

# Impact of ‘web-based mindfulness based stress reduction combined with solution-focused intervention on dementia caregivers’ negative affect

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## Abstract

**Objective:** This study aims to explore the effects of web-based mindfulness-based stress reduction (MBSR) combined with focused solution mode on alleviating negative emotions in dementia caregivers. **Methods:** Sixty dementia caregivers were randomly assigned to either a control group receiving conventional guidance or an intervention group receiving MBSR combined with focused solution mode in addition to conventional guidance. The intervention lasted for 8 weeks. Changes in depression-anxiety-stress scale 21 (DASS-21) and Zarit caregiver burden inventory (ZBI) scores were compared between the two groups before and after the intervention. **Results:** After 8 weeks of intervention, caregivers in the intervention group showed significant decreases in depression, anxiety, stress, and total DASS-21 scores as well as total ZBI score ( $P < 0.001$ ), all of which were lower than those of the control group ( $P < 0.001$ ).

**Conclusion:** MBSR combined with focused solution mode can effectively improve negative emotions and reduce burden levels in dementia caregivers, and is worth promoting and applying in clinical settings.

**Keywords:** Mindfulness, psychosomatic disorders, stress, solution-focused brief therapy, caregivers, affect

## INTRODUCTION

Dementia, characterized by progressive cognitive decline, is a neurodegenerative disorder.<sup>1</sup> Its incidence rises with advancing age in individuals aged 60 and above. Research has demonstrated the pivotal role of caregivers in the rehabilitation process of dementia patients.<sup>2</sup> The emotional state and burden experienced by caregivers are closely linked to the quality of life of dementia patients. As the condition of dementia patients advances, caregivers must continually meet their needs, leading to varying degrees of physical, psychological, and economic burdens.<sup>3,4</sup> Addressing caregivers’ negative emotions is of paramount importance in enhancing the quality of life for both dementia patients and their caregivers.

Mindfulness, characterized by a non-judgmental and accepting way of bringing consciousness to the present moment<sup>1,5</sup>, is gaining increasing popularity as a non-pharmacological alternative for managing physiologic and psychological

outcomes related to health.<sup>2,6</sup> Evidence suggests that mindfulness skills can be enhanced through increased engagement in meditation, home practice, in-person interactions with instructors, and the frequency of weekly sessions.<sup>7</sup>

Studies have found that a strong adherence to both in-person and web-based mindfulness programs can significantly improve indicators of well-being.<sup>8,9</sup> This implies that individuals who actively participate and maintain involvement in mindfulness programs are more likely to achieve positive outcomes regarding their well-being. The diversification of mindfulness programs, particularly through web-based platforms, is becoming more prominent. Compared to traditional face-to-face meetings, this trend provides a flexible and accessible opportunity for broader participation.<sup>10</sup>

However, despite the attention and widespread application of mindfulness programs, further research is needed to gain a deeper understanding

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of their efficacy and applicability. Specifically, investigation into diverse populations, including different age groups, cultural backgrounds, and health conditions, as well as comparative studies conducted in various environmental contexts, requires more in-depth exploration. Additionally, addressing the long-term effects and sustainability of mindfulness programs is an essential topic of concern, as it will contribute to further optimizing and advancing mindfulness as an effective intervention.

Mindfulness-based stress reduction (MBSR) is an active form of self-psychological intervention used to manage emotions and stress<sup>11</sup>, whereas the focus-oriented approach is a clinical intervention that emphasizes personal positive aspects.<sup>12</sup> Both interventions have been demonstrated to effectively ameliorate negative emotions.<sup>6,13</sup> In this study, we implemented an intervention for dementia caregivers, guided by the principles of a web-based mindfulness-based stress reduction combined with a focus-oriented model. The program aimed to investigate its impact on negative emotions and burden levels among dementia caregivers, synergistically integrating mindfulness-based stress reduction with a focus-oriented approach.

## METHODS

### *Participants*

We selected a cohort of 60 caregivers of dementia patients treated at our institution from July 2021 to May 2022 as the study population. The research was approved by the institutional ethics committee, and a random number method was employed to divide the caregivers into two groups: the control group and the intervention group, each comprising 30 participants.

