

The Effects of Mindfulness-Based Stress Reduction Program on the Mental Health of Family Caregivers: A Randomized Controlled Trial

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Key Words

Mindfulness · Depressive symptoms · Psychology · Randomized controlled trial · Caregiver

Abstract

Background: Caregivers of people with chronic conditions are more likely than non-caregivers to have depression and emotional problems. Few studies have examined the effectiveness of mindfulness-based stress reduction (MBSR) in improving their mental well-being. **Methods:** Caregivers of persons with chronic conditions who scored 7 or above in the Caregiver Strain Index were randomly assigned to the 8-week MBSR group (n = 70) or the self-help control group (n = 71). Validated instruments were used to assess the changes in depressive and anxiety symptoms, quality of life, self-efficacy, self-compassion and mindfulness. Assessments were conducted at baseline, post-intervention and at the 3-month follow-up. **Results:** Compared to the participants in the control group, participants in the MBSR group had a significantly greater decrease in depressive symptoms at post-

intervention and at 3 months post-intervention ($p < 0.01$). The improvement in state anxiety symptoms was significantly greater among participants in the MBSR group than those of the control group at post-intervention ($p = 0.007$), although this difference was not statistically significant at 3 months post-intervention ($p = 0.084$). There was also a statistically significant larger increase in self-efficacy (controlling negative thoughts; $p = 0.041$) and mindfulness ($p = 0.001$) among participants in the MBSR group at the 3-month follow-up compared to the participants in the control group. No statistically significant group effects (MBSR vs. control) were found in perceived stress, quality of life or self-compassion. **Conclusions:** MBSR appears to be a feasible and acceptable intervention to improve mental health among family caregivers with significant care burden, although further studies that include an active control group are needed to make the findings more conclusive. © 2013 S. Karger AG, Basel

Dr. Rebecca Hou and Prof. Samuel Wong contributed equally to this work.

Introduction

It is well established that family caregivers of people with chronic conditions experience high levels of psychological and physical distress [1–4]. Various types of psychological and social interventions have been developed to reduce the depressive symptoms of caregivers and improve their general well-being, with an overall small-to-moderate effect size [5–7]. Among the psychosocial interventions to improve psychological health among caregivers with chronic stress, the 8-week mindfulness-based stress reduction (MBSR) program [8] has shown its positive effects on decreasing stress, anxiety and burnout of nurses and medical students [8, 9], as well as enhancing their self-efficacy [8, 10, 11].

Recently, MBSR was further applied to assist family caregivers in coping better with the demands of their roles by improving their self-efficacy and reducing mood disturbance and care burden [12, 13]. However, these studies had a small sample size and there was limited information on follow-up. Moreover, they were conducted only in Western countries. Furthermore, providing care for people with a disabling condition requires significant commitment of time from the caregivers and may deter them from joining a group intervention such as the MBSR, which lasts for 8 weeks. Therefore, the current study was conducted to evaluate the acceptability and feasibility, as well as the effectiveness, of using the MBSR program to improve mental health among Chinese caregivers of people with a disabling chronic condition. Since previous studies have shown that caregivers of someone with a disabling chronic condition had a higher prevalence of clinically relevant depressive symptoms compared to non-caregivers [4, 14], the change of clinically relevant depressive symptoms was used as our primary outcome measure in this study. Changes in anxiety symptoms and perceived stress of caregivers were also examined as secondary outcomes since these are commonly associated with depressive symptoms. Other secondary outcomes included the change in self-efficacy (how confident the caregivers feel to handle the difficulties in their daily care-giving activities) and quality of life, as these have been shown to be important constructs for evaluating the practical value of a novel intervention for family caregivers [15]. Since previous studies have shown that caregivers tended to use more healthcare services than non-caregivers due to their low perceived health [4, 16], changes in medical service utilization were also examined. The changes in mindfulness level and self-compassion were also investigated as these are potential medi-

ating factors that have been suggested to account for the effectiveness of MBSR in improving the mental health of participants [17].

