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Mindfulness's Effects on Undergraduate Nursing Students'
Negative Mental Health Symptoms: A Systematic Review

Erin Sartorius

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Abstract

Background: Undergraduate nursing students endure unique stressors that potentiate negative consequences to their mental health. Mindfulness-based interventions may improve these negative mental health symptoms in nursing students. **Objective:** To assess available research regarding the effects of mindfulness-based interventions on the negative mental health symptoms of undergraduate nursing students. **Design:** The databases CINAHL Complete, PubMed, and PsycINFO were searched for relevant research. Search terms were brainstormed and individually assessed to determine relevancy to the research question. In order to be incorporated into this systematic review, all assessed studies needed to include (1) an intervention rooted in mindfulness, (2) a sample of students in a 4-year undergraduate nursing program (3) research outcomes pertaining to mental health, and (4) publication in a peer-reviewed source. **Results:** Of the 74 articles found within the initial database search and 14 hand-picked articles, 7 studies met the inclusion criteria. Of these 7 studies, 3 were randomized controlled trials, 2 were quasi-experimental studies with a pretest, post-test design and control group, and 2 were mixed-method studies. Overall, these research studies found that mindfulness interventions significantly decreased negative mental health symptoms in nursing students such as anxiety, stress, and depression. Though the results of these studies support the effectiveness of mindfulness-based interventions as a means of improving mental health symptoms, many of these studies lack generalizability and possess small sample sizes leading to insufficient statistical power.

Conclusion: Though more randomized controlled trials with sufficient power and well-executed designs must be conducted, initial research suggests that interventions rooted in mindfulness may improve the negative mental health symptoms of undergraduate nursing students.

Mindfulness's Effects on Undergraduate Nursing Students' Negative Mental Health Symptoms:
A Systematic Review

Undergraduate nursing students undergo a unique type of stress within their programs such as clinical concerns, academic rigor, and individual life events (Chernomas & Shapiro, 2013). When these stressors culminate, negative mental health outcomes may ensue, namely anxiety, depression, and increased perceived stress. Therefore, it is essential to find ways to proactively combat the inherent stress of nursing school with methods that allow for healthy coping and improved mental health outcomes in undergraduate nursing students. Mindfulness-based interventions have demonstrated effectiveness in decreasing stress and promoting positive mental health outcomes in multiple populations. Recent studies have applied mindfulness-based interventions to undergraduate nursing students in order to evaluate mindfulness's effects on this population's mental health. The purpose of this systematic review is to analyze these studies in order to understand their methods, limitations, major findings, and, ultimately, the possible benefits of including mindfulness-based interventions within undergraduate nursing programs.

Background

Stress arises when individuals perceive a threat within their environment (Kang, Choi, & Ryu, 2009). Nursing students endure a unique type of stress when placed into clinical situations for the first time. These stressors include caring for sick patients, feeling unfamiliar within the hospital environment, and confronting suffering and death (Chernomas & Shapiro, 2013). This stress is heightened when one considers the academic rigor associated with obtaining a baccalaureate degree, such as authoring papers and passing examinations. Receiving low grades was rated as the number one source of stress in undergraduate nursing students in a study conducted by Shaban, Khater, and Akhu-Zaheya (2012). Personal factors such as financial strain,

family matters, and time management difficulties may also increase stress within this population (Chernomas & Shapiro, 2013).

Prolonged periods of stress can lead to heightened levels of anxiety and depression, the most commonly measured factors related to mental health (Ko et al., 2003; Won and Kim, 2002). In a study conducted by Zhang, Guo, Li, Chen, and Chen (2007), 10% of nursing students reported moderate to severe anxiety, while one-third reported high incidences of depressive symptoms. With such a high incidence of negative mental health characteristics within the undergraduate nursing student population, it becomes necessary to explore possible means of alleviating this stress, anxiety, and depression.

Defined as, “paying attention on purpose, in the present moment, and nonjudgmentally, to the unfolding of experience moment to moment” (Center for Mindfulness in Medicine, Health Care, and Society, 2017, para. 2), mindfulness is a philosophy rooted in the Buddhist tradition that aims to increase awareness of the present and promote detachment from self among its practitioners (Ratanasiripong, Park, Ratanasiripong, & Kathalae, 2015).

Mindfulness meditation (MM) is derived from Buddhist Vipassana meditation, which emphasizes nonjudgmental awareness of the current moment while detaching from harmful thoughts and feelings associated with one’s self. MM is made up of multiple practical components such as mindfulness walking, mindfulness breathing, mindfulness body scan, and hatha yoga (Alsarairah & Aloush, 2017). In 1979 at the University of Massachusetts, Dr. Jon Kabat-Zinn and colleagues elaborated on this practice by creating a program known as Mindfulness-based Stress Reduction (MBSR). MBSR is an intensive, systematic, 2-hour a week for 8 weeks program rooted in MM aiming to promote improved self-care, mental health, and coping (The Center for Mindfulness in Medicine, Health Care, and Society, 2014).

