

EFFECT OF MINDFULNESS-BASED STRESS REDUCTION THERAPY ON WORK STRESS AND MENTAL HEALTH OF PSYCHIATRIC NURSES

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SUMMARY

Background: Psychiatric nurses are a special group of nursing staff, they experience greater work stress and lower mental health levels than regular nurses. In order to address this problem, the effect of mindfulness-based stress reduction (MBSR) therapy on work stress and mental health of psychiatric nurses is investigated in this study.

Subjects and methods: From August 2017 to November 2017, 100 psychiatric nurses, including 68 females and 32 males, were selected as participants from three hospitals in Hunan Province of China. They were randomly divided into the intervention and control groups, with 50 respondents in each group. MBSR therapy was used as psychological intervention in the intervention group. Before and after the intervention, the two groups were assessed with the Symptom Checklist-90 (SCL-90) scale, Self-Rating Depression Scale (SDS), Self-Rating Anxiety Scale (SAS), and Nursing Stress Scale.

Results: (1) After the intervention, the SCL-90 score of the intervention group decrease significantly, and a statistically significant difference is observed with the figure before the intervention ($P < 0.001$). No statistically significant difference is found in the control group ($P > 0.05$). (2) After the intervention, the SDS and SAS scores of the intervention group decrease significantly, and a statistically significant difference is observed with the figures before the intervention ($P < 0.001$). No statistically significant difference is found in the control group ($P > 0.05$). (3) After the intervention, the Nursing Stress Scale score of the intervention group decrease significantly, and a statistically significant difference is observed with the figure before the intervention ($P < 0.001$). No statistically significant difference is found in the control group ($P > 0.05$).

Conclusions: MBSR therapy can reduce work stress, anxiety, depression, and other negative emotions among psychiatric nurses and improve their mental health.

Key words: mindfulness-based stress reduction therapy - psychiatric nurses – stress - mental health

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INTRODUCTION

Health, the foundation of a happy life, mainly includes two important dimensions, namely, mental health and physical health (Sharpe & Naylor 2016). The definition of mental health involves three core aspects: it is a part of health; it is not only about the absence of disease but also covers psychology and behavior (Fan 2016). Undoubtedly, mental health has a very rich connotation. The World Health Organization pointed out in 2001 that mental health is a state of health or well-being. Under this state, individuals can achieve their value, cope with normal life pressures, engage in fruitful and productive work, and have the ability to contribute to their community (Shadloo et al. 2016). Generally, mental health includes subjective well-being, self-efficacy, autonomy, competency, and ability to recognize others' intelligence and potential emotions (Shadloo et al. 2016). Moreover, mental health also involves the empowerment of individuals and groups to achieve their autonomic goals. Zhi et al. (2014) believed that mental health is a highly effective, satisfying, and continuous mental state, reflected by the harmony and coordination between internal psychological activities, such as cognition, emotion, and personality, and exter-

nal behaviors. In this state, the individual can adapt to the current and future development, study, work, and live happily and positively; have vitality; and fully exert his physical and mental capabilities. Among the complex factors that affect mental health, the relationship between stress and mental health has attracted the attention of various researchers. Cunningham & Regan (2016) pointed out that the impact of stress on mental health is ubiquitous, regardless of age and industry. This argument has been empirically studied both at home and abroad. For example, Koenen et al. (2017) reviewed literature on traumatic emergency stress and mental health and found a significantly negative correlation between traumatic stress and mental health in infants, adolescents, and elderly people, normally at a degree above the average level. In general, stress negatively affects the level of mental health (Ceobanu & Mairean 2015).

It is generally known that nursing groups are under high work stress, and psychiatric nurses have to work under higher stress than nurses in other departments because of the special nature of their work (Su 2011). Noticeably, psychiatric nurses are a particular group of medical workers. This particularity is reflected in the nature of patients that psychiatric nurses have to take care of. As a result of this particularity, the work risk of

psychiatric nurses is significantly higher than that of general nurses (Zhang 2016). However, there is a universal prejudice in society against mental patients, which leads to a lower social status of psychiatric nurses. For various reasons, psychological and social stresses of psychiatric nurses are greater than those of general nurses (Goldberg 2017). At the same time, psychiatric nurses suffer from low levels of mental health (Peng & Pang 2011), and work stress is an important factor causing low mental health levels among psychiatric nurses (Li 2013). Therefore, exploring an effective way to reduce the stress of psychiatric nurses and thereby increase their mental health level is conducive to improving their work efficiency and job satisfaction.

