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Original research article

# The impact of a mindfulness-based stress reduction training program on depression, anxiety, and stress in Moroccan nurses

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**Abstract**
*Background:* This study examines the impact of a mindfulness-based stress reduction-training program on depression, anxiety, and stress among nurses in Morocco.
*Methods:* Participants were selected from a hospital in the province of Tetouan, Morocco. They included 80 hospital nurses, 59 women and 21 men. They were randomly assigned to an intervention group and a control group, with 40 participants in each group. An eight-week mindfulness training was used as a psychological intervention in the intervention group. To assess the outcomes of both groups before and after the intervention, a depression, anxiety, and stress scale and a five-facet mindfulness questionnaire were used.
*Results:* In the intervention group, mean post-test scores showed significant differences from pre-test in the depression variable ($\eta^2 = 0.249$; $p < 0.001$), Anxiety = ($\eta^2 = 0.282$; $p < 0.001$), and Stress = ($\eta^2 = 0.396$; $p < 0.001$), as well as in the FFMQ ($\eta^2 = 0.379$; $p < 0.001$. Similarly, a 4-month follow-up revealed that all variables showed statistically significant differences, with an equally large effect size ($\eta^2 = 1.387$; $p < 0.001$).
*Conclusion:* The MBSR training program is an effective, evidence-based psychotherapeutic intervention for treating depression, anxiety, and stress in hospital nurses. Further in-depth studies based on neuroscientific data using electroencephalogram (EEG) evoked brain potentials are recommended.

**Keywords:** Anxiety; Depression; Mindfulness-based stress reduction; Nurse; Stress

## Introduction

Nurses occupy a fundamental place in all health care systems around the world. Their contribution to the prevention and protection of individual and community health is of great importance (Ghods et al., 2017). However, heavy workloads, unstable schedules, and a lack of support and recognition can lead them to present certain psychological disorders (Gong et al., 2014; Letvak et al., 2012).

Indeed, some studies have revealed that the prevalence of stress in this category of staff varies from around 40% to 90% (Dalvand et al., 2017; Kibria, 2018), and its severity ranges from high to moderate (Okuhara et al., 2021; Subih et al., 2011).

Therefore, the persistence of this problem can have a serious impact on the quality of service and psychological health of some nurses. According to previous studies, workplace stress is a significant factor in reducing work efficiency and performance, and significantly affects the quality of care provided to patients and the community (Gao et al., 2012; Welsh, 2009).

In addition, the intensity of stress also has a significant impact on psychological disorders, including negative feelings of self-esteem, weakness, fatigue, and sexual dysfunction, as well as appetite and sleep dysfunction (Dyrbye et al., 2006). At the physical level, the consequences of stress generally result in the significant development of metabolic, cardiovascular, neurological, and musculoskeletal diseases (Schneiderman et al., 2005). Beyond that, too much stress can lead to or sometimes amplify certain behavioral changes, such as smoking, drinking, or illicit drug use (Sinha, 2008; Yau and Potenza, 2013).

In parallel, according to a general systematic review including the results of several meta-analytic studies on the incidence of psychological disorders in nurses, the overall proportion of subjects suffering from both depression and anxiety was 24.94% and 24.83% respectively (Sahebi et al., 2021). In addition, data from a systematic review including the results of 10 comparative studies showed that the prevalence of de-

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pressive and anxiety disorders in nurses was 28% and 22.8% respectively (Fernandez et al., 2021).

These statistical data reflect the complexity and demanding nature of this profession as well as the risks inherent in its daily practice (Lai et al., 2020). Therefore, implementing effective strategies to better control stress, anxiety, and depression-related issues within this profession could help improve nurses' well-being, performance, and job satisfaction.

Mindfulness therapy relies on a combination of meditations, physical awareness, and mindfulness practice to stimulate inner attention and improve individuals' self-regulatory abilities to help mitigate their levels of stress, pain, and illness (Guillaumie et al., 2017).

This therapeutic strategy was adopted by behavioral medicine specialists in the 1970s as "Mindfulness-Based Stress Reduction (MBSR)" by Jon Kabat-Zinn. Indeed, the MBSR program was designed to support people with chronic pain symptoms and life problems that are difficult to treat in medical centers (Fleer et al., 2014).