### *Inclusion criteria and exclusion criteria*

Inclusion criteria for dementia patients were as follows: (1) Diagnosis of dementia was made according to the criteria outlined in the Fourth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) with a Mini-Mental State Examination (MMSE) score of > 17. (2) Age > 65 years. Exclusion criteria were as follows: (1) Severe visual or auditory impairment; (2) mental incapacity without legal guardianship; (3) Patients with a pre-existing psychiatric-related diagnosis.

Caregiver inclusion criteria were: (1) age between 24 and 65 years; (2) being a spouse, child,

sibling, or other family member of the dementia patient; (3) providing 24-hour care for a dementia patient for more than one month; (4) having an educational level of at least junior middle school; (5) possessing the ability to communicate, interact, understand, and provide feedback effectively; (6) all caregivers voluntarily participated in this study.

Exclusion criteria were as follows: (1) caregivers with mental or other severe illnesses that hindered their ability to fulfill caregiving responsibilities adequately; (2) unable to provide continuous 24-hour care to the patient for at least one month due to various reasons; (3) caregivers who had participated in previous web-based mindfulness-based stress reduction and/or focus-oriented interventions.

### *Treatment approach*

In the control group, caregivers received standard guidance, which encompassed explanations of dementia-related health knowledge, caregiving measures, techniques, and precautionary guidance, as well as everyday life care. In the intervention group, caregivers received a web-based mindfulness-based stress reduction (MBSR) intervention combined with a focus-oriented approach, consisting of the following components:

1. Establishment of intervention team: The intervention team comprised an experienced traditional Chinese medicine physician, a psychological counselor, a graduate research assistant, a head nurse, and four senior-ranking nurses. The head nurse acted as the team leader, responsible for devising the web-based mindfulness-based stress reduction and focus-oriented intervention plan, training team members, and evaluating intervention outcomes. The traditional Chinese medicine physician and the psychological counselor provided training on mindfulness-based stress reduction concepts, knowledge, and course implementation. The head nurse implemented the focus-oriented intervention, and the graduate research assistant assessed research results.

2. New web-based mindfulness-based stress reduction intervention program:

a. Intervention time and instructions: An 8-week mindfulness-based stress reduction intervention was conducted in the department activity room every Wednesday afternoon from 3:00 to 4:00. Each session lasted for one hour, comprising

a 15-minute explanation of mindfulness-based stress reduction concepts, training techniques, and instructions, followed by a 30-minute mindfulness-based stress reduction practice, and concluding with a 15-minute group reflection and experiential exchange. During the first two weeks, concentrated training was provided on-site within the hospital for the caregivers. From the third to the sixth week, instructional videos on mindfulness-based stress reduction were sent to the caregivers through the WeChat platform. Caregivers were asked to provide feedback and check-ins in the group after self-study to assess the educational effectiveness and inquire about any psychological or other issues.

b. Specific content:

- Week 1: Guided practice on mindfulness while eating raisins, establishing an intervention contract, cultivating caregivers' awareness of living in the present moment.

- Week 2: Mindfulness breathing and sitting meditation, teaching meditation postures and breathing techniques.

- Week 3: Mindfulness body scan practice, combined with breathing exercises to perceive changes in bodily sensations.

- Week 4: Observing thoughts and emotions, learning to non-judgmentally observe thoughts and emotions.

- Week 5: Mindful walking and eating practice, integrating mindfulness into daily activities such as eating and walking to genuinely experience life.

- Week 6: Mindfulness breathing and meditation practice, cultivating the ability to live in the present moment, allowing things to happen naturally, and fostering acceptance and allowance.

- Week 7: 3-minute breathing space exercise, spending a few minutes daily to observe and attend to inner experiences, reconnecting with one's own mind and body.

- Week 8: Body scan and mindfulness meditation, integrating mindfulness concepts into daily life, regulating one's own stress, and improving emotional well-being.