Together, MM and MBSR have exhibited positive mental health outcomes in multiple populations. For example, veterans exhibited a significant reduction in anxiety, depression, and suicidal ideation after MBSR training (Serpa, Taylor, & Tillisch, 2014). MBSR was also found to be more effective than community caregiver education in decreasing stress, decreasing depression, and promoting positive mental health outcomes among caregivers of persons with dementia (Whitebird et al., 2013). A systematic review looking at the benefits of applying MBSR to cancer patients found that MBSR allowed for enhanced stress management among this population (Rush & Sharma, 2016).

Recently, researchers have conducted studies to understand mindfulness's effects on undergraduate nursing students. As a population prone to stress, depression, and anxiety, this review explores the mental health benefits that mindfulness-based interventions such as MM and MBSR have demonstrated in the undergraduate nursing student population.

Methods

In order to conduct this systematic review, the population, intervention, comparison group, and outcome (PICO) in question were clearly identified. From this information, a PICO question was formulated: Do mindfulness-based interventions improve negative mental health symptoms in undergraduate nursing students? In order to further specify the type of research analyzed in this systematic review, explicit inclusion criteria was established before the initial search. In order to be included in the systematic review, a source had to include (1) an intervention rooted in mindfulness, (2) a sample of nursing students in a 4-year baccalaureate program (3) research outcomes pertaining to mental health, and (4) publication in a peer-reviewed source. Looking at the PICO question and inclusion criteria, a list of key words were devised and evaluated individually to determine relevancy to the topic. Suggested subject

headings provided by the explored databases also strengthened the initial search process. The list of key words and subject headings (as indicated by quotation-marks) are listed in Table 1.

Table 1

Key Words & Subject Headings in Initial Literature Search

| P: Undergraduate Nursing Students | I: Mindfulness-Based Interventions | C: Non-Mindfulness-Based Interventions | O: Mental Health Outcome |
|--|---|---|---|
| student nurse* nursing student* “Students, Nursing, Baccalaureate” “Students, Nursing” BSN-prepared nursing student* BSN prepared nursing student* undergraduate nursing student* “Students, undergraduate” | mindfulness | | stress “Stress, physiological” “Stress, psychological” anxiety coping distress depression wellbeing well being “Psychological well-being” well-being wellness mental health mood “affect” |

Note. List of key words and subject headings organized according to related aspect of PICO question. * Indicates plural form was also searched; “” Indicate suggested subject headings.

Three databases (CINAHL Complete, PubMed, PsycINFO) were searched in January 2018 using the indicated terms. Seventy-four articles were retrieved from this search and organized using Zotero, a reference management software. Three of these articles were literature reviews that were excluded for not meeting inclusion criteria. The studies discussed in the literature reviews, however, were examined, and from this examination, 14 hand-picked articles were retrieved. Through eliminating duplicates and applying the previously identified inclusion

criteria to the 88 sources retrieved in the initial search, seven sources met all inclusion criteria and will be discussed in this review. The process, including explanations for the elimination of sources, are pictured in Figure 1.