In the health care field, this psychotherapy has had successful results as a complementary treatment for certain psychological disorders and chronic illnesses (Crane, 2017). Indeed, MBSR has been used to treat work-related stress and to improve some anxiety and depressive states with very encouraging results (Khoury et al., 2013).

The findings of Hofmann et al. (2010) demonstrated that the MBSR program was moderately effective in improving anxiety and mood symptoms in patients with anxiety disorders and depression. In a randomized controlled trial, Song and Lindquist (2015) found that nursing students who completed the MBSR program reported a significantly greater decrease in depression, anxiety, and stress, as well as a greater increase in mindfulness.

Within the field of nursing, a recent systematic review found that the MBSR program resulted in positive outcomes in the experimental group in terms of burnout, self-satisfaction, and ability to concentrate (Ghawadra et al., 2019).

However, to date, no research has evaluated the effect of the MBSR program on reducing levels of depression, anxiety, stress, and developing mindfulness in Moroccan nurses. Therefore, the purpose of this study is to determine the extent to which the MBSR program reduces levels of depression, anxiety, and stress, and develops mindfulness in Moroccan nurses.

## Materials and methods

### *Study design, sample, and setting*

In this study, a randomized controlled trial was conducted to examine the effects of MBSR on decreasing levels of anxiety depression, stress, and mindfulness development in hospital- based nurses in relation to the demanding nature of their work. A sample of 80 nurses practicing in a provincial hospital was selected using a stratified and proportional sampling method. To be included in the study, participants had to be nurses working in hospital wards for at least two years, have no serious health problems and not be undergoing psychotherapeutic treatment, agree to attend all training sessions, and practice mindfulness- related activities for 30 minutes per day at home. Free and informed consent was obtained from participants prior to data collection.

### *Sample size*

The present study was conducted on a total of 80 nurses, of which 40 were allocated to each group. Sample size calculation was performed by G* power analysis via the a priori sample size calculation method for MANOVA (Cohen, 1988). Considering a significance level of $\alpha = 0.05$, an expected large effect size is ($\eta^2 = 0.12$), and a statistical power of 0.92. Indeed, this sample size was quite sufficient to perform a meaningful statistical analysis.

### *Intervention*

Based on the results of the pre-test questionnaire, the MBSR training programme was adapted to the needs of the nurses, which contributed to their adherence to the training process.

MBSR was delivered to the intervention group participants by an experienced psychotherapist with a PhD in applied psychology between June and July 2022, followed by a four-month period until the end of November 2022. The sessions are spread over eight weekly two-hour sessions, supplemented by 30 minutes of daily home practice. The training is divided into three parts: training on the themes of meditative practice, guided practice exercises, and a final part devoted to sharing experiences, discussing, and answering questions from the trainer.

The topics covered in this training included a general introduction to mindfulness, a detailed description of MBSR techniques including strategies for coping with difficult situations, concentration and mindfulness techniques, time management techniques, techniques for staying in the present moment, techniques for dealing with and neutralising guilt, techniques for neutralising negative emotions, and techniques for the detachment mechanism.

The control group nurses did not participate in this training, but attended a one-hour awareness session, during which the researchers explained the purpose of this study. During the final training session, the nurses in the intervention and control groups were asked to complete the post-test questionnaires and submit them to the research coordinator. In addition, as part of the monitoring and follow-up, nurses in the intervention group were reassessed four months after the end of the intervention to see if the results were maintained over time.

### *Ethical considerations*

The Director of the Provincial Hospital of Tetouan approved this study (NOR: 103/06-2022). Confidentiality was respected and all participants signed a free and informed consent.

### *Data collection tools*

The primary outcomes of the research focused on participants' levels of depression, anxiety, stress, and mindfulness. These were measured before the training program began (pre-test) and after the program (post-test and four-month follow-up).

*1) Depression, Anxiety and Stress Scale (DASS-21)*

The psychological symptoms of depression and anxiety and stress were measured with the Arabic version of the DASS-21 scale (Moussa et al., 2016).