*Focus-oriented approach*

Pre-intervention phase: During the week preceding the mindfulness-based stress reduction (MBSR) intervention, the intervention team engaged in conversations with the caregivers to establish effective communication and assessed the caregivers' negative emotions, their duration, and intensity using relevant scales. Encouragement was given to caregivers to express their inner thoughts freely.

Setting feasible objectives: Based on the information gathered from the caregivers' problem descriptions, the team delved into the caregivers' approaches to coping with negative emotions and their utilization of resources. Moreover, their incorporation of mindfulness into daily life during the web-based MBSR intervention was also explored. The team provided guidance and assistance in developing feasible objectives for web-based MBSR training, aiming to enhance caregivers' emotional regulation, emotional stability, and self-attention.

Exploration of exceptions: Caregivers were guided to recall their experiences during each mindfulness training session and to review past "successes and failures" in problem-solving through mindfulness. This process aimed to help caregivers recognize their own potential, increase their positivity and proactivity, and guide them in reoccurring "exceptional" events through mindfulness practice.

*Feedback and evaluation*

The team evaluated caregivers' mastery and flexible application of mindfulness techniques, as well as the changes in their emotions before and after the mindfulness intervention. Caregivers who encountered difficulties in adhering to the practice were encouraged and motivated, and testimonials from beneficiaries of mindfulness training were presented when appropriate to inspire caregivers' commitment to persistent mindfulness practice and application.

*Observation metrics*

The changes in Depression-Anxiety-Stress Scale 21 (DASS-21) scores were observed for both groups of caregivers before and after an 8-week intervention.<sup>6</sup> DASS-21 is a scale comprising three dimensions: depression, anxiety, and stress, with a total of 21 items. Each item is rated on a scale of 0 to 3, resulting in a total score range of 0 to 63. Higher scores in individual dimensions indicate a more severe level of negative emotions experienced by the caregivers. The overall Cronbach's alpha<sup>14</sup> for the total scale and the three subscales in this study were 0.94, 0.87, 0.82, and 0.86, respectively.

Additionally, the changes in Zarit Burden Interview (ZBI) scores were evaluated for both groups of caregivers before and after the 8-week intervention.<sup>15</sup> ZBI is a scale that encompasses two dimensions: personal burden and role burden, with a total of 22 items. Each item is rated on a

scale of 0 to 4, resulting in a total score range of 0 to 88. Higher scores in individual dimensions indicate a heavier burden experienced by the caregivers in that specific aspect.

*Statistical analysis*

The statistical analyses were conducted using SPSS 21.0 software. For the metric data, such as DASS-21 scores and ZBI scores, the results were presented as mean ± standard deviation ( $\bar{x} \pm s$ ). A t-test was employed for comparisons between groups. For categorical data, represented as frequencies or percentages (%), a chi-square test (c2 test) was used. Statistical significance was considered at a P-value of less than 0.05.

**RESULT**

*Comparison of general characteristics in two groups*

Strictly adhering to the inclusion criteria, a total of 60 caregivers were enrolled in this study, with 30 caregivers in each group. A comparison of general characteristics, including gender, age, and education level, between the two groups showed no statistically significant differences ( $P > 0.05$ ), indicating the comparability of general characteristics in both patient groups (Table 1 and 2).

*Comparison of different dimensions of DASS-21 scores in both groups*

Before the intervention, no significant differences were found in depression, anxiety, and stress scores on the DASS-21 scale between the two caregiver groups ( $P > 0.05$ ). After the 8-week intervention, the depression, anxiety, and stress scores in the contrast group showed no significant changes

compared to baseline ( $P > 0.05$ ). Conversely, the intervention group caregivers exhibited a significant decrease in depression, anxiety, and stress scores after the 8-week intervention when compared to baseline ( $P < 0.001$ ). Additionally, the depression, anxiety, and stress scores in the intervention group were significantly lower than those in the contrast group ( $P < 0.001$ ) (Fig.1 and Table 3).