Mindfulness therapy is a variety of meditations, physical awareness, and yoga are used in mindfulness therapy to awaken inner focus and improve self-regulation, so as to help people relieve stress, reduce pain, and treat diseases (Witteveen 1974). Particularly, mindfulness-based stress reduction (MBSR) is a program that incorporates mindfulness to assist people with pain and a range of conditions and life issues that are initially difficult to treat in a hospital setting (Fleer 2014). This psychotherapy has gradually been applied to the adjunct treatment of emotional disorders (Crane 2009) and chronic diseases (Morone & Greco 2014) in the medical field and has achieved positive results. MBSR has been used to reduce individual stress levels and enhance individual subjective well-being, achieving desirable results (Khoury et al. 2013). Another study showed that the use of MBSR in healthy people can reduce the stress levels of young and middle-aged individuals (Hofmann et al. 2010). Notably, MBSR can not only improve mental health but also affect physiological results. However, to date, there is no research on the use of mindfulness therapy in stress reduction among psychiatric nurses. In this study, stress intervention on psychiatric nurses was conducted through the use of mindfulness therapy, and the effect of such intervention on the mental health of psychiatric nurses was examined.

SUBJECTS AND METHODS

Participants

Psychiatric nurses were selected as the participants from three large general hospitals in Hunan Province of China (The First Xiangya Hospital of Central South University, The Second Xiangya Hospital of Central South University, and The Fourth Xiangya Hospital of Central South University). Only those who were aged 20–50 years old, had worked for more than 1 year, and were engaged in psychiatric clinical work were included in the study; those with serious cardiovascular and other physical diseases were excluded. A total of 289 respondents were screened using Symptom Checklist-90 (SCL-90), and 106 of them were positive in more than 30 items of SCL-90, facilitating the selection of 100 volunteers to participate in the study. Specifically, there

were 68 females and 32 males, with an average age of 29.5 ± 7.1 years. Eighteen (18%) respondents had received polytechnic school education, 29 (29%) a college degree, and 53 (53%) a bachelor's degree. The random number table was used to divide them into the intervention and control groups, with 50 respondents in each group. The participants in this experiment had already understood the purpose and method of the experiment before they proceeded, and all of them participated voluntarily in the study. The study was approved by the Institutional Review Board of Xiangya Hospital of Central South University.

Methods

Before the intervention, two psychological consultants, a Doctor of Nursing and an associate professor of psychology, used the SCL-90 scale, Self-Rating Depression Scale (SDS), Self-Rating Anxiety Scale (SAS), and Nursing Stress Scale to assess the two groups of nurses. Then, psychological intervention was implemented in the intervention group, whereas the control group received routine psychological support and activities. After the completion of MBSR therapy, the two groups of nurses were again assessed using the same scales, and the results of the two assessments were compared and analyzed. All the operators have correctly grasped the operation method of this experiment.

The period from August 2017 to November 2017 was divided into three phases. Phase 1 is the assessment phase (August), during which the purpose, significance, content, and principles of the study were introduced to the psychiatric nurses. Under the guidance of the researcher, nurses filled in the general situation scale, the Chinese version of the SCL-90 scale, the Chinese version of SDS, and Nursing Stress Scale. Phase 2 is the implementation phase (September to October). The nurses were intervened in the nurse station every Thursday morning or afternoon (once a week) for a total of eight times. The respondents selected training according to their own spare time. The training content was the same for two time periods. They either took part in the training or practiced at home. The specific content includes the following: in the first stage, "relaxation" preparation (Morone et al. 2008), the nurses selected a comfortable rest posture and were guided to gradually relax using relaxing Chinese music; the operator used oral words to guide the nurses to focus on all parts of the body from foot to head in turn. In the second stage, mindfulness breathing (Morone et al. 2008), the nurses closed their eyes; felt their own body; perceived some tight, uncomfortable feelings; and acknowledged the existence of these uncomfortable feelings; then, they felt their breath and the air flowing in the respiratory tract while breathing, gradually deepened their breathing, and assumed that deep breathing can relieve these discomforts in the body due to air flow. In the third stage, mindfulness meditation, the nurses realized their thoughts, opinions, moods, impulses, and other emotions occurring;

experienced the process of their generation and disappearance; and persuaded themselves to objectively accept these emotions. The operator appropriately taught them to make timely and correct responses when negative emotions appeared. Phase 3 is the completion phase (the first week of November). According to the effect of MBSR therapy and the experience of respondents, they were encouraged to share their negative or positive emotional experiences and learn from each other in the following exchange and discussion. Then, the respondents refilled the Nursing Stress Scale, Nursing Stress Scale, and Stress Response Scale. The effect assessment was completed correspondingly on the day before and after the intervention, and answers were collected through questionnaire.

