

ORIGINAL ARTICLES

THE EFFECT OF MINDFULNESS THROUGH SMARTPHONE APPLICATIONS ON THE ANXIETY OF FINAL-LEVEL NURSING STUDENTS

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Abstract

Anxiety in nursing students have been shown to have an impact on the body. This study aimed to determine the effect of mindfulness training by using smartphone applications on anxiety in the group of final level nursing students in Indonesia. This study used quasi-experimental design with non-equivalent control group. The number of samples was 77 students, divided into 38 respondents in the intervention group and 39 respondents in the control group. The intervention group was given mindfulness training by using the smartphone application in four meetings for two weeks, whereas the control group was given mindfulness training after the study in the fifth week. Anxiety is measured by the *Zung Self Rating Anxiety Scale* (ZSRAS) instrument. Data analyze by using Mann-Whitney and Wilcoxon tests. The results of this study indicate that the average value of anxiety in the intervention group before the study was 43.55 (\pm 3.92), and there was a decrease after mindfulness training to 36.50 (\pm 4.77) ($p = .000$). Whereas in the control group the average anxiety value was 44.23 (\pm 4.36), and there was an increase in anxiety to 45.00 (\pm 5.04) in the post-test with a value ($p = .813$). Mindfulness training through smartphone devices SIMBA application has a significant effect on reducing anxiety levels in final-year nursing students. This intervention could be done independently to overcome psychological problems that often interfere with the learning process of nursing students in the academic environment.

Keywords: Anxiety, Nursing students, Mindfulness, Smartphone

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Introduction

Nursing students are very vulnerable to psychological problems such as anxiety disorders. Anxiety disorder is one of the psychological disorders most often experienced by nursing students (1-4). The American Psychiatric Association (2013) defines anxiety as an autonomous response such as symptoms of concern accompanied by feelings of unclear

and uncomfortable where individuals can face perceived threats and or anticipate dangerous events (5).

When compared to nursing students with other students, nursing students have a higher level of anxiety (3,4). The cause of the high anxiety problem in nursing students is directly related to the fact that nursing students must carry out learning activities in the academic realm and conduct clinical practice in the field (3,4).

Sources of anxiety among nursing students can vary. Academic sources such as; exams and academic assignments, clinical resources including; place of practice, fear of making mistakes and interaction with other staff members, while personal and social resources such as; financial problems and at least free time (6). The anxiety problem among nursing students has an impact on the learning process in the academic realm and in the social environment (7). So that resulted in a decrease in the results of academic learning achievement (8). Furthermore, the problem of anxiety can be a major cause of depression problems for nursing students (1,9).

From previous studies, data on the prevalence of anxiety in 120 final semester nursing students in Iran was 50% (10). Meanwhile, a study conducted by Cheung (2016) on 661 Nursing diploma students in Hong Kong found anxiety problems of 39.9% (2). The results of the study were similar to those carried out by Wong who found an anxiety prevalence of 41% in 7,915 nursing students in the Hong Kong country (11).

The right intervention strategy for student groups in dealing with anxiety problems is by mindfulness training (1,12,13). Mindfulness is defined as "paying attention in a certain way: intentionally, at the present time, and without judging the experience experienced daily" (14). Mindfulness training is a therapeutic modality in the field of health science (15). Nursing students who have been taught mindfulness techniques have shown subjective improvements in physical health, psychological, empathy, and well-being (8,12,16). This has a positive impact on the coping mechanism of nursing students in dealing with stressors caused by the student campus environment (15,17). Previous studies have shown that mindfulness training can reduce anxiety and improve health in nursing students (3,4,12). As with the research reported by Song (2015), mindfulness training has an effect on decreasing the level of depression, anxiety, and stress in nursing students in Korea (1).

An intervention will be easier to do, if using a supporting device such as a smartphone application. This can provide an independent learning environment for students in accessing information and skills such as mindfulness training (18). The use of mobile smartphone devices today, in nursing services has become a growing trend in health services (19). In a research study in South Korea conducted by Kim et al. (2016), it was found that smartphone applications have an effect on improving the knowledge, skills and beliefs of nursing students in practicing (18).

There is currently no specific instrument or tool that is able to help nursing students to overcome anxiety problems. The intervention strategy through the smartphone application tool is a research effort in developing information systems in the field of nursing in the student group. Based on the above phenomenon, the researchers are interested in knowing the effect of mindfulness training through smartphone applications on the level of anxiety in the group of final level nursing students.

Objectives

This study aimed to determine the effect of mindfulness training by using smartphone applications on anxiety disorders in the group of final level nursing students.

Methods

This study used a quasi-experimental design with pre-test and post-test design. Research respondents were divided into intervention groups and control groups. The intervention group was treated in the form of mindfulness training through the SIMBA application, while the control group was not given treatment.