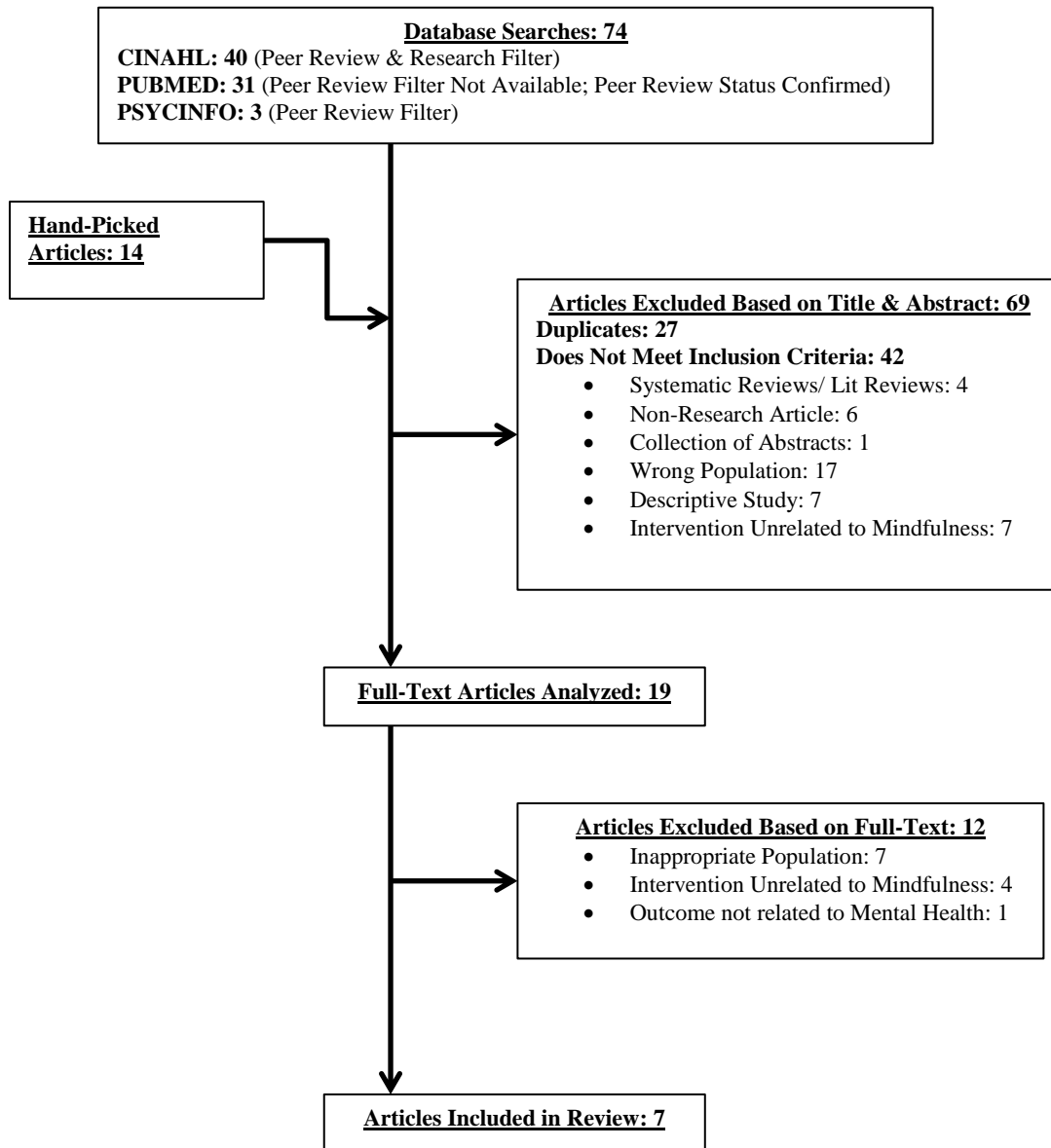


Figure 1. Process of evaluation and elimination of sources for the systematic review.

Results

The final search yielded seven sources that met all inclusion criteria. Of these seven sources, three were randomized controlled trials, two were quasi-experimental trials with a

pretest post-test design and a control group, and two were mixed-methods studies. All seven sources evaluated at least one of three possible mental health measures: Stress, anxiety, and depression. All interventions were rooted in MM or MBSR. Table 2 summarizes the study design and major findings of all seven studies.

Table 2
Summary of Study Designs & Major Findings of Articles in Systematic Review

| Author, Year | Design | Intervention Rooted In... | Intervention Explained | Participants | Setting | Mental Health Outcome | Instrument | Findings |
|--|---|---------------------------|---|--|--|-----------------------------|---|---|
| Alsaraireh & Aloush, 2017 | RCT | MM vs. Aerobic Exercise | 1 hour class (MM or exercise), 3 times a week for 10 weeks | N= 181 undergraduate nursing students | Public University; Jordan | Depression | <i>The Center for Epidemiologic Studies Depression Scale (CESD-R)</i> | Depression significantly decreased in MM group compared to exercise group |
| Beddoe & Murphy, 2004 | Mixed Methods | MBSR | 2 hour class, 1 time a week for 8 weeks; 30 minutes of guided imagery 5 days a week for 8 weeks | N=16 female undergraduate nursing students | San Jose State School of Nursing | Stress | <i>Derogatis Stress Profile (DSP)</i> ; Reflective Journals | Stress significantly decreased post-intervention; Students reported increased value of personal time, increased awareness of internal feelings, increased patience, & increased use of breathing techniques post-intervention |
| Chen, Yang, Wang, & Zhang, 2013 | RCT | MM | 30 minute class everyday for 7 days | N= 60 undergraduate Hahn nursing students | Medical University; Guangzhou, China | Anxiety, Depression | <i>The Self-Rating Anxiety Scale (SAS)</i> ; <i>Self-Rating Depression Scale (SDS)</i> | Anxiety significantly decreased in MM group compared to control group; Depression did not change significantly in MM group compared to control group |
| Kang, Choi, & Ryu, 2009 | Quasi-Experimental with Pretest, Post-test, & Control Group | MM | 1.5- 2 hour class, 1 time a week for 8 weeks | N= 32 junior & senior female undergraduate nursing students | University in South Korea | Stress, Anxiety, Depression | <i>Psycho-social Wellbeing Index Short-form (PWI-SF)</i> ; <i>State-Trait Anxiety Inventory (STAI)</i> ; <i>Beck Depression Inventory (BDI)</i> | Stress and anxiety significantly decreased in MM group compared to control group; Depression significantly decreased in MM group but there was not a significant difference between MM group and control group depression |
| Linden, Turner, Young, & Bruce, 2001 | Mixed Methods | MBSR | 2 hour class, 1 time a week for 8 weeks | N= 30 3 rd year undergraduate nursing students | University of Victoria; Victoria, British Columbia, Canada | Stress | Physical & psychological stress symptoms checklist; Health Profile; <i>Antonovsky's Orientation-to-Life Questionnaire</i> ; Focus Groups | Students reported a decrease in psychological stress symptoms as evidenced by themes in focus groups, decrease in reported psychological stress symptoms from pre to post-test in experimental group, & the significant difference found in post-test psychological stress scores between experimental & control groups |
| Ratanasiripong, Park, Ratanasiripong, & Kathalae, 2015 | Quasi-Experimental with Pretest, Post-test, & Control Group | MM vs. Biofeedback | 2 training sessions in biofeedback or MM; Participants in experimental groups to use skills 3 times per day for 4 weeks | N= 89 2 nd year undergraduate Thai nursing students | Public Nursing College; Thailand | Stress, Anxiety | <i>Perceived Stress Scale (PSS)</i> ; <i>State Anxiety Scale</i> from STAI | Stress and anxiety significantly decreased in MM group; Stress decreased non-significantly in biofeedback group; Anxiety significantly decreased in biofeedback group |
| Song & Lindquist, 2015 | RCT | MBSR | 2 hour class, 1 time a week for 8 weeks | N= 44 undergraduate nursing students | KN University College of Nursing; South Korea | Stress, Anxiety, Depression | <i>Depression, Anxiety, and Stress Scale-21 (DASS-21)</i> | Stress, anxiety, and depression significantly decreased in MBSR group compared to control group |