This scale contains 21 items divided into three domains including depression (3, 5, 10, 13, 16, 17, 21), anxiety (2, 4, 7, 9, 15, 19, 20), and stress (1, 6, 8, 11, 12, 14, 18). Respondents rate the level of symptoms experienced in the past week on a 3-point Likert scale, ranging from 0 (does not apply to me at all) to 3 (applies to me often or most of the time). Higher scores reflect greater levels of symptom confirmation. The DASS 21 has excellent reliability in all three domains: Depression ($\alpha = 0.95$), Anxiety ($\alpha = 0.96$), and Stress ($\alpha = 0.94$). In the present study, the Cronbach's alpha for the scale was $\alpha = 0.97$.

*2) Five Facet Mindfulness Questionnaire (FFMQ)*
The Arabic version of the FFMQ was used (Alkholy, 2022). This questionnaire consists of 24 items assessing five dimensions of mindfulness, including observing, (*e.g.*, "I pay attention to physical experiences, like the wind in my hair or the sun on my face"). Describing (*e.g.*, "I am good at finding words to describe my feelings"). Acting with mindfulness (*e.g.*, "I have trouble staying focused on what is happening in the present moment"). Non-judgment of inner experience (*e.g.*, "I tell myself I shouldn't feel the way I feel"). And non-reactivity to inner experience (*e.g.*, "When I have unpleasant thoughts or images, I don't let them get to me"). Each FFMQ item has five possible responses on a scale ranging from 1 = never or very rarely true to 5 = very often or always true. A range of scores from 24 to 120 was obtained. The higher scores corresponded to a very strong level of mindfulness. In the present study, a Cronbach's alpha of 0.94 was obtained, which is very close to that obtained in Alkholy's (2022) study validated in the Arabic context (Cronbach's alpha = 0.92).

*3) Sociodemographic questionnaire*
Personal and professional data were collected from the demographic questionnaire completed by the nurses, including age, gender, marital status, children, specialty, and work experience.

### *Statistical analysis*
Data analysis was performed using SPSS 22.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used, including mean, standard deviation (mean ± SD), and frequency. The chi-square test was used to test for a possible correlation between two or more categorical variables and the Student's *t*-test to determine if there was a significant difference between the means of the two groups. The one-factor repeated measures ANOVA test (intra- and inter-group) was used. Mauchly's W test was used to check for sphericity, with a Greenhouse–Geisser correction where appropriate. Bonferroni compensation was applied for multiple comparisons. Analysis of covariance (ANCOVA) was used to compare changes in post-test and 4-month follow-up scores between the two groups.

## Results

### *Participant characteristics*
A total of 80 nurses agreed to take part in the study and complete the questionnaires. Their mean age was 38.12 years (SD = 4.06). Of the 80 nurses, 73.75% ($n$ = 59) were female, 72.5% ($n$ = 58) were married, 76.25% ($n$ = 61) had children, 53.75% ($n$ = 43) were multipurpose specialty nurses, and 76.25% ($n$ = 61) had 4 or more years of clinical experience. The intervention and control groups did not differ significantly in any sociodemographic or occupational characteristics (Table 1).

**Table 1. Socio-demographic and professional characteristics of nurses in the control and intervention groups ($N$ = 80)**

| Variables | $N$ = 40 | CG | $N$ = 40 | IG | $P$-value |
|---|---|---|---|---|---|
| Age (Mean ± SD) = 38.12 ± 4.06 | | | | | |
| Gender | | | | | |
| Female | 28 | 70% | 31 | 77.5% | 0.74 |
| Male | 12 | 30% | 9 | 22.5% | |
| Marital status | | | | | |
| Married | 30 | 75% | 28 | 70% | |
| Single | 8 | 20% | 7 | 17.5% | 0.62 |
| Divorced | 2 | 5% | 5 | 12.5% | |
| Having children | | | | | |
| Yes | 31 | 77.5% | 30 | 75% | 0.79 |
| No | 9 | 22.5% | 10 | 25% | |
| Specialty | | | | | |
| MPN | 25 | 62.5% | 18 | 45% | |
| NA | 6 | 15% | 8 | 20% | 0,68 |
| EN | 3 | 7.5% | 5 | 12.5% | |
| MHN | 6 | 15% | 9 | 22.5% | |
| Year of experience | | | | | |
| ≥ 4 years | 31 | 77.5% | 30 | 75% | 0.63 |
| < 4 years | 9 | 22.5% | 10 | 25% | |

*Abbreviation:* SD: Standard Deviation; CG: Control Group; IG: Intervention Group; MPN: Multi-Purpose Nurse; NA: Nurse Anesthetist; EN: Emergency Nurse; MHN: Mental Health Nurse.