All participants in this study were final-semester nursing undergraduate students, who were enrolled in the Nursing Study Program of the Faculty of Medicine, Diponegoro University. The total population of final level nursing students was 124 students. The sampling technique was purposive sampling, where the criteria of respondents were determined by the researcher based on the following inclusion criteria: (a) students who voluntarily agreed to participate in the research implementation, (b) students with moderate anxiety levels and severe anxiety, (c) students who had smartphone devices android. Based on the calculation of the sample, the researcher obtained a number of samples that matched the inclusion criteria as many as 77 respondents. Then divided into two groups set into the intervention group (38 respondents) and the control group (39 respondents).

The study began with the initial data collection before the intervention implementation of the experimental group respondents. Preliminary data at the stage (pre-test) were collected in the form of anxiety scores for final-level nursing students, taking anxiety data through questionnaires using anxiety instruments from Zung-Self Rating Anxiety Scale (ZSRAS). Before the study began, researchers were assisted by research assistants who helped distribute SIMBA applications to all intervention group respondents using WhatsApp group.

Mindfulness training activities in the intervention group respondents were conducted during 6 meetings, each meeting took about 120 minutes. Mindfulness training in this study was conducted by experts who have experience in researching and developing mindfulness interventions. In this study, the intervention group conducted mindfulness exercises consisting of 5 stages of activity (see table.1). At the end of the training activity, researchers again measured the scores of respondents' anxiety scores in the two groups, to see the development of training in the post-test stage of the implementation of mindfulness interventions in final-level nursing students.

Table 1. Mindfulness Training Process

Activity theme	Training	Target of Independent Through Smartphone
1. Getting to know <i>Mindfulness</i>	✓ <i>Mindfulness Training</i> ✓ <i>Mindfulness</i> on students	✓ Respondents learn training procedure of <i>mindfulness</i> through SIMBA application
2. Awareness Training: <i>Thesis as the final assignment of the</i>	✓ Relax for a while ✓ Deep breath training ✓ To feel and to enjoy	✓ Set up the training of an independent self exercise schedule before doing the final project and before going to

<i>students.</i>	breathing	sleep through SIMBA ✓ Breathing exercises for 5 minutes before doing thesis work
3. Focus on Problems: <i>Reducing anxiety symptoms</i>	✓ Body scan ✓ Checking the problems faced ✓ Controlling emotion	✓ Record the existing and perceived problems during training ✓ Relaxing Exercise for a while ✓ Detecting anxiety level through SIMBA application
4. Enjoying moments	✓ <i>Mindfulness</i> ✓ Accepting problems	✓ Enjoying the current moments ✓ Resting for a while during competing for the thesis work for five minutes by: <ul style="list-style-type: none"> • Feeling the breath • Doing stretching muscles

To measure the anxiety of final level nursing students, researchers used the Zung Self-Rating Anxiety Scale (ZSRAS) instrument (20). This instrument was developed based on anxiety symptoms in the Diagnostic and Statistical Manual of Mental Disorders, ZSRAS uses a Likert scale with criteria for mild anxiety levels, moderate anxiety, severe anxiety, and panic. This instrument has 20 questions consisting of 15 unfavourable questions and 5 favourite questions. Researchers used the Indonesian version of the ZSRAS questionnaire, which has been translated into Indonesian, the results of the Cronbach's alpha value from this instrument (21).

All statistical analyses used the SPSS version 22 computer program. Mann-Whitney test and Wilcoxon test were used to compare differences in anxiety values between the experimental group and the control group. Statistical significance was set at $p < .05$.

Results

The results showed that there were 77 or about 60% of students from a total of 124 populations of final-level nursing students experiencing anxiety problems. The results of the examination at the pre-test stage showed that students with moderate anxiety levels amounted to 72 (55%), and nursing students at severe anxiety levels amounted to 5 (5%). Table 2 shows the characteristics of all respondents. No significant differences were found between the intervention and control groups. The mean age of the intervention group was 21.26 (± 0.50) years, and the mean age of the control group was 21.21 (± 0.57) years. While the majority of respondents in the intervention and control groups were female (intervention group: 92%; control group: 98%). The majority of respondents in the two groups in this study were at moderate anxiety levels (intervention group: 90%; control group: 98%), while respondents with severe anxiety were in number (intervention group: 10%; control group: 2%). At the pre-test stage, researchers only limited respondents to the criteria of moderate anxiety levels and severe anxiety, the researchers did not include nursing students with mild anxiety levels into the study, because mild anxiety was included in the normal anxiety range.

Table 2. Comparison pre and post-test scores of respondents (n = 77).

Group	Category of Anxiety	Intervention group	Control group	Mann-Whitney (Z)	p-value
<i>Pre Test</i>	Medium	34	38		
	Weight	4	1	-0,930	0,352
<i>Post Test</i>	Medium	25	34		
	Weight	-	5	-6,037	0,000

In table 3, using the Mann-Whitney analysis test it can be concluded that there are no significant differences in the pre-test stage in the intervention group and the control group with the value ($p = .352$) and there are significant differences in conditions in the post-test in the group intervention and control group with values ($p = .000$). Meanwhile, in table 4 using the Wilcoxon test the results of this study indicate that the average value of respondent anxiety in the intervention group before the study was $43.55 (\pm 3.92)$, and there was a decrease after mindfulness training to $36.50 (\pm 4.77)$ with value ($p = .000$), whereas in the control group the average anxiety value was $44.23 (\pm 4.36)$, and an average anxiety value increased to $45.00 (\pm 5.04)$ in the post-test with a value ($p = .813$).