Note. Summary of seven articles encompassing systematic review including authors, study design, framework of design, intervention details, participants, setting, negative mental health outcomes measured, instruments used, and major findings

Stress

The unique stressors nursing students experience lead to increased stress in this population due to perceived threats related to clinical scenarios, academic expectations, and personal considerations (Chernomas & Shapiro, 2013). Five of the seven studies within this systematic review explored mindfulness's effect on undergraduate nursing student stress.

In the first study examining mindfulness's effect on nursing student stress, Linden, Turner, Young, and Bruce (2001) conducted a mixed-methods study at the University of Victoria in British Columbia, Canada. This study evaluated the effects of an 8-week MBSR program on third-year undergraduate nursing students. Researchers invited students to participate in the study, and after obtaining 15 volunteers, recruited another 15 students to act as the control group who received no intervention. Quantitative data was collected through a pretest and post-test design utilizing three instruments: a physical and psychological stress symptoms checklist, a health status profile, and the *Antonovsky's Orientation-to-Life Questionnaire* (Antonovsky, 1987).

After organizing the results of the three instruments into different categories (average health status scores, ability to respond healthily in stressful situations, psychological stress symptoms, and physical stress symptoms), further analysis of these results demonstrated the largest decrease in the category of psychological stress symptoms experienced by the experimental group from pre-test to post-test. There was also a significant difference (no p given) between reported psychological stress symptoms in the experimental and control groups, with the control group experiencing more stress than the experimental group.

The qualitative findings of this study echo the quantitative results. Focus groups with the students in the experimental group were held before, during, and after the 8-week intervention.

Major themes were deciphered from transcriptions of these focus groups, concluding that students found that the MBSR course allowed them to recognize their body's response to stress while providing them with tools to manage these physical and psychological symptoms.

Similarly, Beddoe and Murphy (2004) conducted a mixed methods study evaluating the effects of an 8-week MBSR intervention on nursing student stress at the San Jose State School of Nursing. In this study, 16 undergraduate nursing students attended a 2-hour weekly MBSR course as well as listened to guided meditation tapes for 30 minutes, 5 days a week. The *Derogatis Stress Profile* (DSP) (Derogatis, 1987) was used as the pretest and post-test instrument to evaluate stress within the study. Journal assignments were completed throughout the MBSR course, allowing students to provide qualitative feedback.

The results of this study yielded a significant decrease in stress from pretest to post-test using a paired *t*-test, though no specific probability is given. This study indicates that the MBSR intervention was effective in decreasing stress within this undergraduate nursing student population. Some qualitative themes found within the participants' journals that support this decrease in stress include increased value of personal time, increased awareness of internal feelings, increased patience, and increased use of breathing techniques to decrease stress.

