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Final Scholarly Project: Incorporation of Mindfulness Application Use in Doctoral Nurse Anesthesia Curricula for Mitigation of Stress and Anxiety in Student Registered Nurse Anesthetists

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We have no conflicts of interest to disclose.

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Abstract

The nurse anesthesia specialty is highly stressful, with educational training being no exception. High didactic demands and intensive clinical experiences are placed on student registered nurse anesthetists (SRNAs), increasing stress and anxiety in their personal and professional lives. High levels of psychological distress can lead to inadvertent consequences in students' mental, emotional, and physical health and can contribute to illness, burnout, substance use, and compromise in patient safety. Some degree of stress is necessary for motivation to succeed and perform at high levels, and encountering stress while enrolled in a doctoral nurse anesthesia program is expected and unavoidable. A search of the literature showed that mindfulness meditation training reduces stress and anxiety and improves performance in graduate student populations. An evidence-based practice project was developed and implemented to provide doctoral nurse anesthesia students with a tool to manage stress and anxiety while enrolled. The Johns Hopkins Nursing Evidence-Based Model guided project planning, development, completion, and dissemination. The chosen intervention modality was the Headspace smartphone application, as it uses science-backed meditation and mindfulness tools to support mental health, is easy to access, and offers a free introductory period. SRNAs participated in a 14-day trial of the Headspace application after attending a presentation for oral solicitation and submitting consent. Pre and post-intervention surveys were conducted and analyzed, showing significant reductions in stress and anxiety. These results suggest Headspace could be a helpful mindfulness tool in improving overall SRNA well-being.

Keywords: mindfulness, student registered nurse anesthetists, curricula, stress, anxiety

Incorporation of Mindfulness Application Use in Doctoral Nurse Anesthesia Curricula for Mitigation of Stress and Anxiety in Student Registered Nurse Anesthetists

Introduction

Nurse anesthesia (NA) is a stressful specialty, as it requires an advanced clinical skillset, high levels of autonomy, and the ability to make critical decisions in life-and-death circumstances. Nurse anesthesia programs (NAPs) provide intensive didactic and clinical experiences to adequately prepare students for the high-stress workforce, placing high personal and professional demands. Foley and Lanzillotta-Rangeley (2021) state that a high incidence of stress and anxiety observed in student registered nurse anesthetists (SRNAs) is directly related to the demanding workload of NAPs. High levels of psychological distress can lead to inadvertent consequences in students' mental, emotional, and physical health, requiring an understanding of the SRNA experience and promotion of overall student well-being (Mesisca, 2021). Gaining insight into the SRNA experience is the first step in assessing the unique needs of this student population.

Background

Recent changes implemented by the Council on Accreditation for NAPs (COA) added to the didactic demands of NA students. In 2022, the COA mandated that all accredited NAPs offer a Doctor of Nursing Practice (DNP) for entry into practice, expanding the responsibilities and expectations of SRNAs (COA, 2022). The extensive time commitment and degree of difficulty associated with an integrated doctoral NAP may amplify students' stress levels through factors such as prolonged duration of education, higher financial debt, the addition of doctoral coursework and scholarly projects, and extended practicum hours (Mesisca, 2021). Increased living expenses lead many students to take on large amounts of debt while enrolled, with the looming responsibility of paying it back upon program completion.

Encountering stress while enrolled in a NAP is expected and unavoidable. According to the Centers for Disease Control and Prevention (CDC) (2021), stress is the body's normal response to

pressures or tensions, often causing unease, anxiety, frustration, nervousness, fearfulness, or helplessness. If managed properly, stress can be utilized as a motivator. Some degree of stress is necessary for motivation to succeed and perform at high levels, serving as a healthy adaptive emotion (Mesisca, 2021). However, if left unmanaged, it may contribute to illness, dissatisfaction, burnout, medication errors, and substance use (Foley & Lanzillotta-Rangeley, 2021; Waechter et al., 2021). Furthermore, unmanaged stress levels can affect students' psychological well-being, potentially interfering with their ability to learn and perform clinically (McConville et al., 2017). Developing healthy coping strategies may aid students in finding a balance between the usefulness and drawbacks of inevitable stress encountered in NAPs, giving them the tools to use the stress emotion as a motivator and means for performance success.

Mindfulness is a form of meditation used as a coping strategy for stress and anxiety. Involving the attention to thoughts, feelings, and sensations that arise at the moment, mindfulness emphasizes a non-judgmental attitude toward one's experience (Waechter et al., 2021). Higher levels of mindfulness are associated with lower levels of anxiety and stress, which can facilitate well-being outcomes of lower stress perception, more adaptive coping strategy use, and the ability to see a situation more clearly and respond more efficiently (McConville et al., 2017). Introducing stress management techniques such as mindfulness may help SRNAs develop healthy coping strategies, potentially avoiding the maladaptive ones previously identified.

The NA specialty is highly stressful, with educational training being no exception. High didactic demands and intensive clinical experiences are placed on students new to the specialty. Unhealthy or absent coping strategies for mitigating stress and anxiety can harm a student's mental, emotional, and physical health. As clinical faculty, developing a scholarly project around utilizing a mindfulness application for the well-being of NA students can have a meaningful impact on their health, education, and future careers as successful nurse anesthetists.

Significance to Nurse Anesthesia Education

As previously stated, the NA specialty is highly stressful, with educational training being no exception. Foley and Lanzillotta-Rangeley (2021) state that stress levels of practicing certified registered nurse anesthetists (CRNAs) rank an average of 4.2 of 10, with SRNAs ranking 7.1 of 10. Learning to address and manage inevitable stressors present in the profession is essential for the overall health and wellness of those who practice and for the safety of patients. The COA and the American Association of Nurse Anesthesiology (AANA) recognize the importance of anesthesia providers balancing personal wellness and professional responsibilities, as evidenced by current accreditation standards and available website resources.

The COA is the accrediting agency for NAPs in the United States. Their mission is to establish standards to promote quality education in NAPs through accreditation while encompassing the values of integrity, accountability, commitment, diversity, equity, inclusion, quality, and innovation (COA, 2023). To foster student achievement and continuous program improvement, the accreditation standards are periodically revised to reflect best practices, with the most current revision dating back to January 30, 2023. According to Smith et al. (2020), recent commentaries call for sustainable and preventative wellness programs in healthcare provider curricula, which the COA implements through graduate and curriculum standards.

Wellness and substance use disorder (SUD) are listed explicitly as curriculum standards to ensure all SRNAs fulfill this requirement upon graduation. The COA (2023) states, “the graduate must demonstrate knowledge of wellness and substance use disorder in the anesthesia profession through completion of content in wellness and substance use disorder” (p. 19). Anesthesia providers are at elevated risk for developing maladaptive coping behaviors from high-stress work environments, with SUD considered the number one occupational hazard of the profession (Rupprecht, 2022). Students who experience stress and anxiety have an increased risk of failure during clinical coursework, may become unsafe during patient care, and struggle with critical

thinking and reasoning (Willigens & Palombaro, 2019). Understanding this correlation, the COA has built wellness and SUD educational requirements into graduate and curriculum standards to prepare SRNAs for entering the high-stress workforce.

The AANA is the professional association of nurse anesthetists in the United States. Through their Health and Wellness Program, they strive to address wellness factors to promote a balanced and fulfilling personal and professional life for their members through topics such as SUD, emotional and mental well-being, physical well-being, social responsibility, state health and wellness resources and toolkit, student wellness, wellness education and research, and workplace wellness (AANA, n.d.). A separate student wellness page is available for SRNAs to connect with peers, locate student-specific wellness resources, and find other health and wellness contacts if needed.

Providing the tools for students to manage inevitable stressors present in the NA profession is essential for their overall health, wellness, and career success. Even at the student level, provider well-being is vital to delivering patients safe, high-quality anesthesia care (Mesica, 2021). Despite curriculum standards set by the COA and available resources through the AANA, high stress levels are still evident in SRNAs. Mindfulness may help to improve student safety, prevent the need for remediation, and safeguard patients from errors (Willigens & Palombaro, 2019). Reducing stress for SRNAs enrolled in NAPs begins with the early implementation of evidence-based wellness programs.

PICO(T) Question

Developing a DNP project often begins with writing a clinical question using the PICO(T) format. This approach uses a framework to help define the focus and identify keywords essential for a successful database search using the PICO(T) components of population, intervention, comparison, and outcome, with a time frame added for clinical questions (Moran et al., 2024). For the scholarly project, the population consists of SRNAs enrolled in a doctoral NAP in their first year

of clinical practicums. The intervention pertains to utilizing a mindfulness application, and the outcomes will measure the degree of stress and anxiety experienced during their first year of clinical practicum.

The doctoral project will address the following question: In DNP SRNAs (**P**), how does incorporating the use of a mindfulness application (**I**) compared to not using a mindfulness application (**C**) affect stress and anxiety levels (**O**) during their first year of clinical practicum (**T**)?

Project Objectives

Utilizing wellness programs in academic curricula enables faculty to promote student success. A search of the literature demonstrates how mindfulness training reduces stress and improves academic and clinical performance in healthcare graduate student populations. Implementing an application-based mindfulness program into nurse anesthesia training curricula takes planning, cost metric considerations, and evaluation of findings with adjustments as necessary. Literature has shown that stress and anxiety reduction through mindfulness can positively impact the effectiveness of NA educational training programs for SRNAs. Furthermore, mindfulness is a skill set that can be used for benefit throughout their careers.

The DNP project aims to provide recommendations for incorporating wellness programs into nurse anesthesia curricula by establishing evidence-based guidelines for mindfulness application usage by students to decrease stress and anxiety. The DNP project will also analyze the effectiveness of implementing an application-based mindfulness wellness program in this student population. The objectives of the doctoral project are as follows:

1. Identify evidence-based practice guidelines from the literature for implementing a mindfulness application wellness program to help decrease stress and anxiety for SRNAs enrolled in DNP NAPs.
2. Develop a comprehensive plan to implement a stress and anxiety reduction technique using a mindfulness application wellness program in SRNA's first year of clinical practice.

3. Develop a comprehensive plan to monitor and measure the mindfulness applications' perceived effectiveness in reducing stress and anxiety in SRNAs during their first year of clinical practice.
4. Develop a comprehensive plan to adjust the guidelines as needed.

Further literature review and analysis will aid in developing evidence-based guidelines for implementing mindfulness application use within DNP nurse anesthesia curricula, including a specific application-based mindfulness program and the total time commitment required by students. The financial impact, ethical considerations, and project feasibility will be extensively explored. Preintervention and postintervention surveys using the Depression Anxiety Stress Scales 21-item (DASS-21) questionnaire will be analyzed to assess the efficacy and efficiency of mindfulness application implementation for students. A second post-intervention survey utilizing a Likert scale will be administered to assess qualitative data, which may be used to adjust guidelines as needed.

Literature Synthesis & Analysis

A literature review assessed mindfulness's efficacy for mitigating stress and anxiety in SRNAs. The literature review used Otterbein University's OneSearch, an aggregator tool provided through the Courtright Memorial Library, to search several online databases simultaneously. Articles selected for this project were from the Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, and MEDLINE databases. Search strategies, including keyword searching, Boolean phrasing, and limits, were implemented to discover literature relevant to the PICO(T) question: In DNP SRNAs (**P**), how does incorporating the use of a mindfulness application (**I**) compared to not using a mindfulness application (**C**) affect stress and anxiety levels (**O**) during their first year of clinical practicum (**T**)?

Literature Search Terms & Results

The initial search using the key terms and Boolean operators "student registered nurse anesthetist OR srna OR nurse anesthesia AND mindfulness AND stress and anxiety" yielded 7,488 results. The following search modes and expanders were applied to narrow the search: apply related words, apply equivalent subjects, scholarly (peer-reviewed) journals, available online (full text), English language, and publish date 2017 through 2023. The phrase "AND mindfulness meditation and mindfulness application AND clinical performance" was added to further narrow results, yielding 403. The final search using key terms and Boolean operators, "student registered nurse anesthetist OR srna OR nurse anesthesia AND mindfulness meditation and mindfulness application AND stress and anxiety reduction AND clinical performance and effectiveness," yielded 101 results. The articles were reviewed for relevance, with 12 meeting inclusion criteria. Three additional articles from the references of identified papers were obtained, resulting in a final count of 15. Of the 15 articles, only two were specific to the SRNA population, with multiple articles in comparable student populations, highlighting the need for literature development on this topic. Articles containing nurses and medical personnel were also included. Key data were abstracted from each study and entered into an evaluation table to summarize the study characteristics, strength of evidence, study design, identification of sample and setting, independent and dependent variables, data collection tool(s), and study findings. The Literature Synthesis Table is summarized in Appendix A of the supplementary information.