Methods

Participants

Multiple strategies were used to recruit participants from community centres, outpatient clinics and non-government organizations. The inclusion criteria were as follows: (1) adult aged 18 or above; (2) a Cantonese speaker; (3) having long-term care-giving responsibility for first-degree relatives with chronic illness or chronic condition; (4) scoring 7 or above in the Caregiver Strain Index [18], and (5) having no self-reported doctor's diagnosis of psychiatric illnesses and impaired cognitive status. Participants were excluded if they: (1) had serious chronic diseases that could potentially affect their participation; (2) were under treatment for serious mental disorders or with uncontrolled mood disorders; (3) had thoughts of self-harming or suicide in the preceding 6 months; (4) had care recipients who had passed away before the study, or (5) had previous experience of participating in a mindfulness-based program or regularly practiced meditation, yoga or tai chi within the preceding year. All participants were blinded to our study hypothesis. Randomization was conducted independently by a research assistant using the random numbers generated in Microsoft Excel 2003 and was not disclosed until the eligible participants completed baseline assessment and signed the informed consent form. Attrition in this study was referred to both dropouts (participants no longer participating in any research-related activities after randomization) and loss of follow-up.

Procedure

The present study was conducted between October 2010 and March 2012 and was approved by the Clinical Research Ethics Committee of the joint Chinese University of Hong Kong/New Territories East Cluster. The intervention group received MBSR, while the control group received self-help health education booklets. At the end of the study, participants in the intervention group had their round-trip transportation fee reimbursed to cover the 8-session interventions, while participants in the control group were given the incentives of HKD 200 (USD 20) per person to reimburse for their participation and time. All data were entered by a research assistant who was blinded to the randomization and allocation results.

Intervention

The MBSR intervention consisted of 8 weekly 2-hour sessions led by trained instructors, and the participants were instructed to do CD-guided home practice for 30–45 min per day. No 1-day retreat was included in this study. The main skills taught in MBSR included body scan, sitting meditation, Hatha yoga stretches, and mindfulness in daily activities (mindful eating, walking, listening, etc.). There were three instructors in our study, and all of them had completed the professional training program in MBSR provided by the originator of this program and had more than 3 years teaching experience in MBSR. They independently led five classes with each class consisting of 12–15 persons. To ensure the homogeneity of program delivery, the same course protocol and teaching

materials were used in the different classes; the course was modelled on the original MBSR by Kabat-Zinn [19]. All sessions were audio-taped and reviewed by a study coordinator to ensure fidelity of the program content.

Control

A self-help booklet with eight chapters of supportive information and health education was used as health education material in the control group. All material in the health education booklet was prepared by a registered nurse who used information from a health education website developed by the Department of Health of the Government of Hong Kong Special Administrative Region <http://www.info.gov.hk/elderly/>. The content included stress acknowledgement and management, common diseases in the elderly and management, skilful communication and practical home nursing advice, and advice on mental health and a healthy lifestyle.

Measures

All questionnaires used in our study have been validated in Chinese. After completion of baseline assessments, participants were asked to self-administer the questionnaires immediately at the end of the intervention and at 3 months post-intervention. Social support [20], physical activity [21] and daily care-giving activities were measured at baseline by the Multidimensional Scale of Perceived Social Support (MSPSS) [22, 23], the Godin Leisure-Time Exercise Questionnaire (GLTEQ) [24, 25] and the scale of activities of daily living (ADLs) [26] and instrumental activities of daily living (IADLs) [27], respectively, as they were potential confounders of the relationship between intervention assignment and mental health. The frequency and duration of home practice of MBSR (including mindfulness in daily activities) were recorded on a weekly practice log that was collected each week during the course.