*Comparison of DASS-21 and ZBI scores in caregivers before and after the intervention in both groups*

Before the intervention, there were no statistically significant differences in personal burden scores, responsibility burden scores, and total ZBI scores between the two caregiver groups ( $P > 0.05$ ). After the 8-week intervention, the control group caregivers showed no significant changes in DASS-21 scores and total ZBI scores compared to baseline ( $P > 0.05$ ). In contrast, the intervention group caregivers demonstrated a significant reduction in DASS-21 scores and total ZBI scores after the 8-week intervention when compared to baseline ( $P < 0.001$ ). Furthermore, the DASS-21 scores and total ZBI scores in the intervention group were significantly lower than those in the control group ( $P < 0.001$ ) at the 8-week follow-up (Table 4).

**DISCUSSION**

Previous study have shown that the severity of daily behaviors and psychological symptoms in dementia patients is a significant contributing factor to anxiety and depression among their caregivers.<sup>16</sup> Caregivers, often being the patients' children or siblings, may experience feelings of sadness<sup>17</sup> and loss upon learning of their

**Table 1: Comparison of baseline characteristics between two caregiver groups [n(%), ( $\bar{x} \pm s$ )]**

Items	Intervention group (n=30)	Control group (n=30)	t/ $\chi^2$	P
Gender				
Male	15(50)	11(36.7)	0.771 <sup>1)</sup>	0.791
Female	15(50)	19(63.3)		
Age (years old)	54.8±8.27	50.9±8.91	-1.757 <sup>2)</sup>	0.084
Education level				
Junior middle school	8(26.7)	9(30)		
Vocational secondary school	14(46.6)	12(40)	0.271	0.873
Senior high school and above	8(26.7)	9(30)		

Note: 1) = $\chi^2$ ; 2)=t

**Table 2: Comparison of baseline characteristics between two patient groups [n(%), ( $\bar{x}\pm s$ )]**

Items	Intervention group n=30	Control group n=30	t/ $\chi^2$	P
gender				
male	14(46.67)	15(50)	0.067 <sup>1)</sup>	0.796
female	16(53.33)	15(50)		
age (years old)	73.11 $\pm$ 6.02	72.35 $\pm$ 5.59	0.507 <sup>2)</sup>	0.614
with BSDS	2(6.67)	1(3.33)		
MMSE score	19.89 $\pm$ 3.01	20.04 $\pm$ 2.35		
Causes			1.346 <sup>1)</sup>	0.853
Alzheimer's disease	8	10		
senile dementia	11	9		
cognitive impairment	6	5		
cerebral infarction	2	1		
brain tumour	3	5		

Note: 1) = $\chi^2$ ; 2)=t

family members' diagnosis. Clinical attention to caregivers (often close relatives) is important. Carer education and interventions can improve the prognosis for people with dementia, alongside continued efforts to effectively deliver primary care for dementia. As the patients' condition worsens, they may become more unfamiliar and unpredictable, leading caregivers to question and worry about their own lives.<sup>18</sup> Furthermore, the prolonged and demanding nature of caring for dementia patients, coupled with reduced personal freedom and increased personal burdens, may give rise to negative emotions in caregivers.<sup>19,20</sup> Additionally, some caregivers may excessively focus on the hereditary aspects of dementia<sup>21</sup>, which can further contribute to the development of negative emotions such as anxiety and depression.<sup>22</sup> A randomized trial revealed that

caregivers' risk of developing dementia increases with the escalation of caregiving burden and stress when sufficient support is lacking.<sup>23</sup> Therefore, providing essential support and intervention measures for caregivers of dementia patients is crucial in improving their physical and mental well-being, as well as enhancing the quality of care provided to dementia patients.<sup>24</sup>

In this study, we implemented a mindfulness-based stress reduction approach combined with a focus-oriented intervention to address caregivers of dementia patients. Introduced into clinical practice by Kabat-Zinn in 1979, positive thinking is defined as non-judgmental present, conscious awareness.<sup>25</sup> The use of Positive Mindfulness Based Stress Reduction (MBSR) has been shown to be effective in reducing perceived stress, anxiety and depressive symptoms in both healthy