The literature review yielded four systematic reviews (level I evidence), two randomized control trials (level I evidence), one quasi-experimental study (level II evidence), one systematic review of randomized and non-randomized control trials (level II evidence), three qualitative studies (level III evidence), one cross-sectional mixed methods study (level III evidence), two observational studies (level III evidence), and one integrated literature review (level V evidence). Participants included SRNAs (2 studies), undergraduate and graduate nursing students (5 studies),

medical students (4 studies), nurses (3 studies), health science graduate students/health profession trainees (4 studies), anesthesia residents (1 study), medical personnel (1 study). The articles explore mindfulness as a stress and anxiety reduction tool, implementation of mindfulness in academic curricula, mindfulness program specifications, and long-term effects of mindfulness training.

Mindfulness as a Stress Reduction Tool

The evidence examined broadly supports utilizing mindfulness as a stress reduction tool in student and health professional populations, as 13 of the 15 selected articles directly observed the effects of stress after mindfulness implementation. The various mindfulness interventions of these articles included mindfulness meditation, mindfulness-based stress reduction programs (MSBR), wellness interventions (yoga, walking), mindfulness workshops (meditation, mindful movement, small group discussions), and quality-of-life programs. Although there was variation in the scales employed to assess the results, all 13 reported a statistically significant reduction of stress post-implementation, highlighting the value in the stress reduction capabilities of wellness programs (Foley & Lanzillotta-Rangeley, 2021; McConville et al., 2017; van der Riet et al., 2018; Waechter et al., 2021; Willgens & Palombaro, 2019; da Silva Gherardi-Donato et al., 2020; Stillwell et al., 2017; Sulosaari et al., 2022; Luangapichart et al., 2022; Carullo et al., 2021; Orosa-Duarte et al., 2021; Schwind et al., 2017; da Silva et al., 2023). Notably, a qualitative study by Foley and Lanzillotta-Rangeley (2021) found a 47 percent reduction in stress in SRNAs after implementing an application-based mindfulness meditation program, proposing a significant benefit of use in this population.

Mindfulness as an Anxiety Reduction Tool

Although observed to be present in fewer studies when compared to stress, the evidence also supports utilizing mindfulness as an anxiety reduction tool. Nine of the 15 articles directly observed the effects of anxiety after mindfulness implementation, all of which shared moderate yet

favorable statistical results (Foley & Lanzillotta-Rangeley, 2021; McConville et al., 2017; van der Riet et al., 2018; Waechter et al., 2021; Sulosaari et al., 2022; Luangapichart et al., 2022; Schwind et al., 2017; Orosa-Duarte et al., 2021; da Silva et al., 2023). A randomized control trial by Waechter et al. (2021) found a significant statistical difference in scores measured by change from pre to post-intervention for anxiety, while the control group showed zero change. However, one systematic review found low evidence to support mindfulness-based programs for anxiety, with another identifying one article out of 19 showing no effect (da Silva et al., 2023; McConville et al., 2017). Overall, the evidence favors using mindfulness as an anxiety reduction tool in the student and health profession populations.

Implementation in Academic Curricula

The literature review suggests that regular engagement with mindfulness training has value and can indeed be introduced into the higher education context for healthcare professional students (McConville et al., 2017; van der Riet et al., 2018; Foley & Lanzillotta-Rangeley, 2021; Waechter et al., 2021; da Silva Gherardi-Donato et al., 2020; Stillwell et al., 2017). The COA shares this value, as the most recent update to accreditation standards includes incorporating wellness into graduate and curriculum standards (COA, 2023). This requirement ensures that all SRNAs encounter wellness education before entering the profession. McConnell et al. (2017) point out that total time investment and long-term adherence to mindfulness practice may influence the overall effectiveness, resulting in a potential challenge for students with high study loads. Understanding this concept, the literature was reviewed for the specifics of effective mindfulness programs for possible implementation into the already demanding workload of the nurse anesthesia curricula.

Mindfulness Program Specifications

With the demanding workload of nurse anesthesia training programs in mind, the literature was examined for the overall time commitment necessary to yield favorable results from mindfulness training. The mindfulness interventions employed across the analyzed studies varied

in length of practice depending on the setting and mindfulness intervention type. A systematic review of 19 articles stated that mindfulness programs were effective regardless of their duration of use or mode of delivery (McConville et al., 2017). Similarly, a systematic review by Stillwell et al. (2017) stated that the mindfulness protocols varied in dose, frequency, and length of intervention, making it difficult to recommend a standardized approach to implementation.

A common theme identified was that regular engagement, regardless of intervention type or duration of use, had the most significant impact on results (McConville et al., 2017; Foley & Lanzillotta-Rangeley, 2021; Sulosaari et al., 2022; Stillwell et al., 2017; Carullo et al., 2021; van der Riet et al., 2018; Luangapichart et al., 2022). One study reported favorable results with a total engagement time of 51.2 minutes of mindfulness training over ten days, with another describing small "sprints" of mindfulness practice during intense clinical rotations or periods of high physical or mental strain as most effective (Foley & Lanzillotta-Rangeley, 2021; Carullo et al., 2021). Both studies delivered mindfulness training via a mobile application, offering users a practical, effective, time-conscious option.

Luangapichart et al. (2022) state that online mindfulness applications are increasingly common as they provide alternative treatments for individuals who face barriers to mental health care services, including time constraints, lack of access to services, confidentiality or social stigma concerns, or high costs. As nurse anesthesia students have demanding workloads and limited funds, evidence suggests they may benefit from easily accessible, cost-effective, application-based mindfulness programs.

Long-Term Effects of Mindfulness Training

The long-term effects of mindfulness training on healthcare students and professionals have yet to be well-explored. The most extended follow-up in the reviewed studies was nine months post-intervention, showing mindfulness practice-based curricula can positively influence the clinical performance of health graduate students (Willgens & Palombaro, 2019). Of the mindfulness

application-based studies reviewed, the effects of mindfulness remained at one and four-month follow-ups (Luangapichart et al., 2022; Carullo et al., 2021). One qualitative study showed that more than 50% of surveyed graduates who had attended mindfulness meditation courses during their studies continued to use mindfulness meditation techniques throughout their careers (Foley & Lanzillotta-Rangeley, 2021). Mindfulness practice can aid in developing essential skill sets that could serve students well during their academic and professional careers (van der Riet et al., 2018; Mesisca, 2021).

Literature Review Summary

The performed literature review broadly supports utilizing mindfulness as a stress and anxiety reduction tool in student and health professional populations. Implementing successful mindfulness-based programs into academic curricula has shown value in the higher education context for healthcare professional students, and the COA supports its mandate in nurse anesthesia curricula. Regular engagement, regardless of intervention type or duration of use, had the most significant impact on results, with application-based programs proving to be a practical, effective, time-conscious option for anesthesia trainees. Regular use may have lasting effects, positively impacting SRNA's academic and professional careers.

Project Framework

Despite the COA updating graduate standards to include wellness within nurse anesthesia curricula and the AANA promoting wellness resources, stress and anxiety levels continue to be high among SRNAs. Providing students with tools to manage inevitable stressors in the anesthesia profession is essential for their overall health, wellness, and career success. Considering the importance of this topic, the project was framed.

Johns Hopkins Nursing Evidence-Based Practice (JHEBP) Model

Permission to use the JHEBP was obtained on July 3, 2023, through the Johns Hopkins University web page (Appendix G). The JHEBP Model is a problem-solving tool for clinical and

academic uses developed to provide a framework for project development and help guide individuals through the evidence-based process (Johns Hopkins Medicine, n.d.). The model aims to ensure that the latest findings and best practices are quickly and appropriately incorporated into practice. Following an inquiry, the JHEBP model uses a three-step PET process to identify the practice question, discover the best evidence to answer the question, and translate the evidence into practice. The most updated model incorporates reflection into each step and is depicted for review in Appendix B.

Methodology & Project Design

JHEBP: Practice Question

The first phase of the JHEBP PET process involves developing a practice question by identifying the population, interventions, and outcomes (PICO). This phase correlates with the original framework of the PICO(T) question: In DNP SRNAs (P), how does incorporating the use of a mindfulness application (I) compared to not using a mindfulness application (C) affect stress and anxiety levels (O) during their first year of clinical practicum (T)? The population includes SRNAs newly enrolled in a university DNP anesthesia program in their first year of clinical practice. The intervention pertains to utilizing a mindfulness application, compared with not using a mindfulness application. Lastly, the outcomes will measure the degree of stress and anxiety experienced during their first year of clinical practicum. Stakeholders include SRNAs, DNP program faculty, Headspace, patients, and hospital risk management.

JHEBP: Evidence

The second phase of the JHEBP PET process is performing a literature search and appraising the evidence for strength and quality. For the project, a literature review was performed to identify relevant, evidence-based mindfulness interventions addressing stress and anxiety in the SRNA population. The effectiveness of various mindfulness interventions, including mindfulness meditation, MSBRs, mindfulness workshops, application-based mindfulness programs, yoga,

walking, and mindfulness movements, was examined. The evidence revealed that regular engagement, regardless of intervention type or duration of use, had the most significant impact on results (McConville et al., 2017; Foley & Lanzillotta-Rangeley, 2021; Sulosaari et al., 2022; Stillwell et al., 2017; Carullo et al., 2021; van der Riet et al., 2018; Luangapichart et al., 2022). An extensive review of the evidence is available in this project's "Literature Synthesis & Analysis" section and in Appendix A, the Literature Synthesis Table.

JHEBP: Translation

The third and final phase of the JHEBP PET process is where findings are synthesized to develop practice recommendations. After examining the evidence, the project developed evidence-based guidelines for implementing mindfulness application use within NAP curricula. A specific application-based program was identified, and an explanation of the total time commitment required by students was provided. Preintervention and postintervention surveys were administered and analyzed for quantitative and qualitative data to assess efficacy and efficiency. Project limitations, financial and ethical considerations were included.

Quantitative Data

Quantitative data collected during the implementation process of this project helped determine if incorporating mindfulness application use in NA curricula would successfully improve the SRNA's perception of stress and anxiety during their first year of clinical practicum. Similar to studies in the literature review, the quantitative data was obtained from pre- and post-implementation surveys, which include the abbreviated Depression Anxiety Stress Scale 21-item (DASS-21) questionnaire (Appendix C). Once obtained, the data was evaluated for statistical significance.

Qualitative Data

Qualitative data collection occurred through a survey supplied to student participants after the implementation phase. Considering the extensive time commitment and difficulty associated

with integrated doctoral NAPs, data collection aimed at understanding study participants' thoughts, feelings, and lived experiences of the implemented project is valued and important. The qualitative data was obtained using a Likert scale, available in Appendix D, with a space provided for additional comments. Adjustments were made to the implementation process based on survey results as necessary.

Implementation Plan

Sample Setting & Target Population

The project was implemented at a university DNP NAP, targeting SRNAs in semester five of the program. The first three semesters of the nine-semester DNP program are didactic, providing one year of theoretical foundation before students enter clinical practice in year two. Semester four is introductory in the clinical setting, comprised of observation days and limited patient participation. Semester five marks the first clinical practicum course, where the students must fulfill full academic and clinical expectations, making it the target semester for project implementation.

Phase 1

Project implementation was laid out in three phases. Following Institutional Review Board approval (Appendix H), potential participants were invited to an oral presentation for solicitation purposes. The project topic, problem statement, favorable effects of mindfulness training, and project intent were provided. The conclusion of the seminar included a question-and-answer session. Willing participants provided verbal and written informed consent (Appendix E) before receiving the pre-implementation survey (Appendix C). The survey was delivered confidentially through Blackboard and included the acquisition of participants' age, gender, years of nursing experience, any previous or current mindfulness experience, and the DASS-21 standardized stress scale. Blackboard was the chosen online platform for the delivery of surveys as it is used for all the university’s academic courses, providing familiarity to study participants. The DASS-21 standardized stress scale is a set of three self-report scales developed to better define and measure

the emotional states of depression, anxiety, and stress among adults. The DASS-21 was chosen for the project as the instrument allows separate measurements of each scale, is available in the public domain, is free for use and reproduction, and is backed by considerable research (Cellucci & Isenhart, 2021).