In another study exploring mindfulness's effects on stress in undergraduate nursing students, researchers Kang, Choi, & Ryu (2009) conducted a quasi-experimental study with a pretest, post-test design and a control group. A convenience sample of 32 junior and senior female undergraduate nursing students was gathered and students were randomly assigned into an experimental group (n=16) and a control group (n= 16). After participants received a 1.5 hour lecture on coping with stress, both the experimental group and the control group completed the *Psycho-social Wellbeing Index Short-form* (PWI-SF) as a measure of pre-intervention stress. The

experimental group then participated in an 8 week MM program for 1.5 to 2 hours a week while the control group did not participate in this program. The PWI-SF was then administered again to both the experimental and control groups to evaluate differences in stress post-intervention.

A Chi-square test and independent *t*-test were utilized to test homogeneity of the experimental and control groups. Though there was homogeneity between the demographics of the two groups, the experimental group had significantly higher pretest PWI-SF scores than the control group. Because of this, an analysis of covariance (ANCOVA) was conducted in order to account for the confounding variables that led to this significant difference ($p= 0.037$) in pre-test PWI-SF scores. After the intervention, post-test scores showed a significant decrease in stress within the experimental group (no *p* given) while there was an increase in stress within the control group (no *p* given). In the end, there was a significant difference in the experimental group's and control group's post-intervention PWI-SF scores ($p= 0.020$) indicating that the intervention had successfully decreased stress within the experimental group.

Ratanasiripong and colleagues (2015) conducted another quasi-experimental study with a pre-test, post-test design and a control group aiming to examine how MM and biofeedback programs affected stress and anxiety in nursing students. Eighty-nine second-year nursing students from a public university in Thailand participated in this study and were assigned to one of three groups: the MM group, the biofeedback group, or the control group. Members of the MM group received two trainings in Vipassana meditation while the biofeedback group received two trainings in manipulation of biofeedback devices. Both groups were instructed to practice the skills they learned three times a day for 4 weeks and to keep a practice log. The control group received no training and did not keep a practice log. The *Perceived Stress Scale* (PSS) (Cohen, 1983) was used as the scale to measure pre-intervention and post-intervention stress.

Homogeneity was confirmed among all three groups and a repeated-measures ANOVA was conducted to compare pre-test and post-test scores in each group. Through this analysis, the MM group demonstrated a significant decrease in stress from pretest to post-test ($p= 0.001$). The biofeedback group, on the other hand, demonstrated a non-significant decrease in stress ($p= 0.089$) while the control group did not experience a significant change in stress from pretest to post-test ($p> 0.05$). A separate ANOVA that compared PSS scores among the three groups after the intervention showed that there was no significant difference among the three groups' post-intervention scores ($p> 0.05$).

Finally, researchers Song and Lindquist (2015) conducted a randomized controlled trial (RCT) evaluating the effects of an 8 week MBSR intervention on undergraduate nursing students at a public university in South Korea. Of the 460 possible students who could participate, 52 were recruited who met inclusion criteria, 50 students agreed to participate, and 44 students completed the study. The 44 students were then randomly assigned to either the experimental group ($n= 23$) or the wait-list control group ($n= 21$). Participants completed the *Depression, Anxiety, and Stress Scale-21* (DASS-21) as a pretest. During the 8 week intervention, participants in the experimental group attended a 2 hour MBSR class 1 day a week for 8 weeks and practiced the learned techniques at home. The control group received no intervention. After the intervention, participants completed a DASS-21 as a post-test.

Homogeneity of the two groups was confirmed, and researchers conducted an ANCOVA in order to account for possible confounding variables. This analysis, using the pretest score as the covariate, demonstrated a larger decrease in stress from pretest to post-test in the MBSR experimental group and a smaller decrease in stress from pretest to post-test in the control group. The ANCOVA showed a significant difference ($p< 0.001$) in the post-test stress scores between

the experimental group and control group, revealing that the experimental group was experiencing less stress than the control group post-intervention.

Anxiety

Anxiety, often characterized by feelings of nervousness, fear, panic, agitation, and apprehension (Chen, Yang, Wang, & Zhang, 2013) is another mental health aspect that mindfulness interventions aim to address. Of the seven sources within this review, four examined mindfulness's effects on undergraduate nursing student anxiety.

First, Chen and colleagues (2013) evaluated the effects of a 30 minute, 7 day MM intervention on undergraduate nursing students' reported anxiety scores and the physiologic measures of heart-rate and blood pressure. This RCT utilized random selection to obtain participation from 60 undergraduate nursing students from a medical university in Guangzhou, China. Random assignment effectively divided these participants into an experimental group ($n=30$) and a control group ($n=30$). Homogeneity was tested and confirmed and the Self-Rating Anxiety Scale (SAS) (Zhang, 1971) was administered as a pretest and post-test. Heart-rate and blood pressure were measured as physiologic indicators of anxiety pre-intervention and post-intervention as well.