### *Depression, Anxiety, Stress and Mindfulness*
Based on the pre-test results, the two groups showed no statistically significant difference in the three domains of the DASS-21: (Depression $P$ = 0.419; Anxiety $P$ = 0.524; Stress $P$ = 0.394), and in the FFMQ ($P$ = 0.295), reflecting the similarity of the scores before the start of the MBSR training. However, the post-test results revealed a significant difference in the intervention group, with a large effect size ($\eta^2$ = 0.249, $\eta^2$ = 0.282, $\eta^2$ = 0.396, $\eta^2$ = 0.379 respectively).

Similarly, the results of the 4-month follow-up, also showed statistically significant differences among subjects in the intervention group in mean depression, anxiety, stress, and FFMQ scores, with an equally large effect size ($\eta^2$ = 1.387) (Table 2).

**Table 2. Intergroup comparison of DASS-21 and FFMQ pre-test and post-test by one-factor ANOVA (*N* = 80)**

| Variables | Evaluation | CG *n* = 40 Mean ± SD | IG *n* = 40 Mean ± SD | F | *P* | $\eta^2$ |
|---|---|---|---|---|---|---|
| Depression | Pre-test | 9.61 ± 3.09 | 10.87 ± 4.41 | 0.478 | 0.419 | 0.031 |
| | Post-test | 9.78 ± 3.09 | 8.91 ± 2.77 | 51.899 | 0.001 | 0.249 |
| | Four-month follow-up | 9.92 ± 3.58 | 7.83 ± 2.61 | 67.174 | 0.001 | 0.388 |
| Anxiety | Pre-test | 6.83 ± 2.07 | 6.27 ± 2.85 | 0.726 | 0,524 | 0.027 |
| | Post-test | 6.79 ± 2.16 | 4.96 ± 2.71 | 64.125 | 0.002 | 0.282 |
| | Four-month follow-up | 6.68 ± 2.25 | 4.34 ± 2.39 | 69.312 | 0.001 | 0.313 |
| Stress | Pre-test | 14.33 ± 4.79 | 15.11 ± 3.62 | 0.547 | 0.394 | 0.028 |
| | Post-test | 14.27 ± 4.42 | 11.19 ± 2.87 | 72.335 | 0.001 | 0.396 |
| | Four-month follow-up | 14.78 ± 4.66 | 9.41 ± 2.25 | 78.128 | 0.001 | 0.301 |
| FFMQ | Pre-test | 25.09 ± 5.17 | 26.96 ± 5.66 | 0.411 | 0.295 | 0.024 |
| | Post-test | 25.45 ± 5.76 | 29.55 ± 5.58 | 70.249 | 0.001 | 0.379 |
| | Four-month follow-up | 24.89 ± 5.81 | 32.19 ± 5.29 | 72.213 | 0.001 | 0.385 |

*Abbreviation:* CG: Control Group; IG: Intervention Group; DASS21: Depression, Anxiety and Stress Scale – 21 Items; FFMQ: Five Facet Mindfulness Questionnaire.

Based on the results of the within-group comparisons, the mean post-test scores and the mean 4-month follow-up scores revealed significant differences from the pre-test in all three domains of the DASS-21 (Depression = $P < 0.001$, Anxiety = $P < 0.001$, and Stress = $P < 0.001$), as well as in the FFMQ ($P < 0.001$) among subjects in the intervention group (Table 3).