After obtaining informed consent and completing the pre-intervention surveys, study participants were guided through downloading the free Headspace application to their personal smartphones. Headspace is an online and mobile application program that uses science-backed meditation and mindfulness tools to support mental health (Headspace, n.d.). This program offers a free 14-day trial for new users and discount subscription rates for students wishing to continue the program after the study period. Once downloaded, participants were directed to the "Quick Meditation" section, consisting of three to ten-minute sessions, where daily mindfulness practice would be completed for the 14-day study period, beginning the following day.

Phase 2

Phase two included the 14-day study period, where participants were encouraged to complete one mindfulness training session daily in the Headspace application on their smartphone. Reminder emails were sent from the project facilitator to participants daily during the study period to encourage the completion of their mindfulness session. Project participants were encouraged to notify the project facilitator via email with any questions or concerns that arose during the study period.

Phase 3

The final implementation phase involved participants completing two post-intervention surveys. Both surveys were delivered confidentially through Blackboard on the first day following the 14-day study period. The first post-implementation survey, aimed at collecting and comparing quantitative data, was the same survey administered pre-intervention (Appendix C). The second survey (Appendix D), aimed at collecting qualitative data, solicited feedback on various application-

use questions using a 5-point Likert scale ranging from strongly disagree to strongly agree. Items for this survey included the Headspace application having a user-friendly interface, being easy to navigate, efficient use of time, whether the participants consistently used the application, would recommend it to future students, and their intent to continue using the Headspace application. Additionally, a separate section was provided for further comments.

Data Collection

Data collection encompassed compiling survey questionnaire data into a Microsoft Excel spreadsheet for comparison and statistical analysis. The primary analysis compared the change in DASS-21 scores between the pre-and post-intervention surveys (Appendix C). The DASS-21 manual provides a scoring scale that delineates results in the three categories of depression, anxiety, and stress as normal, mild, moderate, severe, or extremely severe (Appendix J). A five-point Likert scale and free-text responses provided by the participants were examined from the post-implementation evaluation survey results (Appendix D).

Timeline & Budget

Timeline

The project timeline consists of the oral presentation for solicitation purposes, the implementation phase, and the analysis of results following data collection. The oral presentation took approximately two hours, including consent obtainment from willing participants (Appendix E), deployment and completion of the pre-intervention survey (Appendix C), successful download of the Headspace application on participants' personal smartphones, and application tutorial with the project facilitator. The implementation phase occurred over 14 days, with participant time commitment to the application requiring three to ten minutes daily. Project participants completed the post-intervention surveys (Appendix C & D) beginning on the first day following the 14-day trial period, with the closure of the surveys occurring one week later. Data download and collection occurred over four hours, with data analysis completed after eight.

Budget

Financial considerations for the project consisted of Headspace application use, data obtainment and analysis, and the hourly expense of the project facilitator. The Headspace application is free to download and offers a 14-day trial period to new users at no charge (Headspace, n.d.). Fortunately, none of the participants had prior experience using this mindfulness application, permitting their free participation. If a participant had previous experience with this application, a cost-effective Headspace student plan for $0.83 per month or $9.99 per year was available (Headspace, n.d.). The electronic use of Blackboard for survey deployment came with no associated costs, as it was already used for all the participants' academic courses. Data analysis was performed via Microsoft Excel at no charge. The project facilitator is a CRNA whose hourly rate averaged $101 in the United States as of August 2023 (Salary.com, 2023). The total time commitment for the oral presentation and data analysis was 14 hours, equaling $1414 of total salary costs. The total budget is listed in table format in Appendix F for review.

Outcomes and Analysis

Questionnaire Completion & Participant Demographics

The oral presentation for solicitation purposes was attended by 24 of 24 SRNAs enrolled in semester five of their DNP NAP. Of the 24 pre-implementation surveys (Appendix C) distributed, 17 were completed (70.3%). Following the implementation phase, the post-implementation survey (Appendix C) yielded 12 out of 24 responses (50%), with the post-implementation evaluation survey (Appendix D) resulting in 14 out of 24 responses (58.3%).

Survey results of demographic data revealed that 12 (70.5%) of the 17 participants had no mindfulness experience, with only one (5.8%) currently using a meditation application. Most of the participants were in the 20-30-year age group (13/17 [76.4%]), with nine (53%) identifying as male and eight (47%) identifying as female. Years of nursing experience varied among participants, with five (29.4%) in the one to two-year range, five (29.4%) in the two to five-year range, six

(35.2%) in the five to ten-year range, and one (5.8%) in the more than ten-year range. A visual representation of all survey data is listed in Appendix I for review.

Change in Wellbeing Over the Study Period

Similarly to Foley and Lanzillotta-Rangeley (2021), the DASS-21 scores were compared using pre- and post-implementation survey data. The final scores for depression, anxiety, and stress were calculated using the DASS-21 questionnaire scoring key by summing the scores of relevant items and multiplying them by two (Lovibond & Lovibond, 1995). The three DASS-21 scales were then categorized into normal, mild, moderate, severe, and extremely severe severity labels for result comparison (Appendix J). An unpaired t-test showed statistically significant reductions in anxiety ($t=3.68$, $p=0.003$) and stress ($t=3.00$, $p=0.001$), with no statistical significance observed in depression ($t=0.61$, $p=0.55$).

In the category of anxiety, the DASS-21 pre-intervention survey score of 11 was reduced to a post-implementation score of five, resulting in a 55% reduction and a difference in severity label of moderate to normal. The DASS-21 stress category had a pre-implementation survey score of 19, reduced to 13, a 31% reduction, and a difference in severity label of mild to normal. Although not the focus of the evidence-based project, the DASS-21 depression score was also calculated, reporting normal severity labels pre-(9) and post-implementation (8), with an observed 11% reduction in values.

Participant Feedback Analysis

Likert responses from the post-implementation evaluation survey displayed the strongest agreement with the Headspace application having a user-friendly interface (14/14 [100%] agree or strongly agree) and providing an ease of navigation (14/14 [100%] agree or strongly agree). Feeling as though the Headspace application was an efficient use of time also demonstrated a strong agreement (13/14 [93%] agree or strongly agree), with only one respondent selecting disagree (1/14 [7%]). Dissimilarity was observed in self-reports of consistent application use (11/14 [79%]

agree or strongly agree; 1/14 [7%] neutral; 2/14 [14%] disagree). Although participants largely favored the idea of recommending the Headspace application program to future students (13/14 [93%] agree or strongly agree; 1/14 [7%] disagree), the data reflecting intent toward the continuation of personal use varied widely (7/14 [50%] agree or strongly agree; 4/14[29%] neutral; 3/14 [21%] disagree).

Five participants provided free-text entries for additional analysis in the post-implementation evaluation survey. Suggestions for program optimization included implementation at the beginning of the DNP curricula, consistent application guidance from the faculty, and potential subscription availability through the NAP. One respondent preferred a different mindfulness program over the Headspace application, while another felt Headspace would most benefit students experiencing numerous stress variations. The complete free-text entries are available in table format within Appendix I for review.

Discussion

Key Findings & Interpretations

The evidence-based project examined the effect of Headspace use on SRNA well-being. As discussed in the results portion of the project, all three negative emotional states—anxiety, stress, and depression—were reduced to a severity label of normal after the implementation of application-based mindfulness training. The most statistically significant reduction was observed with anxiety, followed by stress. Although not statistically significant, a reduction in depression scores was also observed.

Many participants claimed frequent use of the mindfulness application throughout the study period and recommended the program to future students. Data results revealed that the Headspace application had a user-friendly interface, was easy to navigate, and was an efficient use of time. Interestingly, data reflecting intent toward continued use of the Headspace program widely varied. Free-text responses provided insight into why some participants lacked the desire to continue using

the application, including limited spare time, preference for a different mindfulness application, and desire for the NAP to offer a Headspace subscription to students. High tuition costs and the inability to work while enrolled may be contributing factors in choosing not to continue using the Headspace application outside of the free 14-day trial period.

Limitations

The evidence-based project had several limitations. Implementation was initiated during one of the busiest semesters of the NAP, potentially leading to a lack of participation. Only 12 post-implementation and 14 post-implementation evaluation surveys were completed, compared to 17 pre-implementation surveys. Participation was voluntary, potentially indicating that project subjects were receptive to mindfulness interventions, conceivably skewing the results. Five subjects reported previous mindfulness experience, one concurrently utilizing a different mindfulness application. Moreover, project participants were aware of the project goals and personally knew the project facilitator, possibly contributing to a Hawthorne effect. Lastly, there was no dedicated control group for comparison.

Future Directions

Although the project provides additional insight into the adoptability of mindfulness training into NAP curricula, the data magnifies how implementation could be improved. A NAP-sponsored subscription offered at the beginning of the program may be considered, which could remove the cost barrier and provide the students with early, more longitudinal exposure to mindfulness training. Additionally, implementing mindfulness training into NAP courses by program faculty may increase SRNA participation by providing structured sessions that weave throughout the program and encourage regular use. Ultimately, adherence to mindfulness training is based on personal need and is the individual's responsibility.

Conclusion

The unique didactic and clinical demands necessary to prepare SRNAs for a high-stress workforce often result in a high incidence of stress and anxiety in this student population. The literature search showed that mindfulness meditation training is a time-conscious option for reducing stress and anxiety and improves performance in graduate student populations. Studies specifically related to mindfulness training in the SRNA population are limited. The project attempted to evaluate the effectiveness of application-based mindfulness training in DNP SRNAs over a 14-day trial period utilizing three to ten-minute sessions daily. Statistically significant reductions were observed in the negative emotional states of anxiety and stress, with a slight, non-statistically significant reduction observed in depression scores. These results suggest that utilizing application-based mindfulness programs such as Headspace could be a helpful tool in improving overall SRNA well-being.

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Appendix A

Literature Synthesis Table

Article 1

APA Citation: Foley, T., & Lanzillotta-Rangeley, J. (2021). Stress reduction through mindfulness meditation in student registered nurse anesthetists. *AANA Journal*, *89*(4), 284–289.								
Conceptual Framework or Model Stress Reduction and Mindfulness Meditation	**Design or Method**	**Sample & Setting**	**Major Variables & Their Definitions, if any**	**Outcome Measurement(s)**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical Worth to Practice**
Theoretical basis for the study: N/A	Evidence-based practice project, Qualitative Study	**Number of Characteristics:** 74 DNP SRNAs **Exclusion Criteria:** N/A **Attrition:** 41. (33 matched pre and postintervention surveys) **Setting:** SRNAs enrolled in a DNP program	**Independent variables: IV1=** Mindfulness Meditation **Dependent variables: DV1=**Depression, **DV2=** Stress, **DV3=**Anxiety	**Scale(s) used: Reliability information (alphas, if any):** Depression Anxiety Stress Scale 21 Item Questionnaire	**Statistical tests, if any/ Qualitative analysis, if any:** P-value Wilcoxon signed rank test (Z)	**Statistical findings, if any: Qualitative findings, if any:** DV1: P <.01; Z=-3.36; 32% reduction DV2: P<.01; Z=-3.45; 32% reduction DV3: P<.01; Z=-3.07; 47% reduction	III	**Strengths:** Directly applicable to PICOT question, effective time-conscious stress reduction strategy **Limitations;** no control group, possible Hawthorne effect **Risk or harm if implemented:** none **Feasibility of use in the project practice area:** Feasible. MM as a coping mechanism was found to be

								effective in the SRNA population.

Annotated Bibliography statement: This qualitative study looked specifically at stress reduction through mindfulness meditation (MM) in Student Registered Nurse Anesthetists (SRNAs). An evidence-based practice project using the MM app Headspace® was developed and implemented to provide SRNAs with a novel stress management mechanism. Preintervention and postintervention surveys were implemented and analyzed. Significant reductions in depression, anxiety, and stress scores were observed among SRNAs postintervention.

Thematic Analysis

Key Themes or FSP-related significance:

1. FSP-related significance is very high as this study directly relates to PICO(T) question.
2. The use of mindfulness meditation as a coping mechanism was found to be effective in this student population.
3. Results were achieved in a short amount of time, demonstrating a time-conscious stress reduction strategy.
4. This study demonstrated the ease of implementation of MM programs into nurse anesthesia curricula.