After the experimental group completed a 7 day MM intervention (while the control group did not complete a MM intervention), a repeated-measures ANOVA found a significant decrease in reported anxiety in the experimental group compared to the control group ($p < 0.001$). Through another repeated-measures ANOVA, the physiological measure of systolic blood pressure also showed a significant decrease ($p = 0.034$) by 2 mmHg in the experimental group compared to the control group, while heart-rate ($p = 0.228$) and diastolic blood pressure ($p = 0.280$) did not show significant changes.

Three of the previously described studies that evaluated mindfulness's effects on stress in undergraduate nursing students also evaluated its effects on undergraduate nursing student anxiety. For example, Kang et al. (2009), also explored MM's effect on anxiety by using the *State-Trait Anxiety Inventory* (STAI) (Spielberger, 1983) as a pretest and post-test measure of anxiety. The researchers found that the experimental group had significantly higher anxiety scores in the pretest compared to the control group ($p = 0.044$). An ANCOVA was utilized to account for confounding variables that led to this lack of homogeneity. The ANCOVA demonstrated in the post-test results that there was a significant difference in STAI scores between the experimental MM group and the control group ($p = 0.013$). A paired t -test comparing pre-intervention and post-intervention STAI scores in the experimental group showed a significant decrease in anxiety after the MM intervention (no p given) while the control group exhibited a non-significant increase in anxiety from pretest to post-test (no p given).

Similarly, Ratanasiripong et al. (2015) also utilized the *State Anxiety Scale*, a portion of the STAI, in their previously mentioned study as a means of measuring situational anxiety in undergraduate nursing students before and after the MM and biofeedback interventions. After homogeneity was confirmed between all three groups, researchers utilized repeated-measures ANOVAs to compare pretest and post-test *State Anxiety Scale* scores in each group. These ANOVAs demonstrated a significant decrease in anxiety scores from pretest to post-test in both the MM group ($p = 0.001$) and the biofeedback group ($p = 0.006$), while the control group's pretest and post-test scores demonstrated no significant change ($p > 0.05$).

In the previously mentioned study, researchers Song and Lindquist (2015) also measured changes in anxiety within their RCT through comparing pretest and post-test scores of the DASS-21. Utilizing an ANCOVA in order to account for confounding variables after

homogeneity had been confirmed, the researchers found that members of the MBSR experimental group experienced a decrease in anxiety while the control group's mean anxiety scores remained the same. They found that a significant difference existed between the post-test scores of the two groups ($p= 0.023$), demonstrating that the MBSR group experienced less anxiety post-intervention than the control group.

Depression

Defined as a mood disturbance leading to persistent bouts of sadness, guilt, disruptions in sleeping patterns, low self-esteem, and appetite changes (Fry, 2016), depression ranks as a prevalent negative mental health concern among nursing students (Cheung et al., 2014). Among the seven sources in this systematic review, four studies evaluated the effects of MM or MBSR on self-reported depression in undergraduate nursing students with mixed results noted.

Researchers Alsarairh and Aloush (2017) conducted a RCT comparing the efficacy of MM versus exercise on the alleviation of depressive symptoms in undergraduate nursing students at a public University in Jordan. This study consisted of two experimental groups and no control group. Researchers used random selection and random assignment to separate 181 participants into a MM group ($n=91$) and an exercise group ($n=90$). Those in the MM group participated in a 1 hour MM intervention three times a week for 10 weeks consisting of mindfulness breathing, mindfulness body scan, and mindfulness walking. Those in the exercise group participated in a 1 hour exercise intervention three times a week for 10 weeks consisting of stretching, aerobic exercise, and strength training. Participants completed *The Center for Epidemiologic Studies Depression Scale* (CESD-R) as the pretest and post-test.

Data was analyzed using an independent sample t -test in order to compare pretest and post-test scores between the two groups. A paired sample t -test was utilized to identify changes

in depression scores within the two groups from pretest to post-test. This study found that both exercise and MM significantly alleviated depressive symptoms as reported on the CESD-R, but the MM group demonstrated a significantly greater decrease in its reported depressive symptoms ($p= 0.00$) than the exercise group ($p= 0.05$).

Three of the previously described studies also evaluated mindfulness's effects on undergraduate nursing student depression. For example, Kang and colleagues (2009) found a similar finding to Alsarairoh and Aloush (2017). Using a paired t -test to compare the experimental MM group and the control group pretest and post-test *Beck Depression Inventory* (BDI) (Beck et al., 1961) scores, the researchers found there was a significant decrease in depression scores from pretest to post-test in the experimental group (no p given), while the control group demonstrated a non-significant increase in depression from pretest to post-test (no p given). An independent t -test comparing the average post-test scores of the two groups found that there was not a significant difference between post-test depression scores between the experimental and control groups ($p= 0.056$).