Clinically relevant depressive symptoms were measured by the Chinese Center for Epidemiologic Studies Depression Scale (CESD) [28, 29]. A cut-off score of 16 [30, 31] was used to indicate the presence of clinically relevant depressive symptoms. Clinically significant improvement was defined as having a CESD score that changed from ≥ 16 to < 16 or a 50% reduction in the score using the baseline score as comparison [32]. Validated Chinese versions of the State-Trait Anxiety Inventory (STAI) [33, 34], the Perceived Stress Scale (PSS) [35, 36], the short form of the Health Survey (SF-12) [37] and the Five Facets Mindfulness Questionnaire (FFMQ) [38] were used to measure anxiety, perceived stress, quality of life and levels of mindfulness, respectively. The Self-Compassion Scale – Short Form (SCS-SF) [39, 40] was used to measure the self-compassionate attitude towards oneself when encountering difficulties and suffering. The revised Care-Giving Self-Efficacy Scale (CRSE) [41] was used to assess how confident caregivers were in obtaining respite (CRSE-OR) and in controlling upsetting thoughts (CRSE-UT), with a score ranging from 0 to 100 [42]. The monthly medical service use was self-reported according to the following 6 types of health service: (1) over-the-counter use of medications; (2) private clinic visits; (3) general outpatient clinic visits; (4) specialist outpatient clinic visits; (5) traditional Chinese medicine (TCM) clinic visits, and (6) accident and emergency visits. A single question was used to assess the self-rating effectiveness of the intervention in both groups with a 5-point Likert scale (from 1 ‘not at all’ to 5 ‘very much’): ‘Do you think MBSR/health education booklet is helpful?’.

Statistical Analysis

To compare potential differences in baseline variables between the two groups, independent t tests were used for continuous variables and χ^2 tests were used for categorical variables. Analysis of covariance (ANCOVA) was performed to evaluate the group effects of MBSR versus control at post-intervention and 3 months post-intervention, treating the baseline measures as covariance. The percentage changes of monthly medical service use relative to baseline were compared between MBSR and the control group by using the Mann-Whitney test. All analyses were conducted on an intent-to-treat basis in SPSS 16.0 for Windows. Per protocol analyses were also conducted in completers, who were defined as participants who had attended at least 6 sessions and completed the questionnaire at baseline and at 3 months post-intervention.

Sample Size Calculation

According to the study of Lengacher et al. [43] the mean score of CESD adjusted by the baseline measure was 6.3 ± 6.45 in the MBSR group and 9.6 ± 6.61 in the usual care group after MBSR training. A sample size of 70 participants per group was required for 80% statistical power at a two-sided 5% significance level and assuming a 20% attrition rate.

Results

A total of 141 participants were randomly assigned to the MBSR group ($n = 70$) and the self-help control group ($n = 71$); 113 participants completed the follow-up at 3 months post-intervention (fig. 1). Our sample had an average age of 57.49 years ($SD = 8.83$); 83% of participants were female. No statistically significant differences were found in all reported baseline measures (table 1). The total attrition rate of this study was 19.9%; the MBSR group had a significantly lower attrition rate than the control group (12.9 vs. 26.8%, $\chi^2 = 4.28$, d.f. = 1, $p = 0.039$). The attritions were significantly younger ($t = 2.60$, d.f. = 139, $p = 0.010$) and had a lower level of physical activity ($t = 2.83$, d.f. = 139, $p = 0.005$).

Effects on Primary Outcome Measure

As shown in figure 2, the participants in the MBSR group had a significantly greater decrease in depressive symptoms, as measured by CESD, immediately post-intervention and at 3 months post-intervention. A total of 77 participants (34 in MBSR and 43 in control group) had clinically significant depressive symptoms at baseline. At the end of the intervention, there was a significantly larger proportion of participants with clinical improvement in the MBSR group compared to the control group (41.2 vs. 11.6%, $\chi^2 = 8.92$, d.f. = 1, $p = 0.003$), although only a non-significant trend was seen at 3 months post-intervention (29.4 vs. 14.0%, $\chi^2 = 2.76$, d.f. = 1, $p = 0.097$).