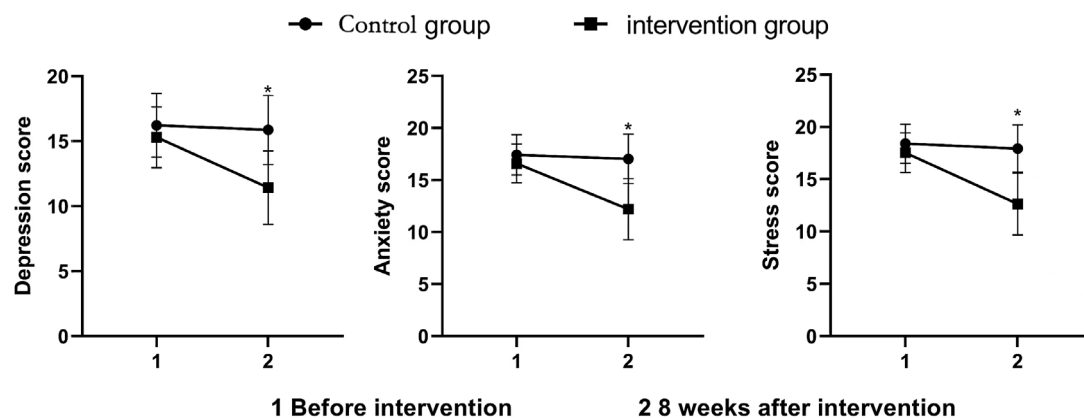


Figure 1. Comparison of different dimensions in DASS-21 scores between the two groups of carers pre-intervention and 8 weeks post-intervention



**Table 3: Comparison of different dimensions in DASS-21 scores between the two groups of carers pre-intervention and 8 weeks post-intervention ( $\bar{x}\pm s$ , points)**

Group	n	Depression score		Anxiety score		Stress score	
		Before intervention	8 weeks after intervention	Before intervention	8 weeks after intervention	Before intervention	8 weeks after intervention
Control group	30	16.23±2.45	15.30±2.34	17.43±1.94	16.60±1.87	18.40±1.87	17.53±1.90
Intervention group	30	15.87±2.66	11.43±2.82	17.03±2.38	12.20±2.94	17.93±2.26	12.63±2.95
<i>t</i>		0.556	5.778	0.712	6.898	0.872	7.665
<i>P</i>		0.581	<0.001	0.479	<0.001	0.387	<0.001

and clinical populations.<sup>26,27</sup> Mindfulness-Based Interventions (MBIs), like Mindfulness-Based Stress Reduction (MBSR), significantly reduce stress and anxiety by fostering mindfulness, enhancing emotional regulation, reducing rumination, and promoting acceptance, diverging from traditional stress management that focuses on cognitive restructuring.<sup>7,28</sup> These interventions also potentially improve cognitive functions such as attention and memory. Neuroscientific research supports these findings, showing MBIs induce structural and functional changes in critical brain regions like the insula, amygdala, anterior cingulate cortex, and prefrontal cortex areas. These changes occur within key brain networks involved in emotional processing, higher-order cognition, and self-referential thinking, suggesting MBIs may optimize stress response by altering network interactions under stress, offering a distinct mechanism for stress regulation.<sup>29,31</sup>

The results revealed that after an 8-week intervention, the depression scores, anxiety scores, stress scores, DASS-21 total score, and ZBI total score in the intervention group were significantly lower than those in the control group. These differences were statistically significant. The

reasons for these outcomes can be attributed to two main factors.

Firstly, under the intervention of web-based mindfulness-based stress reduction, caregivers exhibited an open-minded acceptance of their current situation and surrounding environment. They actively employed mindfulness-based stress reduction techniques to regulate negative habitual thought patterns<sup>32</sup>, enhance individual cognition<sup>33</sup>, improve emotional management capabilities<sup>34</sup>, enhance adaptability to negative events during the caregiving process<sup>35</sup>, reduce the frequency of anxiety and depression experiences<sup>36</sup>, and alleviate the burden level.