Table 3. Comparison of anxiety results in the intervention group and control group respondents (n = 77).

Group	Mean ± Standar Deviasi (SD)		Median		Wilcoxon (Z)	P value
	Pre Test	Post Test	Pre Test	Post Test		
<i>Intervention</i>	43,55 ± 3,92	36,50 ± 4,77	43	36	-5,083	0,000
<i>Control</i>	44,23 ± 4,36	45,00 ± 5,04	45	44	-0,236	0,813

From the above table shows the results of mindfulness through smartphone applications have a significant effect in reducing the anxiety level of final-level nursing students, this is evidenced by a decrease in the average value of anxiety in the intervention group of 6.95 after mindfulness training, whereas in the control group there was an increase in value average anxiety is 0.77.

Discussion

The results of this study indicate that mindfulness training through the use of smartphone applications can reduce anxiety levels in final-level nursing students. The success factor of the study is inseparable from smartphone applications developed by researchers as additional instruments for final-level nursing students in accessing information related to anxiety and how to deal with anxiety problems with mindfulness training. The application developed by researchers in the study is called SIMBA application, which is an android-based application program that is installed via a smartphone device,

which is equipped with content about information about anxiety and accompanied by a training menu to deal with anxiety problems in final-level nursing students as respondents. The SIMBA application is also equipped with a self-efficacy assessment format to assess the extent to which students are able to exercise mindfulness independently.

From various literature and previous research, mindfulness training is a promising way for nursing students to handle psychological problems such as anxiety problems (4,8,17). Mindfulness training has been widely proven in various research studies in reducing anxiety and stress levels in nursing students (1,3). In mindfulness research entitled "*Mindfulness Training for Health Profession Students*" shows that health students who get mindfulness training before academic activities begin, can reduce stress levels, reduce anxiety and increase attention, and increase self-efficacy and empathy among health students (16).

More specifically reported in Gallego's study (2014) mindfulness training in students who accompanied relaxed physical exercise can help reduce the symptoms of stress and anxiety caused by academic examinations (13). Research with literature studies found that mindfulness can reduce the anxiety of nursing students (4). This study is relevant to the research of Chen et al (2013) showing that mindfulness training can reduce anxiety and can reduce systolic blood pressure in nursing students in China (12).

Mindfulness training through the SIMBA application given to the intervention group was carried out for 6 meetings for two weeks, this was based on a previous study conducted by Zeidan et al (2010) which applied mindfulness research activities in a short method to North Carolina USA University students (22). Mindfulness training with a short method can have an effect on reducing anxiety levels in nursing students in China (12).

Therefore, mindfulness training through smartphones has proven effective in reducing anxiety in the final-level nursing students. With these exercises, students will be able to handle psychological problems that exist in the academic realm and in the student's living environment. Mindfulness techniques require the active participation of respondents in the implementation of their activities, through the SIMBA application respondents can exercise mindfulness independently with no help. This is different when compared with other therapies such as acupuncture or energy therapy, where individuals will take on a more passive role and rely on practitioners or experts in carrying out exercises (23).

The research strategy using the smartphone application media is considered very effective for researchers that are applied to the respondents of nursing students. In addition to training to deal with anxiety in nursing students, SIMBA application is equipped with a menu of detection of anxiety levels using the ZSRAS instrument, the SIMBA application can also set the schedule for self-training against anxiety problems. Overall with the SIMBA application, this greatly facilitates researchers and nursing students as respondents in the study, so that students can access information about anxiety problems and how to handle them. This is consistent with a study conducted by Kim (2018) who conducted research on the effect of using mobile smartphone applications on improving learning outcomes of nursing student practices (24).

George's (2017) study of the perception of nursing students with the use of smartphone application devices, shows that health applications in smartphone devices make it easier for students to obtain evidence-based clinical information related to nursing (25). This survey is in line with the study conducted by Choi (2017) which states that the use of smartphone devices can help nursing students access information as a medium of

learning (26). Therefore, the use of smartphone application devices in the group of final level nursing students is considered very effective to facilitate them in doing mindfulness training activities during the research.

Conclusion

The effect of mindfulness training through SIMBA smartphone application can significantly reduce anxiety levels in final-level nursing students. SIMBA application is a tool to support mindfulness training independently for respondents in this study, this is very helpful for nursing students in overcoming anxiety problems that are often felt by students during the final semester lectures in the campus academic environment.

So it can be concluded, that mindfulness training is carried out routinely can motivate nursing students to further increase their confidence in the learning process in the academic activities. In the future, research like this, should not only be done at the final level nursing students, but can take the realm of research as a whole in nursing students or professional nurses in hospital services, or research can be conducted on a larger population of health students such as; midwifery students, medical students, nutrition students etc.

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