Instruments

SCL-90

This checklist, compiled by Derogatis et al. (1973), includes 90 items, hence the name SCL-90. This checklist contains a wide range of psychotic symptomatic contents, such as thinking, emotion, behavior, interpersonal relationship, and lifestyle habit. A 5-point rating is used, including 0 = never, 1 = mild, 2 = moderate, 3 = quite severe, and 4 = severe (Wang et al. 2017).

The self-rating depression scale (SDS)

SDS, compiled by Zung (1965), is a self-rating scale consisting of 20 items. Each item is equivalent to a related symptom. Points 1–4 correspond to never, sometimes, often, and always, respectively, and the index range is 0.25–1.00. A higher index means a higher degree of depression (Peng et al. 2013).

The self-rating anxiety scale (SAS)

SAS was compiled by Zung (1971). From the form of scale construction to the specific assessment method, it is quite similar to SDS. It also covers 20 items, has a 4-point rating, and is used to assess the subjective experience of patients with anxiety (Hao et al. 2016).

Nursing Stress Scale

The Nursing Stress Scale was compiled by Li and Liu (2000) by redesigning and revising the Nursing Stress Scale commonly used in foreign countries according to China's specific national conditions. The scale covers a total of 35 items, including questions concerning nursing professionals and work, problems about time allocation and workload, problems regarding work environment and equipment, problems associated with patient care, and problems related to management and interpersonal relationships. A 4-point rating is used for each item. A higher score indicates a higher degree of stress. One point implies no stress, 1.01–2 points mean mild stress, 2.01–3 points are classified as moderate stress, and 3.01–4 points are classified as severe stress. The total Cronbach's coefficient of the scale is 0.96, with each dimension between 0.84 and 0.93.

Statistical analysis

The data were analyzed by SPSS 15.0 statistical software. The quantitative data were expressed as mean \pm standard deviation. Cross-group comparison of two groups of means was conducted using independent samples t test, and intra-group comparison was performed using paired t-test. The qualitative data were expressed by the number of cases and constituent ratio. Cross-group comparison was conducted using chi-square test or Wilcoxon rank sum test. $P < 0.05$ was considered statistically significant.

RESULTS

Comparison of General Information of the Research Participants

There were 50 respondents in the intervention and control groups, respectively, before the intervention. After the intervention, due to the loss of some data of 3 respondents in the control group and 2 respondents in the intervention group, only 47 respondents in the control group and 48 respondents in the intervention group were actually included in the analysis. As shown in Table 1, the two groups have no statistically significant difference in gender, age, education level, marital status, and family economic situation ($P > 0.05$), suggesting that the two groups are comparable in terms of general information.

Table 1. Comparison of general information of the research participants

	Control group (n=47)	Intervention group (n=48)	P
Gender			
Male	15	16	0.883
Female	32	32	
Age		29.2 \pm 6.9	0.646
Education			
Polytechnic school	8	9	0.631
College	13	15	
Undergraduate and above	26	24	
Marital status			
Married	22	24	0.756
Unmarried	25	24	
Working years	9.3 \pm 3.2	8.9 \pm 2.9	0.525

Comparison of the Two Groups in SCL-90 after the Intervention

As shown in Table 2, before the intervention, SCL-90 and the positive number of SCL-90 ($P > 0.05$) showed no significant difference between the two groups. In the intervention group, they were significantly lower after the intervention than before the intervention, demonstrating a statistically significant difference ($P < 0.001$); meanwhile, in the control group, they were slightly lower after the intervention than before the intervention, demonstrating no statistically significant difference ($P > 0.05$). In addition, in terms of the changes in the two

groups before and after the intervention, the changes of the indicators in the intervention group before and after the intervention were both greater than those of the control group, demonstrating a statistically significant difference ($P < 0.001$).

