclusion based on having lost a spouse combined with high scores on measures of loss-related psychological distress. This was done to control for potential selection bias when participants sign up voluntarily based on, e.g., newspaper ads as has been implemented in most previous MBCT effect studies (Didonna 2009). However, the present study suffered from major attrition rates both before and after intervention, with only 36 % of the potential participants completing the intervention. While not unusual in this type of study, the large attrition rate is problematic and our results may point to the importance of deep motivation and voluntary participation rather than selection based on psychological distress alone as a factor for completing MBCT. MBCT relies on home practice, and therefore, high motivation is necessary for this kind of treatment. Thus, signing up for MBCT based on newspaper ads or referral from health professionals may be a more appropriate way of recruiting participants for MBCT than controlled inclusion methods as applied in this study, although the former yields other kinds of selection biases.

In conclusion, this study to our knowledge is the first controlled study to investigate the effect of MBCT on elderly people with long-term grief reactions. The study suggests that MBCT may be an effective intervention for reducing symptoms of distress, and especially depressive symptoms, as well as for possibly improving working memory function among elderly bereaved with problematic grief reactions. However, replications of the present findings in larger samples are required for firm conclusions to be made. Still, the findings are encouraging and further studies should be undertaken to pursue this line of research.

Psychological intervention with older population (75 years+) poses a special challenge. Older people do often not actively turn to psychological treatment in times of need, but receive medical treatment for psychological problems. If MBCT is found to have robust effects in this population, it may be a relevant alternative to medication in a group of patients that rarely receive psychological treatment and often are already taking numerous prescriptions with risks of serious side effects (Mulsant and Pollock 2007). Easy access to MBCT intervention (e.g., by reference from the local physician and advertisement for intervention at hospitals, old age homes, or local news papers), short geographical distance to treatment location, and

good public transportation options are important to facilitate MBCT intervention effects with this population. Future studies may benefit from taking this into consideration when working clinically with elderly samples.

Participants in this study were selected for inclusion based on measures of distress relating directly to the death of the spouse. The results indicate that using depressive symptoms, which does not necessarily relate directly to the loss experience, may be a more appropriate inclusion criterion than PTSS and CG. MBCT was originally developed for preventing depressive relapse (Segal et al. 2004), and the intervention has previously been found to be effective on depressive symptoms (Piet et al. 2012). Thus, depressive symptom severity is suggested as inclusion criteria for further research with this population. The preliminary results for participants with elevated vs. non-elevated depressive symptoms indicated that participants with clinically relevant depression scores benefited more from MBCT than participants without elevated depressive symptoms. This finding should be followed up in future research.

The results regarding working memory in this study are at best preliminary, but because of the potential clinical relevance of improving memory functions in this population, it would be valuable to investigate the potential effect of MBCT on executive functions in elderly people in future studies. Taken together, this study provides early evidence for the effectiveness of MBCT with highly distressed elderly bereaved people and suggests useful directions for future research within this population.

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