Article 2

APA Citation: McConville, J., McAleer, R., & Hahne, A. (2017). Mindfulness training for health profession students –the effect of mindfulness training on psychological well-being, learning and clinical performance of health professional students: A systematic review of randomized and non-randomized controlled trials. *Explore: The Journal of Science & Healing*, *13*(1), 26–45. https://doi.org/10.1016/j.explore.2016.10.002

Conceptual Framework or Model	**Design or Method**	**Sample & Setting**	**Major Variables & Their Definitions, if any**	**Outcome Measurement(s)**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical Worth to Practice**
Stress Reduction and Mindfulness Meditation								
Theoretical basis for the study: N/A	Systematic review of RCT's and non-RCT's, Meta-analysis	**Number of Characteristics: Exclusion Criteria: Attrition: Setting:** 19 studies on the effect of MT on mindfulness, anxiety, depression,	**Independent variables: IV1=** Mindfulness Training **Dependent variables: DV1=**Anxiety **DV2=** Stress	**Scale(s) used: Reliability information (alphas, if any):**	**Statistical tests, if any/ Qualitative analysis, if any:** Standardized Mean Difference CI P-value	**Statistical findings, if any: Qualitative findings, if any:** DV1: SMD= -0.44; 95% CI -0.59 to -0.28; p<.01	I	**Strengths:** High LOE, analyzed multiple studies **Limitations:** no studies blinded the participants, not limited to SRNA population

		stress, mood, self-efficacy, and empathy of health professional students.				DV2: SMD=-0.44; 95% CI: -0.57 to -0.31; p< .01		**Risk or harm if implemented:** none **Feasibility of use in the project practice area:** Feasible. Mindfulness training can be adapted/integrated into health professional training programs. Mindfulness-based interventions decrease stress and anxiety and could be applied to the SRNA population
Annotated bibliography statement: This systematic review examined 19 studies to assess the effectiveness of mindfulness training in medical and other health professional student population groups to compare the effectiveness of the different mindfulness-based programs. The Meta-analysis discovered that mindfulness-based interventions decreased stress, anxiety, and depression and improved mindfulness, mood, self-efficacy, and empathy in health profession students. A range of presentation options and mindfulness training program lengths were examined, showing mindfulness training can be relatively easily adapted and integrated into health professional training programs.								
Thematic Analysis **Key Themes or FSP-related significance:** **1.** FSP-related significance is high for this study as mindfulness training programs were implemented in student populations comparable to SRNAs, including medical and nursing students. **2.** Use of mindfulness-based interventions showed decreased stress, anxiety, and depression. **3.** Mindfulness-based stress reduction (MBSR) programs demonstrated a larger effect size than mindfulness meditation alone. **4.** MBSR programs require trained staff, high cost, and large time commitment to implement, whereas mindfulness meditation can be guided by a facilitator, presented online, or completed independently at home. **5.** Mindfulness meditation can easily and cost-effectively be introduced into the higher education context. **6.** Mindfulness training programs demonstrate ease of adaptability to health professional training programs.								

Article 3

APA Citation: Mesisca, J. (2021). Stress, anxiety, and well-being in nurse anesthesia doctoral students. *AANA Journal, 89*(5), 396–402.								
Conceptual Framework or Model Effects of Stress, Anxiety, and well-being	**Design or Method**	**Sample & Setting**	**Major Variables & Their Definitions, if any**	**Outcome Measurement(s)**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical Worth to Practice**
Theoretical basis for the study: N/A	Cross-sectional mixed methods study, Quantitative study	**Number of Characteristics:** 76 DNP SRNAs **Exclusion Criteria:** N/A **Attrition:** 12 (64 survey respondents) **Setting:** enrolled in a doctoral program at a small urban university campus	**Independent variables:** IV1= low well-being **Dependent variables: DV1=**anxiety, **DV2=**perceived stress, **DV3=** academic performance	**Scale(s) used: Reliability information (alphas, if any):** Perceived Stress Scale-10, Penn State Worry Questionnaire, Medical School Well-Being Index	**Statistical tests, if any/ Qualitative analysis, if any:** P-value, Cronbach alpha	**Statistical findings, if any:** DV1: P=.02; CA: >0.70 DV2: P=.001; CA: mean 0.89 DV3: P=.003; CA range: 0.69-0.78 **Qualitative findings, if any:** The study findings suggest that in doctoral nurse anesthesia education there exists low well-being or high levels of distress for SRNAs, as depicted on the MSWBI scores. Additionally, as scores of low well-being on MSWBI increased, participants had	III	**Strengths:** high response rate, population directly relates to PICOT question **Limitations:** small sample size **Risk or harm if implemented:** none **Feasibility of use in the project practice area:** Equipping SRNAs with tools to cope with stress, anxiety, and disturbance of well-being may foster a positive response.

						increasing levels of perceived stress and anxiety, demonstrated with the PSS-10 and PSWQ. Results on the MSWBI demonstrate an interesting inference for the increased risk of negative outcomes.		Results favor the need for stress reduction interventions, use conclusions with caution based on level of evidence.
Annotated Bibliography statement: The focus of this qualitative study was to address the lack of research regarding SRNA's stress, anxiety, and well-being. Questionnaires were utilized to obtain responses from doctoral nurse anesthesia students on their self-perceived stress, anxiety, and distress. Additionally, other questions exposed students' perceptions of performance, experiences, and suggestions for improvement. Results showed that the prevalence of stress, anxiety, and low well-being in a nurse anesthesia doctoral program suggests the need for wellness intervention development and educational changes.								
Thematic Analysis **Key Themes or FSP-related significance:** **1.** FSP-related significance is very high as this study assesses the SRNA doctoral population as it relates to stress, anxiety, and low well-being. **2.** Themes include negative personal and emotional impacts such as new onset anxiety and constant overwhelming stress from doctoral anesthesia education, the impact of doctoral nursing courses on educational programs needing changes, and a perceived divide between students and clinical preceptors in understanding or supporting their DNP education. **3.** The prevalence of stress, anxiety, and low well-being in a nurse anesthesia doctoral program suggest the need for wellness intervention development and educational changes.								

Article 4

APA Citation: van der Riet, P., Levett-Jones, T., & Aquino-Russell, C. (2018). The effectiveness of mindfulness meditation for nurses and nursing students: An integrated literature review. *Nurse Education Today*, *65*, 201–211. https://doi.org/10.1016/j.nedt.2018.03.018								
Conceptual Framework or Model	**Design or Method**	**Sample & Setting**	**Major Variables & Their**	**Outcome Measurement(s)**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical Worth to Practice**

Mindfulness Meditation effectiveness on prevention of stress, anxiety, and burnout			**Definitions, if any**					
Theoretical basis for the study: N/A	Integrated Literature Review	**Number of Characteristics:** **Exclusion Criteria:** **Attrition:** **Setting:** 16 articles on the effectiveness of MM for nurses and/or nursing students.	**Independent variables:** **IV1=** Mindfulness Meditation **Dependent variables:** Stress Reduction, Depression & Anxiety, Burnout, Sense of Well-being and Empathy	**Scale(s) used:** **Reliability information (alphas, if any):** N/A	**Statistical tests, if any/ Qualitative analysis, if any:** N/A	**Statistical findings, if any:** **Qualitative findings, if any:** Mindfulness Meditation programs have a significant impact on stress, depression, anxiety, burnout, and well-being	V	**Strengths:** analyzed multiple studies, high LOE **Limitations;** small scale localized studies limit generalizability **Risk or harm if implemented:** none **Feasibility of use in the project practice area:** Feasible. MM is an effective strategy for preventing and managing workplace stress and burnout. It has statistical significance and could be applied to the

								SRNA population.

Annotated Bibliography statement: This systematic review critically appraised 16 articles related to the effectiveness of MM programs for nurses and nursing students. The dominant MM modality used was MBSR, with the duration of programs varying from five to 60 minutes per week for 24 weeks. A large number of programs required participants to practice MM independently outside of structured sessions. The results showed MM positively impacts nurses' and nursing students' stress, anxiety, depression, burnout, sense of well-being, and empathy.

Thematic Analysis

Key Themes or FSP-related significance:

1. FSP-related significance is high as this study examined the effects of MM on nurses and nursing students.
2. The dominant MM modality used was Mindfulness-Based Stress Reduction (MSBR), with all but two MM programs conducted face-to-face.
3. Recommendation for MM programs to be introduced early in the nursing curricula.
4. Implementation of MM programs is achievable and worthwhile, even within finite resources.

Article 5

APA Citation: Waechter, R., Stahl, G., Rabie, S., Colak, B., Johnson-Rais, D., Landon, B., Petersen, K., Davari, S., Zaw, T., Mandalaneni, K., & Punch, B. (2021). Mitigating medical student stress and anxiety: Should schools mandate participation in wellness intervention programs? *Medical Teacher*, *43*(8), 945955. https://doi.org/10.1080/0142159X.2021.1902966

Conceptual Framework or Model	**Design or Method**	**Sample & Setting**	**Major Variables & Their Definitions, if any**	**Outcome Measurement(s)**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical Worth to Practice**
Theoretical basis for the study: N/A	Randomized Control Trial	**Number of Characteristics:** 70 medical students participated in 12-week randomized controlled intervention of	**Independent variables: IV1=** Mandatory Wellness Programs **Dependent variables:**	**Scale(s) used: Reliability information (alphas, if any):** Mann-Whitney Test Cohen's d	**Statistical tests, if any/ Qualitative analysis, if any:** U test Cohen's d P-value	**Statistical findings, if any: Qualitative findings, if any:** DV1: U=741; d=.54; p=.02	I	**Strengths:** control group **Limitations:** low response rate, participant attrition **Risk or harm if**

		either yoga, mindfulness, walking, or control group. **Exclusion Criteria:** none documented **Attrition:** High, 107 (6%) of 1077 students participated **Setting:** 1st year medical students in the School of Medicine at St. George's University	**DV1=** anxiety **DV2=** perceived stress			DV2: U=769; d=.63; p=0.01		**implemented:** none Feasibility of use in the project practice area: Feasible. wellness intervention sessions protected medical students from anxiety and stress without negative academic performance. has statistical significance and high LOE, can be applied to PICOT.
Annotated Bibliography statement: This 12-week single randomized control trial examined the effectiveness of assigning medical students to a mandatory twice weekly, one-hour wellness intervention group of either yoga, mindfulness, or walking. They analyzed the adherence to the assigned intervention group and evaluated the psychological and academic outcomes. Students completed standard psychological assessments at baseline and following the intervention. A significant difference was observed in change from pre- to post-intervention on measures of state anxiety and perceived stress, with better outcomes observed in the intervention versus the control group.								
Thematic Analysis **Key Themes of FSP-related significance:** **1.** FSP-related significance is high. Although this RCT is based on the medical student population, many of the stressors associated with academic demands and clinical placements are common among all health professionals. **2.** Students randomized to wellness intervention groups engaged in more minutes of assigned activities than students in the control. **3.** Engagement in wellness intervention is more important than the actual wellness activity type. **4.** Medical educators should consider mandatory preventive MM programs to reduce anxiety and perceived stress among students.								