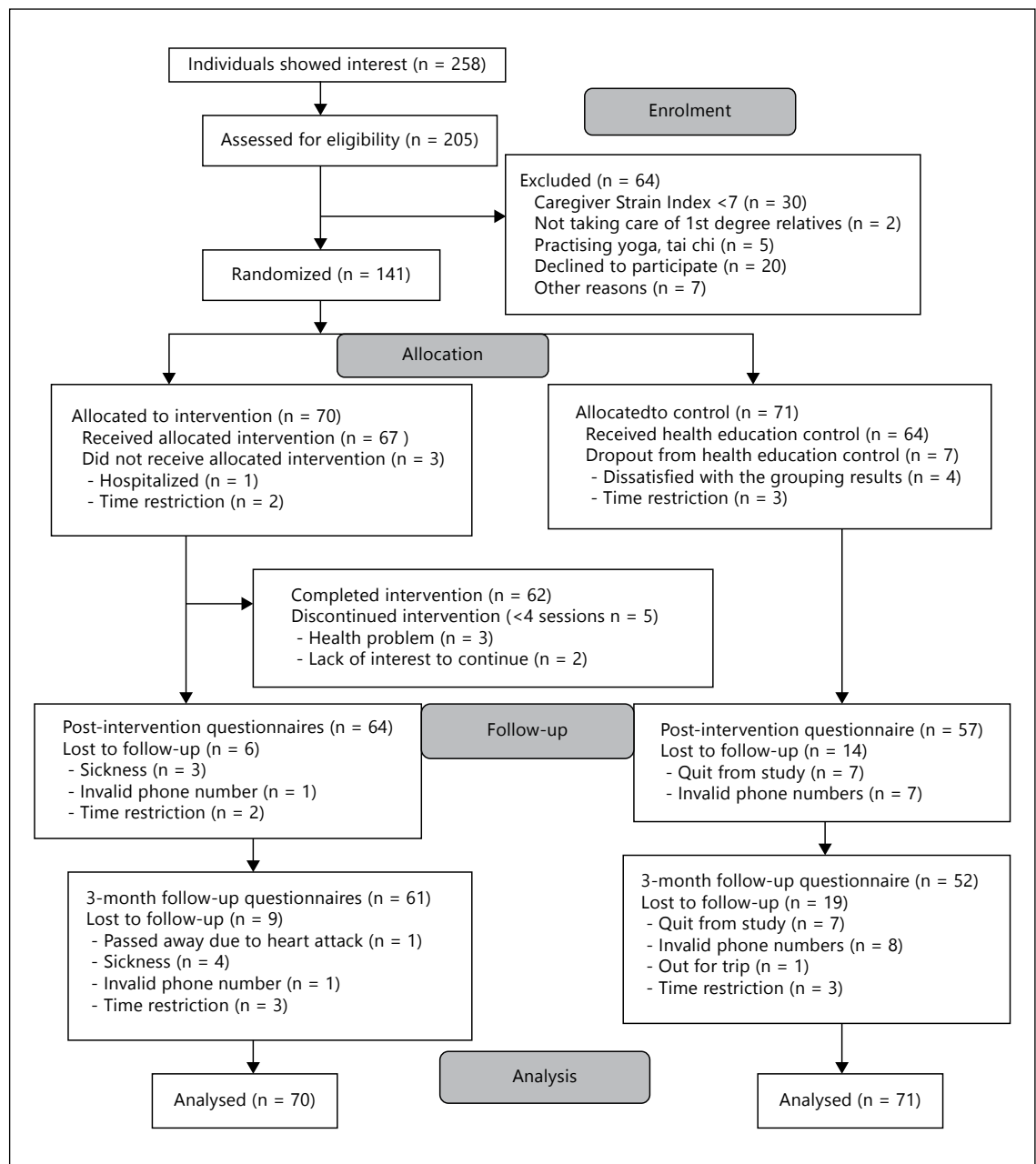


Fig. 1. Consort flow diagram of MBSR for caregivers.

Effects on Secondary Outcome Measures

The participants of the MBSR group showed greater improvement in state and trait anxiety levels as reported by the STAI than the participants of the control group immediately post-intervention, but this difference was not statistically significant at 3 months post-intervention. Increases in self-efficacy (controlling negative thoughts) and mindfulness, as measured by CRSE-UT and FFMQ,

respectively, were significantly greater in the MBSR group than in the control group at 3 months post-intervention (table 2). The differences in changes in monthly medical service use between the two groups were statistically significant only in TCM service utilization immediately post-intervention ($Z = -2.7, p = 0.007$), with a total of 53% decrease in TCM service utilization in the MBSR group compared to a 15% increase in the control group.