Comparison of the Two Groups in SDS after the Intervention

As shown in Table 3, no significant difference was observed between the intervention group and the control group in the SDS scores before the intervention ($P > 0.05$). After the intervention, the SDS score of the intervention group was significantly lower than that before the intervention, demonstrating a statistically significant difference ($P < 0.001$). The SDS score of the intervention group was slightly lower than that before the intervention, demonstrating no statistically significant difference ($P > 0.05$). In addition, in terms of the changes in the two groups before and after the intervention, the change of the SDS score in the intervention group before and after the intervention was greater than that of the control group, demonstrating a statistically significant difference ($P < 0.001$).

Comparison of the Two Groups in SAS After the Intervention

As shown in Table 4, no significant difference was observed between the intervention group and the control group in the SAS scores before the intervention ($P > 0.05$).

After the intervention, the SAS score of the intervention group was significantly lower than that before the intervention, demonstrating a statistically significant difference ($P < 0.001$). The SAS score of the intervention group was slightly lower than that before the intervention, demonstrating no statistically significant difference ($P > 0.05$). In addition, in terms of the changes in the two groups before and after the intervention, the change of the SAS score in the intervention group before and after the intervention was greater than that of the control group, demonstrating a statistically significant difference ($P < 0.001$).

Comparison of the Two Groups in Nursing Stress Scale After the Intervention

As shown in Table 5, no significant difference was observed between the intervention group and the control group in the Nursing Stress Scale score before the intervention ($P > 0.05$). After the intervention, the Nursing Stress Scale score of the intervention group was significantly lower than that before the intervention, demonstrating a statistically significant difference ($P < 0.001$). The Nursing Stress Scale score of the intervention group was slightly lower than that before the intervention, demonstrating no statistically significant difference ($P > 0.05$). In addition, in terms of the changes in the two groups before and after the intervention, the change of the intervention group in the Nursing Stress Scale score before and after the intervention was greater than that of the control group, demonstrating a statistically significant difference ($P < 0.001$).

Table 2. Comparison of the two groups in SCL-90 after the intervention

Indicator	Group	Before intervention	After intervention	Difference before and after intervention	P of Intra-group comparison	P of cross-group comparison of difference
SCL-90	Control group (n=47)	134.5±25.6	132.6±24.9	1.9±8.4	0.128	P<0.001
	Intervention group (n=48)	136.7±27.7	119.6±21.6	17.1±9.3	<0.001	
Positive number	Control group (n=47)	34.2±4.6	33.2±4.1	1.0±4.9	0.168	P<0.001
	Intervention group (n=48)	36.1±5.1	25.6±5.6	10.5±4.3	<0.001	

Table 3. Comparison of the two groups in SDS after the intervention

Group	Before intervention	After intervention	Difference before and after intervention	P of Intra-group comparison	P of cross-group comparison of difference
Control group(n=47)	43.3±7.9	41.2±8.7	2.1±8.4	0.093	P<0.001
Intervention group (n=48)	45.8±9.1	35.4±8.3	10.4±7.5	<0.001	

Table 4. Comparison of the two groups in SAS after the intervention

Group	Before intervention	After intervention	Difference before and after intervention	P of Intra-group comparison	P of cross-group comparison of difference
Control group(n=47)	46.2±7.1	45.1±6.7	1.1±5.8	0.200	P<0.001
Intervention group (n=48)	44.8±6.1	36.4±7.1	8.4±6.0	<0.001	

Table 5. Comparison of the two groups in Nursing Stress Scale after the intervention

Group	Before intervention	After intervention	Difference before and after intervention	P of Intra-group comparison	P of cross-group comparison of difference
Control group(n=47)	84.8±8.1	83.1±8.4	1.7±8.2	0.162	P<0.001
Intervention group (n=48)	83.9±8.3	68.2±9.1	15.7±7.5	<0.001	

DISCUSSION

MBSR Therapy Is Conducive to Promoting Mental Health of Psychiatric Nurses

According to the results of this study, both the intervention and control groups had lower mental health levels before the intervention. After the intervention, the mental health levels of the intervention group were significantly higher than that of the control group and significantly higher than that before the intervention. This finding shows that MBSR therapy can increase the mental health levels of psychiatric nurses.