Article 6

APA Citation: Willgens, A., & Palombaro, K. (2019). A mindfulness workshop for health science graduate students: Preliminary evidence for lasting impact on clinical performance. *Journal of Physical Therapy Education*, *33*(2), 144–151. https://doi.org/10.1097/JTE.0000000000000089								
Conceptual Framework or Model: Pilot a curriculum in mindful practice for graduate health science students under high levels of perceived stress	**Design or Method**	**Sample / Setting**	**Major Variables & Their Definitions, if any**	**Outcome Measurement(s)**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical Worth to Practice**
Theoretical basis for the study: N/A	Qualitative, Mixed Method Pilot Study	**Number of Characteristics**:23 health science graduate students across 4 health professions participated in a 6-week workshop for stress management **Exclusion Criteria:** One student did not submit the practice log Attrition: 2 **Setting:**	**Independent variables:** **IV1=** Mindfulness Workshop **Dependent** variable**s:** levels of worry, perceived stress, feelings of isolation, self-judgement, self-kindness, over identification, and mindfulness	**Scale(s) used: Reliability information (alphas, if any):** The Cognitive Affective Mindful Scale-Revised Perceived Stress Scale Penn State Worry Questionnaire "How I typically act toward myself in difficult times"	**Statistical tests, if any/ Qualitative analysis, if any:** N/A	**Statistical findings, if any:** **Qualitative findings, if any:** Students demonstrated improvements in all measures of stress over the 6-week workshop. Additionally, they reported positive influences on clinical performance in the affective	III	**Strengths:** **Limitations:** small sample size and limited prior research, lack of control group **Risk or harm if implemented:** none **Feasibility of use in the project practice area:** Use conclusions with caution based on level of evidence

						and cognitive domains 9 months later		

Annotated Bibliography statement: This qualitative study aimed to pilot a mindful practice curriculum for graduate health science students to determine the effectiveness of a mindfulness workshop and its potential lasting benefit. Twenty-three graduate students participated in 15-minute mindfulness activities of meditation, mindful movement, and small group discussions daily over six weeks. Participants experienced significant improvements in mindfulness scores and self-compassion and showed improvements in perceived stress and worry. Overall, students demonstrated improvements in all measures of stress over the 6-week workshop and reported positive influences on clinical performance nine months later.

Thematic Analysis

Key Themes of FSP-related significance:

1. FSP-related significance high. Although this study is not specific to SRNAs, it examines health science graduate students who likely encounter similar stressors in their academic and clinical experiences.
2. Graduate students can learn to manage worry, feelings of isolation, and self-judgment using tools and strategies from mindfulness practices.
3. Students who practice mindfulness in a six-week workshop report lasting effects on clinical performance nine months later.
4. Students benefit from peer interaction in a shared space to express their thoughts and feelings as emerging healthcare professionals.
5. Suggestions for integrating mindful practices into graduate health science education are made.

Article 7

APA Citation: da Silva Gherardi-Donato, E. C., Gomes Quinhoneiro, D. C., Hidalgo Gimenez, L. B., Hernandes Siqueira, L., Victoria Diaz-Serrano, K., & Carolina Guidorizzi Zanetti, A. (2020). Mindfulness-based intervention for nursing students: Effects on stress and quality of life. *SMAD Revista Electronica Salud Mental, Alcohol y Drogas*, *16*(3), 1–11. https://doi.org/10.11606/issn.1806-6976.smad.2020.152589

Conceptual Framework or Model Determine the effectiveness of an intervention to reduce stress based on mindfulness.	**Design or Method**	**Sample & Setting**	**Major Variables & Their Definitions, if any**	**Outcome Measurement(s)**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical Worth to Practice**
Theoretical basis for the study:	Pilot and quasi-experimental	**Number of Characteristics:** 10 students 18	**Independent variables:**	**Scale(s) used: Reliability information**	**Statistical tests, if any/**	**Statistical findings, if any:**	II	**Strengths:** Population-specific to

N/A	study, Mixed Methods approach, Quantitative	years or older, current student in undergraduate or graduate nursing course at the **Exclusion Criteria:** those in the acute phase or in treatment for psychiatric disorders, such as mood, thought, personality, or substance use. **Attrition:** 5 **Setting:** University of Sao Paulo – USP Ribeirao Preto Campus, Brazil	**IV1=**Mindfulness Level **Dependent variables:** **DV1**= Full Attention **DV2**= Perceived Stress **DV3**= Quality of Life	**(Alphas, if any):** Mindful Attention Awareness Scale, Perceived Stress Scale, WHOQOL-100 by the Quality of Life Group of the World Health Organization	**Qualitative analysis, if any:** t-test, Wilcoxon's non-parametric test	**Qualitative findings, if any:** **IV1:** p=0.005 **DV1**: p=0.005 **DV2:** p=0.037 **DV3:** p=0.017		undergraduate and graduate nurses **Limitations:** The convenience sample is not a representative sample. Results focus on academic performance with no mention of clinical performance. **Risk or harm if implemented:** None **Feasibility of use in the project practice area**: Feasible as the pre and post-intervention showed a statistically significant difference in graduate students
Annotated Bibliography statement: This pilot and quasi-experimental study aimed to evaluate the effectiveness of an intervention to reduce stress through a mindfulness-based stress reduction and quality of life program in aspects related to the quality of life, mindfulness, and perceived stress in undergraduate and postgraduate nursing students. The intervention included weekly two-hour sessions over eight weeks and aimed at developing skills such as attention regulation, emotional regulation, body conscience, and change in the perspective of the self, based on the MBSR. A statistically significant difference was observed when comparing values of the pre-intervention scores to the post-intervention, indicating the intervention program can be an efficient strategy for the promotion of mental health of undergraduate and graduate nursing students.								

Thematic Analysis
Key Themes of FSP-related significance:

1. FSP-significance is high as this study directly observes graduate nursing students' response to MBSR programs.
2. Results show that an intervention program based on mindfulness aimed at reducing stress and increasing the quality of life efficiently reduced perceived stress, enhanced the quality of life, and increased the full attention level of undergraduate and graduate nursing students.
3. Teaching institutions can consider the results of this study as an indicator of the potential impact mindfulness intervention programs may produce on improving students' academic performance.

Article 8

APA Citation: Stillwell, S. B., Vermeesch, A. L., & Scott, J. G. (2017). Interventions to reduce perceived stress among graduate students: A systematic review with implications for evidence-based practice. *Worldviews on Evidence-Based Nursing*, *14*(6), 507–513. https://doi.org/10.1111/wvn.12250

Conceptual Framework or Model Explore evidence-based self-care interventions that would mitigate perceived stress and support graduate nursing students	**Design or Method**	**Sample & Setting**	**Major Variables & Their Definitions, if any**	**Outcome Measurement(s)**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical Worth to Practice**
Theoretical basis for the study: N/A	Systematic Review	**Number of Characteristics:** 8 inclusion criteria – Self-care as the intervention, participants were graduate students,	**Independent variables:** Perceived Stress **Dependent variables:** Stress management course, mind-	**Scale(s) used: Reliability information (Alphas, if any):** All studies measured the Perceived Stress Scale- a valid and reliable	**Statistical tests, if any/ Qualitative analysis, if any:** N/A	**Statistical findings, if any:** N/A **Qualitative findings, if any:** Self-care interventions in eight	I	**Strengths:** High level of evidence, all participants were graduate health science students **Limitations:** All studies had

		perceived stress as measured by the PSS, quantitative analysis of the outcome, U.S.-based studies, English language, peer-reviewed, and approval from IRB **Exclusion Criteria:** articles not meeting the above inclusion criteria **Attrition:** n/a **Setting:** n/a	body-stress-reduction techniques, yoga, breath work, meditation and mindfulness	instrument in measuring perceived stress. Alphas range from .84 to .86.		studies reduced perceived stress in graduate health science students.		small sample sizes and were conducted in single-site university settings, leaving the potential for bias **Risk or harm if implemented:** none **Feasibility of use in the project practice area:** feasible
Annotated Bibliography statement: A systematic review exploring the evidenced-based self-care interventions that would mitigate perceived stress and support graduate nursing students. Eight articles were included, all of which measured the outcome of stress with the Perceived Stress Scale. Self-care interventions varied from a stress management course to MBSR techniques, such as yoga, breath work, meditation, and mindfulness. Implementation of MBSR sessions ranged in frequency from 15-180 minutes per week for 3-18 weeks. Each study demonstrated a reduction in perceived stress in graduate health science students postintervention.								
Thematic Analysis **Key Themes of FSP-related significance:** **1.** FSP-related significance is high as this systematic review focused on interventions to reduce perceived stress among health science graduate students. **2.** The most effective MSBR interventions include a didactic component, a guided MSBR practice session, and homework. Consideration should be given to a trained MSBR instructor to teach the intervention. **3.** Implementing a self-care MBSR program may be an encouraging practice for students entering health science graduate programs.								

Article 9

APA Citation: Sulosaari, V., Unal, E., & Cinar, F. I. (2022). The effectiveness of mindfulness-based interventions on the psychological well-being of nurses: A systematic review. *Applied Nursing Research*, *64*. https://doi.org/10.1016/j.apnr.2022.151565

Conceptual Framework or Model Identify mindfulness-based interventions and outcome measures and evaluate the effect on the psychological well-being of nurses	**Design or Method**	**Sample & Setting**	**Major Variables & Their Definitions, if any**	**Outcome Measurement(s)**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical Worth to Practice**
Theoretical basis for the study: N/A	Systematic Review	**Number of Characteristics:** RCTs and quasi-experimental studies focused on mindfulness-based interventions **Exclusion Criteria:** studies conducted with nursing students or physicians, descriptive studies, editorials, case reports or reviews, qualitative and pilot studies **Attrition:** N/A	**Independent variables: IV1=** Mindfulness-Based Interventions **Dependent variables:** Stress, Depression, Anxiety, Burnout, Resilience, Quality of Life, self-compassion, happiness, level of mindfulness	**Scale(s) used: Reliability information (alphas, if any):** In total, 30 different measuring tools were used to measure outcomes. The most preferred tool was the Maslach Burnout Inventory, with the Depression, Anxiety, and stress scale following it.	**Statistical tests, if any/ Qualitative analysis, if any:** Joanna Briggs Institute critical appraisal tools were used to assess the quality of the studies	**Statistical findings, if any: Qualitative findings, if any:** A total of 11 RCTs and quasi-experimental studies with a total of 1009 participants were included, with 10 demonstrating the positive impact of a mindfulness-based intervention on nurses' psychological well-being	I	**Strengths:** High LOE, Mindfulness-based programs had an impact on improving primary outcomes in 10 of the 11 studies **Limitations:** Not specific to nurse anesthetists, students were listed as exclusion criteria **Risk or harm if implemented:** none

		Setting: electronic databases						**Feasibility of use in the project practice area:** Feasible. Overall, the results suggest that mindfulness-related trainings, programs, and overall interventions may positively impact nurses' psychological well being
Annotated Bibliography statement: This systematic review looked at 11 RCTs and quasi-experimental studies to identify recently published studies on the effect of mindfulness-related interventions used to increase the psychological well-being of nurses. The outcome measures were stress, depression, anxiety, burnout, resilience, quality of life, self-compassion, happiness, and the level of mindfulness. All but one study demonstrated a positive impact of mindfulness-based interventions on nurses' psychological well-being, with all seven studies measuring stress determining that mindfulness-based programs decrease the stress level of nurses.								
Thematic Analysis **Key Themes of FSP-related significance:** **1.** FSP-related significance is moderate as this review looks at nurses without regard to students or educational training. **2.** Mindfulness-based interventions were found to have positive effects in all studies. **3.** Results suggest mindfulness-related training, programs, and interventions may positively impact nurses' psychological well-being.								