**Table 3. Intra-group comparison of DASS-21 and FFMQ pre-test and post-test by repeated measures ANOVA (*N* = 80)**

| Variables | Evaluation | CG *n* = 40 Mean ± SD | IG *n* = 40 Mean ± SD | F | *P* | $\eta^2$ |
|---|---|---|---|---|---|---|
| Depression | Pre-test | 9.23 ± 3.19 | 10.66 ± 4.91 | 0.369 | 0.360 | 0.039 |
| | Post-test | 8.61 ± 2.73 | 7.10 ± 2.16 | 52.374 | 0.001 | 0.315 |
| | Four-month follow-up | 9.31 ± 3.05 | 6.51 ± 2.22 | 73.248 | 0.001 | 0.426 |
| Anxiety | Pre-test | 6.74 ± 2.13 | 6.84 ± 2.91 | 0.484 | 0,463 | 0.031 |
| | Post-test | 6.63 ± 2.43 | 4.58 ± 2.62 | 63.217 | 0.001 | 0.344 |
| | Four-month follow-up | 6.59 ± 2.74 | 4.03 ± 2.21 | 68.522 | 0.001 | 0.480 |
| Stress | Pre-test | 13.40 ± 4.29 | 15.64 ± 3.41 | 0.472 | 0.369 | 0.024 |
| | Post-test | 14.29 ± 4.71 | 12.01 ± 2.38 | 65.152 | 0.001 | 0.311 |
| | Four-month follow-up | 13.31 ± 4.22 | 7.66 ± 2.10 | 79.217 | 0.001 | 0.450 |
| FFMQ | Pre-test | 24.78 ± 5.49 | 26.49 ± 5.42 | 0.453 | 0.329 | 0.032 |
| | Post-test | 25.20 ± 5.42 | 29.78 ± 5.47 | 71.127 | 0.001 | 0.421 |
| | Four-month follow-up | 24.26 ± 5.21 | 32.92 ± 5.81 | 72.260 | 0.001 | 0.496 |

*Abbreviation:* CG: Control Group; IG: Intervention Group; DASS21: Depression, Anxiety and Stress Scale – 21 Items; FFMQ: Five Facet Mindfulness Questionnaire.

The ANCOVA analysis revealed statistically significant differences for the variables depression, anxiety, stress, and mindfulness between the two groups, confirming the inter-group comparisons mentioned above. Therefore, the MBSR training program explains the changes observed at post-test and four-month follow-up in the intervention group (Table 4).

**Table 4. ANCOVA analysis comparing the two groups: post-test and 4-month follow up results and pre-test results (*N* = 80)**

| Evaluation | Variable | Source | Type III Sum of Square | Df | Mean Square | F | *P* | $\eta^2$ |
|---|---|---|---|---|---|---|---|---|
| Post-test | Depression | Pre-test depression | 545.51 | 1 | 545.51 | 38.770 | <0.001 | 0.381 |
| | | CG/IG | 109.17 | 2 | 54.58 | 3.379 | 0.013 | 0.080 |
| | | Error | 996.82 | 61 | 16.32 | | | |
| | Anxiety | Pre-test anxiety | 199.38 | 1 | 199.38 | 31.167 | <0.001 | 0.373 |
| | | CG/IG | 22.39 | 2 | 11.19 | 2.260 | 0.101 | 0.119 |
| | | Error | 365.84 | 61 | 5.99 | | | |
| | Stress | Pre-test stress | 159.70 | 1 | 159.70 | 46.550 | <0.001 | 0.389 |
| | | CG/IG | 36.80 | 2 | 18.4 | 4.331 | 0.012 | 0.120 |
| | | Error | 256.51 | 61 | 4.20 | | | |
| | FFMQ | Pre-test FFMQ | 529.82 | 1 | 529.82 | 44.120 | <0.001 | 0.399 |
| | | CG/IG | 126.10 | 2 | 64.05 | 4.146 | 0.021 | 0.089 |
| | | Error | 982.10 | 61 | 9.78 | | | |
| Four-month follow up | Depression | Pre-test depression | 418.31 | 1 | 418.31 | 29.688 | <0.001 | 29.845 |
| | | CG/IG | 79.08 | 2 | 39.54 | 3.052 | 0.041 | 0.065 |
| | | Error | 942.22 | 41 | 22.98 | | | |
| | Anxiety | Pre-test anxiety | 109.63 | 1 | 109.63 | 21.124 | <0.001 | 0.242 |
| | | CG/IG | 21.28 | 2 | 10.64 | 2.160 | 0.114 | 0.041 |
| | | Error | 351.62 | 41 | 175.81 | | | |
| | Stress | Pre-test stress | 134.70 | 1 | 134.70 | 36.230 | <0.001 | 0.289 |
| | | CG/IG | 19.91 | 2 | 9.95 | 2.481 | 0.023 | 0.062 |
| | | Error | 241.22 | 41 | 5.88 | | | |
| | FFMQ | Pre-test FFMQ | 582.91 | 1 | 582.91 | 44.261 | <0.001 | 0.402 |
| | | CG/IG | 162.18 | 2 | 81.09 | 4.154 | 0.036 | 0.093 |
| | | Error | 991.79 | 41 | 24.19 | | | |