Song and Lindquist (2015) also measured changes in depression within their RCT through comparing pretest and post-test scores of the DASS-21. Researchers found that members of the MBSR experimental group experienced a greater decrease in depression than the control group (though both groups experienced a decrease) and that a significant difference existed between the post-test scores of the two groups ($p=0.002$). This analysis reveals that the MBSR group experienced less depression post-intervention than the control group.

Not all studies regarding mindfulness interventions demonstrated this significant decrease in depression. In the previously mentioned RCT completed by Chen and colleagues (2013), researchers also examined the brief MM intervention's effect on self-reported depression. Using

the Chinese version of Self-Rating Depression Scale (SDS) (Zung et al., 1965) as both the pretest and post-test measure of self-reported depression, researchers found through a repeated-measures ANOVA that there was not a significant decrease in depression in the experimental group compared to the control group ($p = 0.082$). Researchers attributed this lack of significance to the brevity of the intervention compared to the 8 week structure of a MBSR course.

Discussion

All seven studies that compile this systematic review indicate that MM and MBSR interventions can lead to improvements in negative mental health symptoms such as stress, anxiety, and depression in undergraduate nursing students. All five studies examining stress as a dependent variable demonstrated a significant decrease in stress or a significant difference in stress in the experimental group compared to the control group. All four studies exploring mindfulness's effect on anxiety demonstrated a significant decrease in anxiety or a significant difference in anxiety in the experimental group compared to the control group. Lastly, of the four studies that investigated changes in depression from pre-intervention to post-intervention, three concluded that depression significantly decreased in the experimental groups or that there was a significant difference in depression post-intervention when comparing the experimental group to other groups. A possible reason for the lack of significance in the study by Chen *et al.* (2013) could be attributed to the short period in which MM was applied and the small sample size, rendering insufficient power to detect a small effect size. This lack of power increases the likelihood of a type II statistical error, meaning that the results may have been found to be non-significant when the results really were significant. This study could have been strengthened by establishing sufficient power, establishing a level of significance, calculating the Cohen's effect size, and calculating the required sample size before beginning the study.

One strength of all the studies at hand includes the presence of clearly defined objectives. The purpose of each study and the dependent variables being measured are clearly stated. Researchers, in turn, utilized appropriate tools to measure these variables. Five of the seven studies within the systematic review provide information regarding the established validity and internal consistency of the pretest and post-test instruments, citing Cronbach's α 's ranging from acceptable (0.72) to excellent (0.93), with only one instrument citing questionable internal consistency (PSS, 0.62). Two studies, Chen et al. (2013) and Linden et al. (2001), did not provide specific information on validity or reliability of the instruments used.

Another strength of five of the seven studies includes randomization of participants. Two studies (Alsarairh & Aloush, 2017; Chen et al., 2013) utilized random sampling in order to recruit members, and three more studies (Kang et al., 2009; Ratanasiripong et al., 2015; Song & Lindquist, 2015) used random assignment to assign members to experimental groups or control groups. The results of Linden et al.'s (2001) study, along with Beddoe and Murphy's (2004) study, would have been strengthened had they utilized random sampling and random assignment, instead of recruiting volunteers. Beddoe and Murphy's (2004) study design would have been strengthened further had it implemented a control group instead of just an experimental group.

Though initial research regarding mindfulness's efficacy on improving negative mental health symptoms looks promising, there are many limitations consistent across all seven studies. For one, all studies lack generalizability. All studies ran one trial at single universities and many possessed small sample sizes. Two studies (Beddoe & Murphy, 2004; Kang et al., 2009) only included female nursing students, further detracting from the generalizability of the studies' findings. Future research on mindfulness interventions as applied to undergraduate nursing students must possess larger sample sizes to increase the statistical power of the study. Multiple

trials done at different universities with both male and female nursing students will also help to increase the generalizability of study findings.

Another common weakness found within many of the studies was relatively high attrition rates. Three of the seven studies (Chen et al., 2013; Linden et al., 2001; Ratanasiripong et al., 2015) had a 0% to 1% attrition rate, while the other four studies possessed attrition rates ranging from 10% to 30% (Alsaraireh & Aloush, 2017; Beddoe & Murphy, 2004; Kang et al., 2009; Song & Lindquist, 2015). Future research regarding mindfulness interventions for nursing students should take measures to ensure nursing student participation throughout the intervention.

All of the studies also possess areas of potential bias. For example, three studies (Beddoe & Murphy, 2004; Kang et al., 2009; Ratanasiripong et al., 2015) involved researchers as the main instructors of the experimental techniques utilized by the students. This could pose a potential risk related to the manipulation of participants into thinking about the intervention in a specific way that benefits the researcher. Another weakness present in all studies is that all participants were aware of the study goals and objectives, potentially skewing results so that MM or MBSR showed improvements in the negative mental health outcomes measured. Two studies (Beddoe & Murphy, 2004; Linden et al., 2001) only included participants who volunteered to be in the experimental group of the studies. Because of this, there is a potential risk that those who volunteered for a mindfulness intervention were those who felt they would benefit most from the intervention.