Article 10

APA Citation: Luangapichart, P., Saisavoey, N., & Viravan, N. (2022). Efficacy and feasibility of the minimal therapist-guided four-week online audio-based mindfulness program "mindful senses" for burnout and stress reduction in medical personnel: A randomized controlled trial. *Healthcare (2227-9032)*, *10*(12), 2532. https://doi.org/10.3390/healthcare10122532								
Conceptual Framework or Model	**Design or Method**	**Sample & Setting**	**Major Variables & Their**	**Outcome Measurement(s)**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical**

Online mindfulness program creation for medical personnel with aims to increase effect size and lower dropout rate than previous studies on the topic			**Definitions, if any**					**Worth to Practice**
Theoretical basis for the study: N/A	Randomized Controlled Trial, open-label, parallel-group	**Number of Characteristics:** 90 eligible participants included physicians, dentists, pharmacists, nurses, practical nurses, medical technologists, physical therapists, traditional medical practitioners, or public health professionals ages 18 and over who could use LINE, a mobile phone application **Exclusion Criteria:** practiced	**Independent variables:** Online Audio-Based Mindfulness Program 'Mindful Senses' **Dependent variables:** Burnout, Stress, Anxiety, Depression, Mindfulness, and Quality of Life	**Scale(s) used: Reliability information (alphas, if any):** Copenhagen Burnout Inventory (T-CBI) 3 subscales: personal burnout, work-related burnout, and client-related burnout Cronbach's alpha coefficient for total scale was 0.96, and 0.91, 0.93, and 0.88 for the three subscales. Stress Test Questionnaire (ST-5) Cronbach's alpha: 0.85	**Statistical tests, if any/ Qualitative analysis, if any:** Pearson's chi-square test Fisher's exact test Independent t-test Mann-Whitney U test	**Statistical findings, if any: Qualitative findings, if any:** The Online Audio Based 'Mindful Senses' program for burnout and stress reduction in medical personnel showed it decreased burnout and stress levels with statistical significance and large	I	**Strengths:** No statistically significant differences in baseline characteristics between the groups, high level of evidence **Limitations:** participants and therapists were not blinded for the group assignment, the outcome measures were all self-reports that are at risk of retrospective recall bias. **Risk or harm if**

		mindfulness at least five days per week for more than one year, were receiving psychotherapy, starting treatment for a psychiatric illness during the last three months, started taking new psychotropic medication during the previous three months, or had an existing psychotropic medication dose adjusted during the previous three months. **Attrition:** 4.4% -Four participants dropped out **Setting:** Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand.		HADS- 14-item self-reported questionnaire with 7 items measuring anxiety and 7 measuring depression Cronbach's alpha HADS anxiety: 0.86, Cronbach's alpha HADS depression 0.83 Philadelphia Mindfulness Scale- 20-item self-reported questionnaire with 10 items measuring awareness and 10 measuring acceptance. Cronbach's alpha awareness subscale: 0.87 Cronbach's alpha acceptance subscale: 0.88 World Health Organization quality of life questionnaire with 4 domains: physical, psychological,		effect sizes, and effects remained at one-month follow-up.		**implemented:** none **Feasibility of use in the project practice area:** Feasible. The MS online program largely reduced burnout and stress in medical personnel, with also improvement see in depression, anxiety, mindfulness, and QOL also improved.

				social, and environmental Cronbach's alpha coefficient for the total scale 0.90, and 0.73, 0.81, 0.61, and 0.72 for the 4 domains.				
Annotated Bibliography statement: This randomized control trial aimed to develop an app-based mindfulness program, 'Mindful Senses (MS)' for burnout and stress reduction in medical personnel with a high effect size and low dropout rate. Burnout, stress, anxiety, depression, mindfulness, and quality of life were measured at baseline. Results showed the group who read psychological self-help articles and participated in the app-based MS program had statistically significant improvements in burnout, stress, anxiety, depression, mindfulness, and quality of life compared to the psychological self-help article-only group, with effects remaining in the one-month follow-up.								
Thematic Analysis **Key Themes of FSP-related significance:** **1.** FSP-related significance is moderate as this RCT examines an app-based mindfulness program for medical personnel, not students specifically. **2.** The majority of participants felt the MS program was well-designed, easy to understand, the therapist was skillful and felt as though they could gradually practice mindfulness without feeling uncomfortable. **3.** Due to time constraints, there were obstacles to listening to the MS audio three times per day. **4.** Decreased burnout and stress levels of medical personnel were observed with statistical significance and large effect sizes. **5.** This app-based MS program largely reduced burnout and stress in medical personnel, while improving depression, anxiety, mindfulness, and quality of life.								

Article 11

APA Citation: Carullo, P. C., Ungerman, E. A., Metro, D. G., & Adams, P. S. (2021). The impact of a smartphone meditation application on anesthesia trainee well-being. *Journal of Clinical Anesthesia*, *75*. https://doi.org/10.1016/j.jclinane.2021.110525								
Conceptual Framework or Model	**Design or Method**	**Sample & Setting**	**Major Variables & Their Definitions, if any**	**Outcome Measurement(s)**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical Worth to Practice**
Investigate the use of the smartphone meditation application *Headspace* as								

a well-being improvement tool in anesthesia trainees								
Theoretical basis for the study: N/A	Prospective self-controlled observational study	**Number of Characteristics:** 29 anesthesia residents and fellow trainees at Pittsburgh Medical Center Department of Anesthesiology and Perioperative Medicine **Exclusion Criteria:** none **Attrition:** 25. 54 completed applications with 29 completions **Setting:** Anesthesia training programs in an academic hospital	**Independent variables: IV1=** Headspace meditation smartphone application **Dependent variables:** depression, stress, sleep quality, emotional exhaustion, depersonalization, and personal achievement	**Scale(s) used: Reliability information (alphas, if any):** Maslach Burnout Inventory, Becks Depression Index, Cohens Stress Score, Pittsburgh Sleep Quality Index, *Headspace* Self-Reporting Questionnaire	**Statistical tests, if any/ Qualitative analysis, if any:** Paired Student's t-test Cohen's d Because 6 different well-being outcomes were compared, Bonferroni Correction of the *p*-value (0.05/6) was used, with a *p* of 0.008 as statistically significant. To assess the association between application usage and well-being	**Statistical findings, if any/ Qualitative findings, if any:** Application use was associated with reduced depression scores and increased feelings of personal achievement at both 1 month (p=0.003, p=0.066) and 4 months (p=0.011, p=0.005) of app use.	III	**Strengths:** Applicable to PICOT question, **Limitations:** Potential for Hawthorne effect, related to anesthesia residents and fellows not student registered nurse anesthetists **Risk or harm if implemented:** none **Feasibility of use in the project practice area:** Feasible. This study provides insight into anesthesia trainees' adoptability of a mindfulness application.

					scores the Pearson correlation coefficient was used with a p-value of 0.05 considered statistically significant.			

Annotated Bibliography statement: This observational study investigated the use of the smartphone medication app Headspace® as a well-being improvement tool in anesthesia trainees. A free one-year subscription was given to the anesthesia trainees. Several questionnaires were administered at baseline, one month, and four months to document the assessment of burnout and well-being. Measurements included depression, stress, sleep quality, emotional exhaustion, depersonalization, and personal achievement. Application use was associated with reduced depression scores and increased feelings of personal achievement at one and four months.

Thematic Analysis

Key Themes of FSP-related significance:

1. FSP-related significance is very high as this study directly relates to the PICO(T) question.
2. Mindfulness-based smartphone applications have increased access to high-quality resources for anesthesia trainees to improve their overall wellness.
3. The most commonly used meditation sessions in the Headspace® application were for managing anxiety, stress, sleep, and general well-being.
4. Headspace® could serve as a mindfulness tool for incorporating meditation into the daily practice of anesthesia trainees in an effort to improve overall well-being.

Article 12

APA Citation: Schwind, J. K., McCay, E., Beanlands, H., Schindel Martin, L., Martin, J., & Binder, M. (2017). Mindfulness practice as a teaching-learning strategy in higher education: A qualitative exploratory pilot study. *Nurse Education Today*, *50*, 92–96. https://doi.org/10.1016/j.nedt.2016.12.017

Conceptual Framework or Model	**Design or Method**	**Sample & Setting**	**Major Variables & Their Definitions, if any**	**Outcome Measurement(s)**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical Worth to Practice**
Explore how undergraduate and graduate								

students experience brief instructor-guided mindfulness practice; specifically on their feelings of stress, anxiety, and sense of wellbeing.								
Theoretical basis for the study: N/A	Qualitative exploratory pilot study	**Number of Characteristics:** 52 graduate and undergraduate students in different disciplines **Exclusion Criteria:** none listed **Attrition:** High, 25 percent of students participated (N=13) **Setting:** Within a community services faculty of an urban university	**Independent variables: IV1=** Mindfulness practice **Dependent variables:** stress, anxiety, sense of wellbeing	**Scale(s) used: Reliability information (alphas, if any):** Open-ended prompts and questions	**Statistical tests, if any/ Qualitative analysis, if any:** Responses were considered using qualitative content analysis approach which best aligned with the purpose of the exploratory qualitative pilot study.	**Statistical findings, if any/ Qualitative findings, if any:** Overall, participants found the mindfulness intervention to be a positive experience, helping them mitigate anxiety and stress in school and overall life.	III	**Strengths:** Study findings highlight that brief mindfulness practice benefits students and instructors. **Limitations:** not specific to anesthesia or nursing populations, no statistical analysis **Risk or harm if implemented:** none **Feasibility of use in the project practice area:** Feasible. Introduced the

								idea of offering instructor-guided mindfulness practice in addition to home practice at the beginning and end of class.

Annotated Bibliography statement: This qualitative study explores how undergraduate and graduate students experience brief instructor-guided mindfulness practices toward their feelings of stress, anxiety, and sense of well-being. Fifty-two graduate and undergraduate students participated in five-minute instructor-guided mindfulness practices offered over eight weeks at the beginning and end of class. In addition, students were asked to engage in home practice of five to fifteen-minute mindful breathing exercises four to five times per week. Students reported an increased sense of calm and decreased feelings of anxiety.

Thematic Analysis

Key Themes of FSP-related significance:

1. FSP-related significance is high as it applies mindfulness training to academic program curriculums of graduate students.
2. Offering mindfulness practice at the beginning and end of the class provided ease of accessibility to the students.
3. Course instructors did not receive in-depth training on mindfulness practices yet their instruction to students was sufficient to provoke positive mindfulness improvements.
4. Participating students found the mindfulness intervention to be a positive experience, helping them mitigate anxiety and stress in school and overall life.

Article 13

APA Citation: Orosa-Duarte, Á., Mediavilla, R., Muñoz-Sanjose, A., Palao, Á., Garde, J., López-Herrero, V., Bravo-Ortiz, M.-F., Bayón, C., & Rodríguez-Vega, B. (2021). Mindfulness-based mobile app reduces anxiety and increases self-compassion in healthcare students: A randomised controlled trial. *Medical Teacher*, *43*(6), 686–693. https://doi.org/10.1080/0142159X.2021.1887835

Conceptual Framework or Model	**Design or Method**	**Sample & Setting**	**Major Variables & Their Definitions, if any**	**Outcome Measurement(s)**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical Worth to Practice**
Mindfulness-based mobile app vs. in-person								

training program for reducing anxiety and increasing empathy, self-compassion, and mindfulness in healthcare students								
Theoretical basis for the study: N/A	Single-Blind Randomized Control Trial	**Number of Characteristics:** 84 medicine, psychology, nursing and nutrition students **Exclusion Criteria:** previous training in Mindfulness-Based Stress Reduction Programs or other standardized mindfulness programs **Attrition:** 50% **Setting:** Autonomous University of Madrid	**Independent variables:** **IV1=**Mindfulness based mobile app **IV2=** in-person training program **Dependent variables:** anxiety, empathy, self-compassion, mindfulness	**Scale(s) used: Reliability information (alphas, if any):** State-Trait Anxiety Inventory (STAI-T) Jefferson Scale of Physician Empathy (JSPE) Self Compassion Scale (SCS) Five Facet Mindfulness Questionnaire (FFMQ)	**Statistical tests, if any/ Qualitative analysis, if any:** One-way ANOVA for the STAI-T, FFMQ, SCS. Kruskal-Wallis H test for the JSPE.	**Statistical findings, if any/ Qualitative findings, if any:** The mobile app group showed a large effect size for reductions in trait anxiety compared with controls (g=0.52, p=0.003), and a medium non-significant effect compared with the IMBP group	**I**	**Strengths:** High LOE, most students were in clinical practice at time of study, presence of a control group **Limitations:** High attrition rate, not limited to nursing or anesthesia. **Risk or harm if implemented:** none **Feasibility of use in the project practice area:** Feasible. This study concluded a mobile app

						(g=0.52, p=0.152).		can be effective as an IMBP in reducing anxiety and increasing self-compassion and mindfulness among healthcare students.

Annotated Bibliography statement: This RCT compared the effect of a mindfulness-based mobile application versus an in-person mindfulness-based training program (IMBP) in reducing anxiety and improving empathy, self-compassion, and mindfulness in healthcare students. Measures of anxiety, empathy, self-compassion, and mindfulness were assessed at baseline and eight-week post-intervention. The mobile app group showed a large effect size for reductions in trait anxiety compared with controls, and a medium effect compared with the IMBP group. Both intervention groups experienced a significant increase in self-compassion and mindfulness compared to the control. Empathy remained unchanged in all groups.

Thematic Analysis

Key Themes of FSP-related significance:

1. This study's FSP-related significance is relatively high as mindfulness-based mobile applications are applied and evaluated in healthcare student populations.
2. Most participating students were in clinical practice in health facilities.
3. An app-based program can be as effective as in-person training in reducing anxiety and increasing self-compassion and mindfulness among healthcare student populations.