*Abbreviation:* df: Degree of Freedom; CG: Control Group; IG: Intervention Group; FFMQ: Five Facet Mindfulness Questionnaire.

## Discussion

In this research, the effects of an MBRS training programme for hospital nurses were evaluated. The potential benefits of this training programme on depression, anxiety, and stress were examined. The main results showed that participants who underwent MBSR training improved their scores on the DASS-21 and FFMQ tests, and that these effects were maintained over time.

This result is consistent with some studies that have shown that MBSR training leads to a positive transformation in the way people perceive their environment, relationships, behaviors, and emotions, while helping them to take a more objective view of the different situations and experiences that arise in their lives (Gracia-Gracia and Oliván-Blázquez, 2017; Hazlett-Stevens, 2020; Song and Lindquist, 2015).

The theory developed by Shapiro et al. (2006) indicates that the MBSR training program induces a significant and lasting change in our perception of various events and emotions from three mechanisms: intention, attention, and attitude. These in turn trigger additional mechanisms that participate in the production of positive changes in the functioning of consciousness and the appearance of pleasant emotions and internal satisfaction. In fact, we distinguish mainly self-regulation and self-management, emotional, cognitive and behavioral flexibility, value clarification and exposure. Through this approach, some studies confirm that the beneficiaries of this program will be able to implement a "mindfulness-based stress management strategy" and thus will be able to better control their emotions and reduce their anxiety and stress levels (Gracia-Gracia and Oliván-Blázquez, 2017; Hazlett-Stevens, 2020; Shapiro et al., 2006).

The literature on MBSR-trained nurses supports this finding. Indeed, according to a meta- analytic review pooling the results of 38 randomized clinical studies on the impact of mindfulness on nursing, Spinelli et al. (2019) found that occupational anxiety and stress were significantly alleviated after conducting this training program. Kriakous et al. (2021) corroborate these findings by reporting that stress and anxiety were significantly improved after a three-month follow up in an MBSR program for caregivers, and then finding significant reductions after a six-month follow-up.

The findings of our study also show that the implementation of an MBSR training program satisfactorily contributes to the improvement of depressive symptoms experienced by the participants. Indeed, Song and Lindquist (2015) examined the issue of depression and academic performance of Korean nurs-

ing students and implemented an eight-week MBSR training program. Thus, the results obtained showed a good reduction in depressive manifestations and an increase in the academic performance level of these students. Similarly, Pizutti et al. (2019) examined the potential impact of an eight-week MBSR training on depressive and anxiety symptoms among a group of eighty-four nurses working in primary care centers, and observed a statistically significant decrease in these symptoms after this intervention. In contrast, research by Moody et al. (2013) found that MBSR training led to no consistent or significant effect on stress or depression. This variation in results could be attributed to methodological differences, measurement instruments used, sample sizes, sociocultural differences in the individuals selected, and the overrepresentation of women.

Moreover, the current study confirmed that MBSR training promotes a significant improvement in the overall level of mindfulness among nurses. According to data from Fortney et al. (2013), participation in an eight-session MBSR training and a nine-month follow up resulted in a significant reduction in levels of depression and an increase in specific facets of mindfulness among nurses. Furthermore, according to data reported by Bazarko et al. (2013), nurses who underwent MBSR training, were able to develop certain dimensions of mindfulness such as: self-regulation of one's own and others' emotions and non-reactivity to inner experience when unpleasant thoughts or images arose – unlike other nurses who did not undergo this training. Another study found that nurses were more positive about their clinical work after MBSR training (Duarte and Pinto-Gouveia, 2016). In this regard, our study is consistent with the literature.