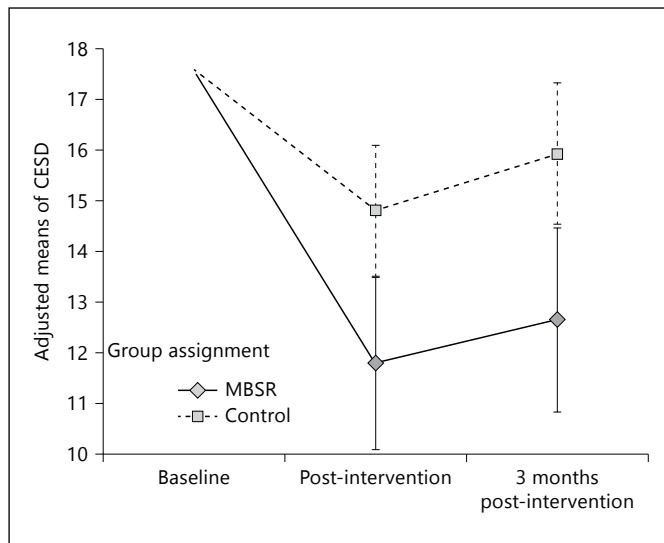


Fig. 2. Change of the adjusted means of CESD and 95% confident interval over the study period in both the MBSR and control group. Adjusted means: means of CESD adjusted by the baseline measure.

No significant between-group differences were found in PSS, the physical and mental component of SF-12 and SCS at the end of intervention and at 3 months post-intervention.

Adherence

The attendance of the MBSR was 6.76 ± 1.72 sessions; 58 (83%) participants attended at least 6 sessions in MBSR and 30 (43%) attended all 8 sessions. No statistically significant demographic difference was found between participants who attended at least 6 sessions and those who did not. The average weekly home practice time was 34.4 ± 49.4 min, with a range of 0–225 min. At 3 months post-intervention, 37 (53%) participants stated that they were still practicing meditation exercises once or twice per week for about 15 min each time. However, the number of sessions attended and the weekly home practice time were not associated with changes in any of the outcome measures.

Correlations between Mindfulness and Other Outcome Measures

At the end of the intervention, increased mindfulness was associated with decreased depression, anxiety and perceived stress, and mental health component measured by the SF-12. Similar correlations were also found at the 3-month follow-up.

Table 1. Demographic characteristics of participants and baseline outcome measures

	MBSR (n = 70)	Control (n = 71)	p
Age, years	57.90±8.49	57.08±9.21	0.585
Gender			0.391
Female	60 (86.7)	57 (80.6)	
Male	10 (14.3)	14 (19.4)	
Education			0.533
Primary	20 (28.6)	25 (36.2)	
Secondary	33 (47.1)	27 (38.0)	
Tertiary	17 (24.3)	19 (26.8)	
Employment			0.101
Full-time	6 (8.6)	14 (19.7)	
Part-time	12 (17.1)	15 (21.1)	
Unemployed/ housewife/retired	52 (74.3)	42 (59.2)	
Monthly household income, HKD			0.997
<10,000	36 (51.4)	37 (52.1)	
10,000–20,000	16 (22.9)	16 (22.5)	
>20,000	18 (26.7)	18 (26.4)	
Religion			0.275
Christianity/ Catholicism	16 (22.9)	21 (29.6)	
Buddhism/Taoism	13 (18.6)	18 (26.4)	
Non-religion	41 (58.5)	32 (46.0)	
Relationship to care recipients			0.326
Spouse	26 (37.1)	31 (43.7)	
Children	30 (42.9)	33 (46.5)	
Parents	12 (17.1)	5 (7.0)	
Relatives	2 (2.9)	2 (2.8)	
GLTEQ	14.60±12.23	13.69±11.32	0.647
MSPSS	56.66±16.61	54.26±17.85	0.621
Daily care-giving activities			
ADL	5.73±4.70	6.65±4.85	0.255
IADL	12.39±8.00	14.45±7.87	0.123
Baseline outcome measures			
CESD	16.91±8.97	17.55±8.92	0.153
SAI	47.00±10.94	50.49±11.40	0.066
TAI	48.46±9.61	50.77±9.96	0.162
PSS	26.73±7.63	27.9±7.05	0.345
SF12-PH	38.86±9.45	42.27±9.32	0.033
SF12-MH	40.07±11.02	38.56±11.53	0.428
SCS	37.67±6.45	36.76±6.26	0.056
CRSE-OR	57.57±27.89	49.6±30.57	0.110
CRSE-UT	54.25±23.68	48.51±26.56	0.169
FFMQ	117.67±16.56	114.69±14.02	0.234