There are many areas for future researchers to contribute to this investigation of mindfulness's effect on mental health in undergraduate nursing students. For example, future research should include a focus on how mindfulness affects nursing students in Western cultures.

Of the seven studies, only two (Beddoe & Murphy, 2004; Linden et al., 2001) take place in North America, while the rest take place in Asia. It is not surprising that more research regarding mindfulness has been conducted in Asia due to mindfulness's conception from Asian Buddhist philosophy. However, the way in which nursing students in Eastern cultures accept and interpret mindfulness interventions may differ from nursing students in Western cultures.

Future research should also aim to explore mindfulness's effect on positive mental health characteristics. Though all seven studies showed improvements in at least one of three negative mental health symptoms (stress, anxiety, and depression) in undergraduate nursing students, future nurses, championing health promotion and primary prevention, should examine how mindfulness can foster positive mental health characteristics as well. Two studies within this systematic review begin this exploration of positive mental health symptom improvement due to mindfulness. Beddoe and Murphy (2004) found that nursing students in the MBSR group of their study demonstrated improvements in empathy scores post-intervention compared to the control group. Song and Lindquist (2015) found that nursing students in the MBSR group showed significant improvements in mindfulness scores post-intervention. Other positive mental health outcomes that researchers could explore in the future include coping, resilience, confidence, and attention.

Relevance to the Kirkhof College of Nursing

The results and discussion of this systematic review examine how mindfulness can improve mental health characteristics of nursing students in baccalaureate nursing programs. In particular, findings of this review possess potential insights into how mindfulness interventions can improve undergraduate nursing students' mental health at Grand Valley State University's (GVSU's) Kirkhof College of Nursing (KCON). Though researchers must continue to study the

effects of mindfulness, current research reveals significant improvements in negative mental health symptoms when mindfulness interventions were employed on populations similar to that of KCON. All participants within the seven studies of this systematic review attended 4 year baccalaureate nursing programs. Because GVSU's KCON is a 4 year baccalaureate nursing program as well, mindfulness interventions may help to promote positive mental health outcomes for student-nurses in this program.

One possible way of implementing mindfulness practices into KCON would be through creating a mindfulness event for nursing students in the Student Nurses' Association (SNA). This organization currently hosts weekly exercise classes as a means of providing student-nurses with a positive coping mechanism. As Alsarairh and Aloush (2017) demonstrated in their study, participants in the MM group experienced a greater decrease in depression than participants in the exercise group. Therefore, this type of event could equip nursing students in KCON with another positive coping mechanism. In order to facilitate this type of event, a certified mindfulness coach must be contacted to provide MM training and education to student-nurses in GVSU's SNA.

Another way of encouraging nursing students at GVSU's KCON to utilize mindfulness techniques is by encouraging the use of mindfulness applications, especially early on in the program. Nursing students today have their phones readily available. By promoting the use of mindfulness applications such as Headspace and Calm, two applications that provide daily guided meditations and mindfulness reminders (Andriakos, 2018), nursing students are equipped with tools to help them cope when the unique stress of nursing school begins to overwhelm them. The use of productivity applications, like Freedom, an application that blocks the use of distracting websites and social media sites (Andriakos, 2018), can also encourage nursing

students to “unplug” and focus on “paying attention on purpose... to the unfolding of experience moment to moment” (Center for Mindfulness in Medicine, Health Care, and Society, 2017, para. 2).

The final practical way in which nursing students at GVSU’s KCON can implement mindfulness into their lives is to partake in five minutes of meditation before an exam. With academic stress being the largest source of stress cited by nursing students (Shaban et al., 2012), employing this brief mindfulness intervention could decrease stress when many students are at their most distressed. Whether this meditation is self-led, class-led, or instructor-led, implementing this quick meditation could facilitate healthier mental health outcomes for those students overwhelmed with the academic rigor associated with nursing school.

Conclusion

In conclusion, initial research suggests that interventions rooted in mindfulness may improve negative mental health symptoms in undergraduate nursing students. After evaluating seven sources that met the specified inclusion criteria, the results indicated that students experienced improvements in stress, anxiety, and depression after partaking in MM or MBSR interventions. Strengths of the studies include clearly stated goals and objectives, appropriate use of validated and reliable instruments, and the use of random selection and random assignment when possible. Weaknesses include the lack of generalizability, small sample sizes, and high attrition rates. More RCTs with sufficient power and well-executed designs that nursing students can practically participate in must be conducted. Future research that focuses on applying mindfulness to nursing students in Western cultures, as well as research focusing on fostering positive mental health characteristics through mindfulness, could provide more insight to the

existing body of research regarding the possible benefits of applying mindfulness-based interventions to undergraduate nursing students.

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