### *Strengths and limitations*

It should be noted that this innovative study is the first to analyze the effects of an eight-session MBSR training program on levels of depression, stress-related anxiety, and dimensions of mindfulness in Moroccan nurses. However, these results will need to be examined in terms of their strengths and limitations. The most important strengths relate to a longitudinal methodology based on randomization, which ensures the identification of causal relationships between the different components. In addition, the use of validated measurement instruments allows for the collection of more reliable data tailored to the Moroccan population. Finally, the identical characteristics of the groups before the beginning of the study in terms of levels of depression, anxiety, stress, and mindfulness allowed us to conclude that the conditions were almost identical in all participants, which led to the development of a training plan adapted to their needs.

It should be noted that the generalizability of the results of this study is limited because the data collection was conducted in a single hospital, which may limit the representativeness of all nurses in Morocco. Indeed, cross-sectional studies could generate far more reliable results by including a very large sample of nurses from different regions of Morocco.

Similarly, future studies should be based on mixed methods including measurement scales and personal interviews to allow for a more comprehensive and in-depth evaluation of the MBSR training program on psychological disorders such as depression, anxiety, and stress.

## Conclusion

Based on the results of an eight-session MBSR training program for hospital nurses, a significant improvement in levels of depression, anxiety, and stress in general, and in the dimensions of mindfulness in particular, was recorded, with a lasting effect over a four-month period. Further in-depth studies based on neuroscientific data using electroencephalogram (EEG) evoked brain potentials are needed to better analyze objectively and accurately the possible psychological effects of the MBSR program and the resulting beneficial effects.

### *Acknowledgment*

We express our thanks to all the nurses for their participation in this research.

### *Ethical aspects and conflict of interest*

The authors have no conflict of interest to declare.

## Vliv tréninkového programu zaměřeného na snižování stresu, deprese a úzkosti u marockých sester na základě všímavosti

**Souhrn**

*Pozadí:* Tato studie zkoumá dopad tréninkového programu zaměřeného na snižování stresu, deprese a úzkosti na základě všímavosti u zdravotních sester v Maroku.

*Metody:* Účastníci byli vybráni z nemocnice v provincii Tetouan v Maroku. Jednalo se o 80 nemocničních sester, 59 žen a 21 mužů. Byli náhodně rozděleni do intervenční skupiny a kontrolní skupiny, v každé skupině bylo 40 účastníků. Jako psychologická intervence v intervenční skupině byl použit osmitýdenní trénink na všímavost. K posouzení výsledků obou skupin před a po intervenci byla použita škála deprese, úzkosti a stresu a pětiúrovňový dotazník zaměřený na všímavost.

*Výsledky:* Intervenční skupina vykazovala významné rozdíly v průměrném post-testovém skóre od pre-testu v proměnných: deprese ($\eta^2 = 0{,}249$; $p < 0{,}001$), úzkost = ($\eta^2 = 0{,}282$; $p < 0{,}001$) a stres = ($\eta^2 = 0{,}396$ $p < 0{,}001$), stejně jako ve FFMQ ($\eta^2 = 0{,}379$; $p < 0{,}001$). Podobně čtyřměsíční sledování odhalilo, že všechny proměnné vykazovaly statisticky významné rozdíly se stejnou velikostí účinku ($\eta^2 = 1{,}387$; $p < 0{,}001$).

*Závěr:* Výcvikový program MBSR je účinná psychoterapeutická intervence založená na důkazech pro léčbu deprese, úzkosti a stresu u nemocničních sester. Doporučují se další hloubkové studie založené na neurovědeckých datech pomocí elektroencefalogramu (EEG) evokovaných mozkových potenciálů.

**Klíčová slova:** deprese; snížení stresu pomocí dbalosti; stres; úzkost; zdravotní sestřička

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