Values are means ± SD. Values in italics represent number of participants, with percentages in parentheses. SAI = State-Trait Anxiety Inventory – State Anxiety; TAI = State-Trait Anxiety Inventory – Trait Anxiety; SF12-PH = SF-12 physical health component; SF12-MH = SF-12 mental health component.

Table 2. Estimated marginal means and the group effect of MBSR at different time point from ANCOVA

		MBSR		Control		d.f.	F	p
		mean	SD	mean	SD			
Primary outcome								
CESD	T1	11.78	7.00	14.80	7.55	116	9.921	0.002
	T2	12.64	8.80	15.92	9.47	107	6.889	0.009
Secondary outcomes								
SAI	T1	40.85	11.07	44.91	11.65	117	7.321	0.007
	T2	42.59	10.46	45.19	11.24	109	3.087	0.081
TAI	T1	43.40	9.36	46.00	9.85	117	4.256	0.041
	T2	43.78	10.33	45.97	11.31	109	2.194	0.141
PSS	T1	24.39	6.78	25.36	7.25	117	1.100	0.296
	T2	24.60	7.29	25.11	7.83	109	0.242	0.623
SF12-PH	T1	40.82	8.72	41.24	9.49	106	0.110	0.739
	T2	40.93	10.21	39.57	11.09	108	0.869	0.353
SF12-MH	T1	44.92	12.82	42.10	13.93	106	2.332	0.129
	T2	44.58	11.89	42.18	12.90	108	2.014	0.158
SCS	T1	39.59	6.30	38.64	6.52	115	1.249	0.265
	T2	39.64	5.83	38.58	6.32	110	1.646	0.202
CRSE-OR	T1	53.55	30.05	50.70	32.00	112	0.458	0.499
	T2	55.42	32.28	49.59	33.97	117	1.770	0.185
CRSE-UT	T1	65.19	24.81	61.65	25.91	114	1.095	0.297
	T2	66.00	21.28	59.62	22.95	105	4.290	0.041
FFMQ	T1	123.27	15.32	119.17	15.98	116	3.970	0.048
	T2	124.94	15.19	117.89	16.48	108	10.659	0.001

Mean refers to estimated marginal mean adjusted by the baseline measure. T1: post-intervention. T2: 3 months post-intervention. SAI = State-Trait Anxiety Inventory – State Anxiety; TAI = State-Trait Anxiety Inventory – Trait Anxiety; SF12-PH = SF-12 physical health component; SF12-MH = SF-12 mental health component.

Self-Rated Effectiveness

At the end of the intervention, the average score of self-rated effectiveness in the MBSR group was 4.3 ± 1.17 , with 42 participants (62.7%) rating MBSR as 'helpful' or 'very helpful'. At 3 months post-intervention, there were still 36 participants (53.7%) who rated MBSR as helpful and very helpful, whereas 14 (20.1%) participants thought that MBSR had no effect on them.

Adverse Effects of MBSR

Only 1 male aged 80 strained his neck when practicing yoga at home, which did not inhibit him from participating in the weekly MBSR course. No other adverse effects were reported by the other participants.

Per Protocol Analyses

A total of 109 completers were included in per protocol analyses. The results were very similar to those of the intent-to-treat analyses.