Article 14

APA Citation: Smith, J. L., Allen, J. W., Haack, C., Wehrmeyer, K., Alden, K., Lund, M. B., & Mascaro, J. S. (2021). The impact of app-delivered mindfulness meditation on functional connectivity and self-reported mindfulness among health profession trainees. *Mindfulness*, *12*(1), 92–106. https://doi.org/10.1007/s12671-020-01502-7

Conceptual Framework or Model	**Design or Method**	**Sample & Setting**	**Major Variables & Their Definitions, if any**	**Outcome Measurement(s)**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical Worth to Practice**
Impact of app-delivered								

mindfulness meditation on resting-state functional MRI connectivity among physician assistant (PA) students and surgery residents								
Theoretical basis for the study: N/A	Longitudinal and randomized wait-list controlled design	**Number of Characteristics:** 25 PA and surgery resident students **Exclusion Criteria:** none **Attrition:** 3 **Setting:** Academic University	**Independent variables: IV1=** app-delivered mindfulness meditation **Dependent variables:** resting state functional MRI connectivity	**Scale(s) used: Reliability information (alphas, if any):** Five Facet Mindfulness Questionnaire (FFMQ)	**Statistical tests, if any/ Qualitative analysis, if any:** An F-statistic was computed for each Region of Interest in the brain from the functional MRI scan. For the difference in FFMQ-describing scores between the baseline and post-program time points, the ΔFFMQ(Des) = FFMQ(Des)post − FFMQ(Des)pre as a surrogate	**Statistical findings, if any/ Qualitative findings, if any:** The right LP network attained significance for the treatment × ΔFFMQ(Des) interaction. The supramarginal vertices of the right LP network attained significance for the treatment ×ΔFFMQ(Des) × practice time interaction. The strength of	III	**Strengths:** Applicable to the PICOT question, effective time-conscious intervention, convenient to use **Limitations:** high-cost potential, small sample size **Risk or harm if implemented:** none **Feasibility of use in the project practice area:** Feasible to implement with the

					variable was computed.	these connections increased proportionally with longer practice times.		exception of the cost associated with MRI scans

Annotated Bibliography statement: This study examined the impact of the use of the app-delivered mindfulness meditation program Happier on resting state functional MRI (fMRI) connectivity among physician assistant (PA) students and surgery residents. fMRI scans were obtained before and after an 8-week meditation period to examine changes within and between-network connectivity across the entire brain and examine whether changes in connectivity were associated with app use or changes in self-reported mindfulness. The meditation practitioners exhibited significantly stronger brain connectivity. Additionally, mindfulness practice time was correlated with increased connectivity between the lateral parietal cortex and the supramarginal gyrus, which positively correlated with increased scores on the "Describing" subscale of the mindfulness questionnaire utilized pre-and post-intervention.

Thematic Analysis

Key Themes of FSP-related significance:

1. FSP-related significance is large as this study examines app-delivered mindfulness meditation app use in PA students and surgery residents, both of which are relatable healthcare professional trainees to SRNAs.
2. Trainees randomized to mindfulness meditation had increased self-reported "Describing" scores, a change that significantly correlated with practice times.
3. The data suggests brief sessions of app-delivered mindfulness practice are associated with functional connectivity changes in the brain.

Article 15

APA Citation: da Silva, C. C. G., Bolognani, C. V., Amorim, F. F., & Imoto, A. M. (2023). Effectiveness of training programs based on mindfulness in reducing psychological distress and promoting well-being in medical students: a systematic review and meta-analysis. *Systematic Reviews*, *12*(1), 1–28. https://doi.org/10.1186/s13643-023-02244-y

Conceptual Framework or Model	**Design or Method**	**Sample & Setting**	**Major Variables & Their Definitions, if any**	**Outcome Measurement(s)**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical Worth to Practice**
Effectiveness of mindfulness-based training program in reducing psychologica								

l distress and promoting the well-being, resiliency, empathy and mindfulness of medical students								
Theoretical basis for the study: N/A	Systematic Review and Meta-analysis	**Number of Characteristics:** In all included articles, there were 694 medical students age 18 and over, with or without diagnosed anxiety and depression, peer-reviewed manuscripts **Exclusion Criteria:** studies without a control or comparison group **Attrition:** N/A **Setting:** Public and private universities	**Independent variables: IV1=** Mindfulness-based training program by Kabat-Zinn **Dependent variables:** Mindfulness, well-being, stress, anxiety, depression, resilience, and empathy	**Scale(s) used: Reliability information (alphas, if any):** To assess mindfulness: The Mindful Attention Awareness Scale (MAAS), Five Facet Mindfulness Questionnaire (FFMQ) To assess stress/psychological distress: The Hopkins Symptom Checklist 90 Revised (SCL-90-R) Perceived Stress Scale (PSS-10) General Health Questionnaire (GHQ) Brief Symptom Inventory (BSI/GSI)	**Statistical tests, if any/ Qualitative analysis, if any:** Considering the outcomes of interest were evaluated with different scales and units, standardized measurements were used to calculate the intervention effect sizes in standardized mean difference (SMD) and 95% confidence	**Statistical findings, if any/ Qualitative findings, if any:** Mindfulness outcome: SMD 0.29, 95% CI: 0.03, p=0.03 to 0.54. Mindfulness training improved students mindfulness Anxiety outcome: SMD -0.17, 95% CI -1.32 to 0.98. Quality of evidence is low. Depression outcome: SMD 0.06, 95% CI -1.04 – 1.16. Quality of evidence is low. Well-being/psychologic	I	**Strengths:** High level of evidence, **Limitations:** population of students observed are not considered a clinical population, sample sizes were volunteers, possibly revealing the students self perceived need to improve their psychological health. **Risk or harm if implemented:** none **Feasibility of use in the**

				Depression, Anxiety, and Stress Scale (DASS) To assess anxiety: SCL-90-R, The State-Trait Anxiety Inventory (STAI-I Form) and DASS To assess depression: SCL-90-R/GSI, and DASS To assess well-being/psychological health: Mental Health Continuum-Short Form (MHC-SF), General Well-Being Schedule (GWBS) and World Health Organization Quality of Life (WHOQOL-BREF) To assess level of empathy: Empathy Construct Rating Scale (ECRS) and Jefferson Scale of Physician Empathy (JSPE) To assess resiliency:	intervals (95% CI). A SMD below 0.4 indicates a small effect; 0.4-0.7 indicates a moderate effect; above 0.7 large effect	al outcome: SMD -0.27, 95% CI: -0.67 to 0.13, p=0.18 Well-being did not improve with mindfulness training Stress outcome: SMD -0.29, 95% CI -0.56 to -0.02, p=0.04 Mindfulness training reduced perception of stress/psychological distress Empathy: SMD -3.50, 95% CI -6.51 to -0.49. Quality of evidence is low. Resiliency: SMD -3.40, 95% CI -9.91 to 3.11. Positive correlation between resiliency outcome and stress and well-being perception outcomes.		**project practice area:** Feasible. The results of the meta-analysis show benefits of offering mindfulness training as a mental health promotion strategy for general university students and those in health-related careers.

				Resilience Scale (RS-14)				

Annotated Bibliography statement: This systematic review and meta-analysis aimed to locate evidence regarding the effectiveness of mindfulness-based training programs in reducing psychological distress and promoting the well-being of medical students. Only studies evaluating mindfulness training based on the original MSBR program by Kabat-Zinn were included. Meditation techniques of seated meditation, body sweeping, yoga movements, and walking meditation were taught at weekly meetings over eight weeks, with mindfulness and home practice exercises included for daily self-use. Primary outcomes were psychological state of mindfulness, well-being, stress, anxiety, and depression. The secondary outcomes were resilience and empathy. The results indicate students who participated in mindfulness training noticed a reduction in stress/psychological distress symptoms, anxiety, and depression, reporting an improvement in well-being/psychological health, mindfulness, resilience, and empathy.

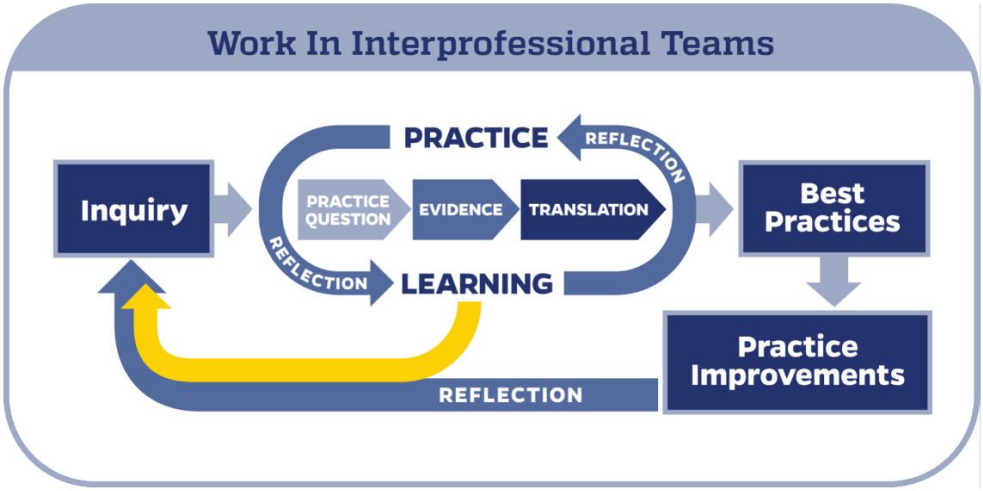
Thematic Analysis

Key Themes of FSP-related significance:

1. FSP-related significance is moderately large for this study as it examines the effectiveness of training programs based on mindfulness in medical students not specific to anesthesia.
2. In all included studies, medical students received mindfulness training based on the original MSBR program by Kabat-Zinn.
3. Different instruments were used as assessment measures through self-report questionnaires in each study to evaluate students' mindfulness, well-being, stress, anxiety, depression, and empathy.
4. Results indicate that students who participate in mindfulness training programs perceived improvements in stress and psychological distress symptoms as well as experienced improved health perception and psychological wellbeing.
5. Implementation of a MBSR program can improve students' well-being and academic performance.

Appendix B

The Johns Hopkins Evidence-Based Practice Model for Nursing and Healthcare Professionals



Appendix C

Pre & Post Implementation Questionnaire for SRNAs

1. Age:
    a. 20-30 years
    b. 30-40 years
    c. 40-50 years
    d. > 50 years

2. What is your gender? (Response optional)
    a.

3. Nursing Experience:
    a. 1-2 years
    b. 2-5 years
    c. 5-10 years
    d. >10 years

4. Do/Did you have previous mindfulness meditation application experience prior to beginning this study?
    a. Yes
    b. No

5. Do you currently use a meditation application?
    a. Yes
    b. No

For the following, please read each statement and circle a number 0, 1, 2, or 3 that indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:
0 Did not apply to me at all
1 Applied to me to some degree, or some of the time
2 Applied to me to a considerable degree, or a good part of the time
3 Applied to me very much, or most of the time

1.	I found it hard to wind down	0	1	2	3
2.	I was aware of dryness of my mouth	0	1	2	3
3.	I couldn't seem to experience any positive feeling at all	0	1	2	3
4.	I experienced breathing difficulty (eg, excessively rapid breathing, Breathlessness in the absence of physical exertion)	0	1	2	3
5.	I found it difficult to work up the initiative to do things	0	1	2	3
6.	I tend to over-react to situations	0	1	2	3
7.	I experienced trembling (eg, in the hands)	0	1	2	3
8.	I felt that I was using a lot of nervous energy	0	1	2	3
9.	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10.	I felt that I had nothing to look forward to	0	1	2	3
11.	I found myself getting agitated	0	1	2	3
12.	I found it difficult to relax	0	1	2	3
13.	I felt down-hearted and blue	0	1	2	3
14.	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15.	I felt I was close to panic	0	1	2	3
16.	I was unable to become enthusiastic about anything	0	1	2	3
17.	I felt I wasn't worth much as a person	0	1	2	3
18.	I felt that I was rather touchy	0	1	2	3
19.	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3
20.	I felt scared without any good reason	0	1	2	3
21.	I felt that life was meaningless	0	1	2	3

Survey adapted from Lovibond & Lovibond, P.F. (1995), *The Depression Anxiety Stress Scale-21 (DASS-21)*

Additional Wellness Resources are available to study participants for support at:
https://www.otterbein.edu/wellness

Appendix D

Post-Implementation Evaluation Survey

	Strongly Disagree = 1	**Disagree = 2**	**Neither Agree nor Disagree = 3**	**Agree = 4**	**Strongly Agree = 5**
The Headspace application had a user-friendly interface					
The Headspace application was easy to navigate					
The Headspace application was an efficient use of time					
I consistently used the Headspace application					
I would recommend this program to future students					
I intend to continue using the Headspace application					

Please leave any additional comments below:

_____
_____
_____
_____
_____

Additional Wellness Resources are available to study participants for support at:
https://www.otterbein.edu/wellness

Appendix E

Informed Consent

The Department of Nursing at Otterbein University supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty.