Secondly, the combined application of the focus-oriented approach method served as a motivational factor for caregivers to effectively apply mindfulness practice while encouraging adherence to web-based mindfulness-based stress reduction therapy.<sup>37</sup> This approach ensured the intervention's quality and indirectly enhanced its effectiveness.<sup>38,39</sup> This suggests that the combination of web-based mindfulness-based stress reduction with a focus-oriented approach is effective in ameliorating negative emotions in dementia patients and alleviating the burden

**Table 4: Comparison of DASS-21 and ZBI scores between the two groups of caregivers before and 8 weeks after intervention ( $\bar{x}\pm s$ , points)**

Group	n	DASS-21 total score				ZBI total score			
		Before intervention	8 weeks after intervention	<i>t</i>	<i>p</i>	Before intervention	8 weeks after intervention	<i>t</i>	<i>p</i>
Control group	30	49.5±11.42	49.4±5.77	0.028	0.977	71.97±10.83	69.17±9.13	1.083	0.283
Intervention group	30	50.93±6.81	36.2±8.63	7.306	<0.001	71.60±11.76	51.8±15.08	5.660	<0.001
<i>t</i>		-0.598	6.947	0.712	6.898	0.126	5.385		
<i>P</i>		0.559	<0.001	0.479	<0.001	0.90	<0.001		

experienced by caregivers.

The research findings demonstrate that mindfulness significantly improves psychological or physiological outcomes.<sup>32,37-49</sup> The majority of studies reviewed here suggest that web-based mindfulness interventions have positive effects on psychological or physiological indicators<sup>2,3</sup> as mentioned in the following reference.<sup>39</sup> A primary finding from this review is that participants with higher compliance are more likely to experience greater improvements in outcomes.<sup>39</sup>

The occurrence of negative emotions is highly detrimental to treatment compliance and recovery in patients.<sup>43</sup> Traditional Chinese medicine attributes diseases caused by emotional factors to “emotional diseases.” “Emotional transformation” is an essential component of psychological treatment in traditional Chinese medicine. Through “emotional transformation,” negative emotions in patients can be alleviated, improving their quality of life, and sometimes achieving effects that are difficult to attain through medication. The emphasis and key of mindfulness-based stress reduction therapy lie in guiding patients to consciously focus on and face the present moment with non-judgmental thinking. This approach not only provides psychological benefits but also optimizes immune function supportive of cancer control.<sup>50</sup> By using techniques such as body scanning, mindfulness introspection, mindfulness breathing, mindful walking, self-emotion regulation, and meditation, patients are able to achieve a state of physical and mental relaxation. This treatment philosophy is entirely consistent with that of traditional Chinese medicine. Numerous clinical studies have confirmed the effectiveness of mindfulness-based stress reduction therapy in reducing patient stress and improving their emotional well-being. The focus-oriented approach centers on exploring and utilizing individuals’ inherent potential and resources, with an emphasis on their positive aspects. It helps individuals acquire skills and resources, guiding them to discover and utilize their own strengths and resources to solve real-life problems. The focus-oriented approach involves clear and prominent steps for addressing problems. It can provide excellent support in implementing web-based mindfulness interventions.

This study has some limitations that should be acknowledged. Firstly, the study was conducted in a single-center, which may limit the generalizability of the findings to other settings. Secondly, due to the nature of the intervention, blinding was not feasible, which may introduce

bias. Thirdly, the study included a small number of subjects, and in the future, the sample size should be expanded to increase the statistical power of the study. Finally, it may be beneficial to strengthen cooperation with other departments to address the limitations of this study and to further investigate.

In conclusion, this study investigated the effect of a web-based mindfulness-based stress reduction intervention combined with a focus-oriented approach on regulating negative emotions in caregivers of dementia patients. The results indicate that the study combines the advantages of psychological interventions and web-based mindfulness-based approaches, providing emotional relief channels for dementia caregivers, effectively reducing their psychological stress, and demonstrating good clinical efficacy. Therefore, it is worth further promoting and applying this intervention.

## DISCLOSURE

Ethics: The studies involving human participants were reviewed and approved by the Ethics Committee of the Changsha First Hospital. The patients/participants provided their written informed consent to participate in this study.

Data availability: The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

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Conflict of interest: None

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