Discussion

This is the first randomized controlled trial to examine the effects of MBSR on improving the psychological health of family caregivers with a large sample size. Also, this is one of the few trials that have studied the effects of MBSR on mental health in the Chinese population. Several studies have shown that caregivers in Hong Kong endure levels of stress and burden comparable to their counterparts in Western countries [44, 45]. The characteristics of participants in our study were similar to those of the previous studies, i.e. mainly females with a secondary or lower education level and a low income [45–47].

The positive effects of MBSR on depressive symptoms reduction persisted for at least 3 months after intervention. This finding is consistent with the results of meta-analyses on the effects of MBSR both on clinical and non-clinical samples [48, 49], and it suggests that MBSR may have at least comparable effects to other established psychotherapies used for caregivers [5].

The vast majority of caregivers were able to attend more than 6 sessions of MBSR, even though they usually had considerable time constraints and commitment to look after their first-degree relatives who suffered from chronic conditions. The adherence rate and the average number of sessions attended were comparable to those reported in previous studies conducted in other populations who experienced significant psychological stress [43, 50, 51]. Of importance, over half of the participants in the MBSR group continued to practice at the 3-month follow-up and stated that they experienced ongoing benefits from MBSR, although the dose-response relationship was not demonstrated in our study. There are several potential explanations for this finding. Firstly, only half of the participants submitted their home practice logs during the 8-week course. For the missing logs, values of zero were entered. This might have resulted in an underestimation of the practice time. Secondly, it might have been very difficult for caregivers to complete the daily practice without interruption or to record the exact amount of time spent in practice [12, 52]. Finally, caregivers tended to do informal practice such as being mindful during their daily activities (e.g. mindful walking, driving, and eating) [12], which might not be correlated with the changes in levels of mindfulness being measured by the mindfulness scale or other psychological instruments [53].

Our study replicated the effects of MBSR on increasing participants' general level of mindfulness [17, 51, 54] and the correlation between increased mindfulness and improved mental health [17, 55]. Although the exact mechanism of the relationship between levels of mindfulness and improvement in mental health is unknown, recent neurobiological studies may shed some light on the potential reasons for this relationship. Holzel et al. [56] revealed that the reduced perceived stress among participants of an 8-week MBSR was associated with decreased grey matter density in the right basolateral amygdala. Farb et al. [57] also reported that increased activities in ventrolateral prefrontal cortices were observed among participants who had completed an 8-week MBSR programme, which the authors attributed to be associated with augmented inhibitory control.

Our current study did not demonstrate the effects of MBSR on caregivers' health-related quality of life and perceived stress. There are several potential explanations. Firstly, the reduced sample size resulting from dropout decreased the power to test for significant difference between the two groups and thus there may have been a type I error. Secondly, the instruments used in our study might not have been sensitive enough to measure the changes in quality of life or perceived stress. Finally, MBSR may have

changed participants' reactions to chronic perceived stress, rather than perceived stress itself, resulting in no change of perceived stress among caregivers [58].

Although this study shows some promising results, there are still a number of limitations. The first and most important limitation is that we did not employ an active control group. The effects of MBSR can be overestimated because of the potential beneficial effects of social interaction and extra attention given to them by the intervention. Future studies are thus required to more conclusively demonstrate the effectiveness of MBSR in improving mental health in this group using a design with an active control that can account for the group and attention effects of simply participating in an intervention group. Secondly, participants in our study were recruited from centres for the elderly, clinics and non-government organizations. The study findings might not be generalizable to caregivers with different characteristics and illness behaviour [59]. Thirdly, we followed our participants for only 3 months after the 8-week intervention, and thus we were unable to demonstrate the long-term effects of MBSR or to address any potential barriers associated with long-term practice. Fourthly, only self-reported daily practice time and medical services utilization were collected in this study and potential recall bias could not be prevented. Finally, the use of self-rating psychological scales prohibited us from assessing the change of clinician-rated clinical assessment which might have been more relevant to clinical practice [60].

MBSR appears to be a feasible and acceptable intervention for Chinese family caregivers with significant care burden. The effects of MBSR on reducing depressive symptoms and improving self-efficacy and mindfulness, as shown in this study, need to be further examined using a study with an active control arm and more objective assessments.

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Disclosure Statement

The authors report no conflicts of interest.

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