First, psychiatric nurses suffer from low levels of mental health. This finding is consistent with the finding of Li & Yang (2011), who investigated 110 psychiatric nurses using SCL-90, and her results showed that the total scores of psychiatric nurses in somatization, obsessive-compulsive disorder, depression, anxiety, psychosis, and other dimensions are significantly higher than the corresponding national norms. The main recipients of care of psychiatric nurses are mental patients who do not have clear consciousness and may take various actions that endanger themselves and others at any time and at any place. Consequently, the psychiatric nurse's mentality remains in a state of tension. According to stress-related models (Ko et al. 2008), when an individual is in a state of emergency for a long time, the stress level perceived by the individual also increases. If an organism remains stressed for a long time, the body function declines, resulting in various psychological problems. Therefore, the particularity of the work of psychiatric nurses directly determines greater work stress, which reduces their level of mental health. It also indicates that it is imperative to strengthen the mental health of psychiatric nurses.

Second, the reason why MBSR therapy can reduce the stress level of psychiatric nurses and increase their mental health is related to the essential characteristics of mindfulness therapy. Mindfulness therapy originates from "meditation" in the field of religion and philosophy (Renaud 2014), which emphasizes no comment and critique upon any experience one is undergoing but only on his or her own experience. Applied in stress reduction, mindfulness highlights mobilization of the active power of a person to focus on one's own needs and experience (Evans et al. 2008). Given the special nature of their patients, many psychiatric nurses themselves also have some misunderstandings about their work of taking care of mental patients. They do not think it is a "glorious" job. Moreover, most people in society have a prejudice against mental patients and believe that they are "devils and ominous people." According to the self-verification theory of self-esteem, one's view of the self is often influenced by others' opinions (Li & Yang 2011). Hence, the self-esteem level of psychiatric nurses is generally low. Individuals with lower self-esteem levels are less concerned with themselves than those with

higher self-esteem levels because they are reluctant to face their own negative situations. Through mindfulness, psychiatric nurses can focus on their own experience at the present and actively perceive that their previous experiences are actually not all negative, and that their understanding of their work is not all correct, so that they can obtain a sense of self-affirmation (Renaud 2014). In addition, mindfulness training can also assist psychiatric nurses to relax their bodies, leaving their bodies that have been in a state of intense emergency for a long time to a more relaxing state, which is conducive to improving their mental health level (Wang et al. 2014).

MBSR Therapy Reduces Anxiety and Depression of Psychiatric Nurses

According to the results of this study, no significant difference in the anxiety and depression levels was observed between the intervention group and the control group before the intervention. Both the depression and anxiety levels after the intervention are significantly lower in the intervention group than in the control group, demonstrating a significant difference in the intervention group before and after the intervention. This finding illustrates that MBSR therapy effectively reduces the levels of anxiety and depression in psychiatric nurses.

First, depression and anxiety are the most common mental health problems in the nursing community. Hui & Li (2015) investigated 800 community nursing staff using a questionnaire survey. Their results showed that the incidence of depression and anxiety among nursing staff reaches 45%. However, different from the community nursing staff, psychiatric nurses are facing greater workload and work stress. The results of the survey conducted by Xu et al. (2010) on psychiatric nurses showed that the detection rates of depression and anxiety are 51.9% and 45%, respectively, indicating that psychiatric nurses suffer from more severe depression and anxiety. Furthermore, Xu et al. (2010) pointed out that the intense work stress of psychiatric nurses is a significant cause of their depression and anxiety. Therefore, from the perspective of relieving work stress, reducing the levels of depression and anxiety is a feasible intervention method to improve the mental health of psychiatric nurses.

Second, the use of MBSR therapy in this study has significantly reduced the depression and anxiety levels of psychiatric nurses. Mindfulness training can effectively activate the left prefrontal cortex of the brain, thereby enhancing the individual's experience and perception of positive emotions (Harris et al. 2016). Positive attention to internal emotions also helps increase the breadth of attention, strengthen individuals' self-monitoring and management of internal conflicts, and enhance their feelings of internal and external activities and emotional flexibility (Palmieri et al. 2009). The work of psychiatric nurses is full of

stress and challenges. However, mindfulness training, on the one hand, can effectively improve the ability of psychiatric nurses to face negative emotional experience in their daily work. In other words, psychiatric nurses can perceive more positive aspects from the negative events they are facing, reducing the impact of the negative events on their mental health and the levels of anxiety and depression caused by the negative events. On the other hand, through metacognitive control, mindfulness training can also help psychiatric nurses establish correct self-knowledge and master correct methods to deal with stress. The mastery of various methods of managing depressive emotions is also helpful for psychiatric nurses to improve their self-efficacy. Previous studies have shown that Improving one's self-efficacy, especially emotional self-efficacy, contributes to the reduction of depression, anxiety, and other undesirable emotions, thereby improving the mental health of psychiatric nurses (Wen et al. 2010).

MBSR Therapy Is Conducive to Reducing Work Stress of Psychiatric Nurses

According to the results of this study, before the intervention, no significant difference in the work stress score was observed between the psychiatric nurses in the intervention group and in the control group. After the intervention, the work stress of the psychiatric nurses in the intervention group decreased significantly, whereas that of the psychiatric nurses in the control group also decreased, but not obviously. This finding shows that MBSR therapy reduces work stress of psychiatric nurses to some extent.

First, psychiatric nurses face a higher workload due to their special patients, so they usually have greater work stress (Su 2011). Previous studies have illustrated that MBSR therapy can effectively reduce occupational stress and stress response of operating room nurses. Wang and Jiang (2016) conducted a 12-week intervention of MBSR for 50 operating room nurses. Occupational stress of the operating room nurses were examined before and after the intervention by using Nursing Stress Scale, Stress Perception Scale, and Work Stress Response Scale. The results show that work stress of the operating room nurses is significantly lower after the intervention and is significantly lower than those nurses who did not receive the intervention. The reason why mindfulness therapy can reduce work stress is related to its nature. MBSR allows individuals to focus their attention in a certain moment, without any subjective judgment on his or her momentary experiences, and gradually develops their ability to open up their inner thoughts and accept various imperfect experiences, thereby helping the individual better meet their work requirements and reduce work stress.

Second, to some extent, the training of MBSR therapy also improves the individual's self-efficacy of

emotional regulation, so as to enhance the individual's ability to deal with work stress and to adopt a more effective stress-coping style to reduce work stress (Mann et al. 2010). Self-efficacy is one of the factors influencing the individual's confidence in completing a task (Lai & Chen 2014). Different levels of the individual's self-confidence in completing a task determine the choice of different behaviors, the degree of effort, the time of persistence, and the attitude orientation in the process of completing the task, thus affecting the progress and success of the task. Hence, self-efficacy has a decisive influence on the success or failure of the individual in fulfilling a task or achieving a goal (Lai & Chen 2014). Emotional regulation self-efficacy helps mobilize personal positive emotions and relieve negative emotions, thereby enhancing one's ability to cope with stress, promoting interpersonal relationships and happiness, and ultimately improving their personality. Students with high emotional regulation efficacy are more likely to use positive emotional coping styles to face stress and look at problems with optimism, so that they can relieve occupational stress more effectively. However, students with low emotional regulation self-efficacy cannot adjust and deal with negative emotions, and they perceive more stress from work tasks (Valois et al. 2015). Sun et al. (2013) investigated the relationship between emotional regulation self-efficacy and stress coping and discovered that emotional regulation self-efficacy can assist the individual to adopt stress-oriented coping styles and reduce work stress.

CONCLUSION

Psychiatric nurses are a special group of nurses. Given the unique nature of their work and the great work stress, they do not have an optimistic mental health condition. In this study, the psychiatric nurses are intervened using MBSR therapy. The respondents are randomly divided into the intervention and control groups. Before and after the intervention, the respondents are assessed using the SCL-90 scale, SDS, SAS, and Nursing Stress Scale. Results of the study show that no significant difference is observed between the two groups of nurses before the intervention in mental health, depression, anxiety, and work stress. Nevertheless, after the intervention, the mental health level of the experiment group improves, and their levels of depression, anxiety, and work stress decrease. This finding shows that MBSR therapy is conducive to reducing work stress of psychiatric nurses and increasing their mental health. This study provides a new perspective for improving the mental health of psychiatric nurses. The limitation of this study lies in the issue of sampling. Therefore, the sample should be expanded in future research, for example, including nurses from various departments. At the same time, other influencing factors of this experiment should be explored.

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Contribution of individual authors:

All authors contributed equally to this manuscript.

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