We are interested in studying the effects of mindfulness practice on stress and anxiety levels in the student registered nurse anesthetist population. You will participate in a 14-day session that will involve filling out some questionnaires, downloading the mobile application Headspace, and participating in 5-10 minutes of daily mindfulness training to reduce stress and anxiety. It is estimated that this will take less than 200 minutes of your time. Although it is not likely, there is a chance that you might feel slightly uncomfortable with some of the questions asked on the surveys. A literature review of the evidence shows mindfulness training can have direct benefits for student users, and we believe the information obtained from this study will be useful in evaluating the effects on the student registered nurse anesthetist population enrolled in doctoral education programs.

Your participation is solicited, although strictly voluntary. We assure you that your name will not be associated in any way with the research findings.

If you would like additional information concerning this study before or after it is complete, please feel free to contact me by phone or email.

Sincerely,

Kerrie Rodgers MSN, CRNA

kerrie.schiefer@otterbein.edu

(419)-561-0985

_____

Signature of subject agreeing to participate.

With my signature, I affirm I am at least 18 years of age*

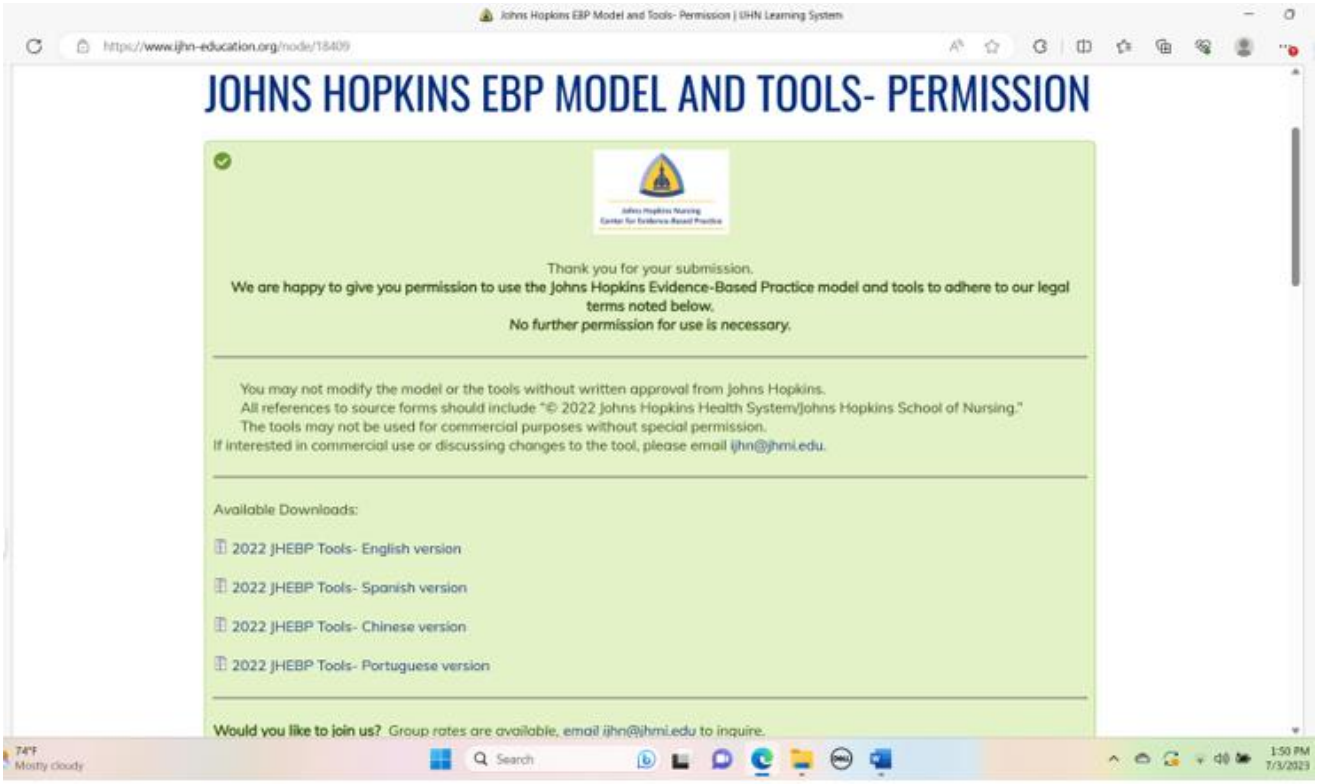
Appendix F

Project Budget

Budget Items	Download Fee	Usage Fee	Hourly Rate	Total Time Commitment	Total Costs
Headspace Application	Free	New Users: FREE Student Rate: $0.84/mo. $9.99/yr.	N/A	N/A	$0.00
Survey Deployment via Blackboard Online Platform	N/A	No Cost	N/A	N/A	$0.00
Data Analysis via Microsoft Excel	N/A	No Cost	N/A	N/A	$0.00
Project Facilitator	N/A	N/A	$101	14 Hours	$1414

Appendix G

Permission to Use the Johns Hopkins Evidence-Based Practice Model & Tools



Screenshot courtesy of the Johns Hopkins Nursing website: https://www.ijhn-education.org/node/18409/done#:~:text=Thank%20you%20for%20your%20submission,written%20approval%20from%20Johns%20Hopkins.

Appendix H

Institutional Review Board Approval Letter

OTTERBEIN UNIVERSITY

INSTITUTIONAL REVIEW BOARD

☒ Original Review
☐ Continuing Review
☐ Amendment

Dear Dr. Batross,

With regard to the employment of human subjects in the proposed research:

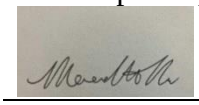
HS # 23/24-04
Batross & Rodgers: Evaluating the Effectiveness of Incorporating the Mindfulness …

THE INSTITUTIONAL REVIEW BOARD HAS TAKEN THE FOLLOWING ACTION:

☒ Approved
☐ Approved with Stipulations*
☐ Limited/Exempt/Expedited Review
☐ Disapproved
☐ Waiver of Written Consent Granted
☐ Deferred

*Once stipulations stated by the IRB have been met by the investigator, then the protocol is APPROVED.

1. As Principal Investigator, you are responsible for ensuring all individuals assisting in the conduct of the study are informed of their obligations for following the IRB-approved protocol.
2. It is the responsibility of the Principal Investigator to retain a copy of each signed consent form for at least four (4) years beyond the termination of the subject's participation in the proposed activity. Should the Principal Investigator leave the university, signed consent forms are to be transferred to the IRB for the required retention period.
3. If this was a limited, exempt, or expedited review, there is no need for continuing review unless the investigator makes changes to the proposed research.
4. If this application was approved via full IRB committee review, the approval period is one (1) year, after which time continuing review will be required.
5. You are reminded you must promptly report any problems to the IRB and no procedural changes may be made without prior review and approval. You are also reminded the identity of the research participants must be kept confidential.

Signed:  Date: 9/21/2023

IRB Chairperson

Appendix I
Data Analysis

Demographic Data

Figure 1: Age at the Start of the Survey Process

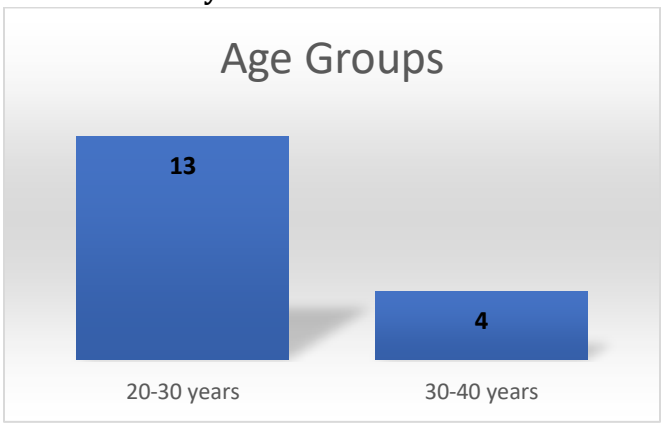


Figure 2: Gender

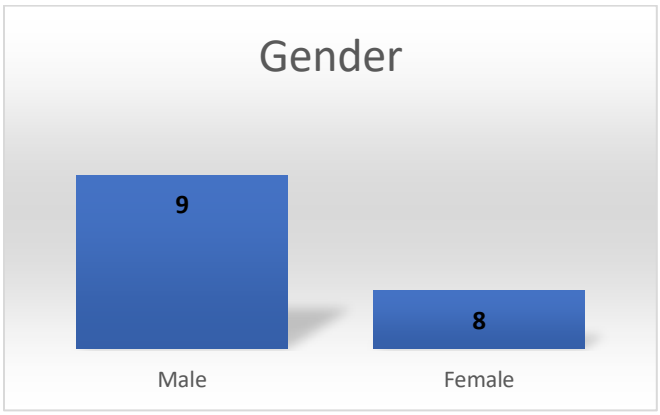


Figure 3: Years of Nursing Experience

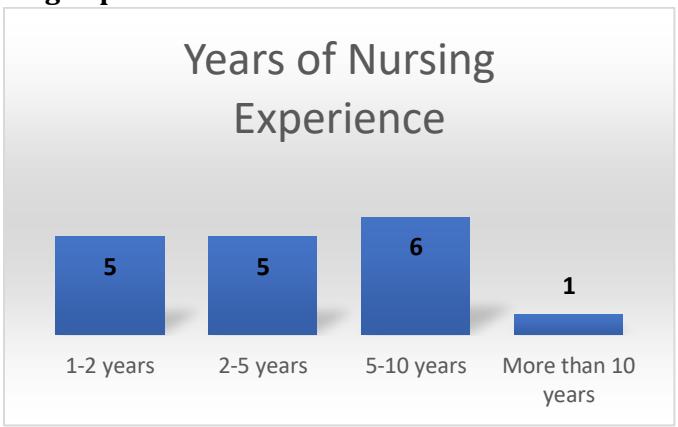


Figure 4: Previous Mindfulness Meditation Application Experience

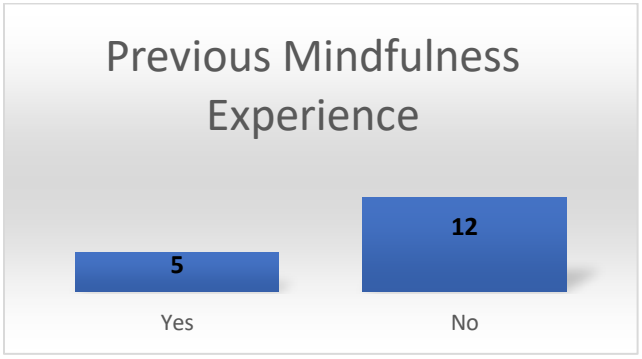
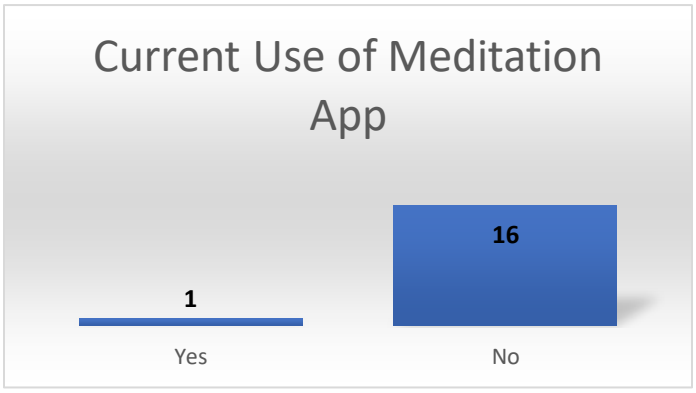
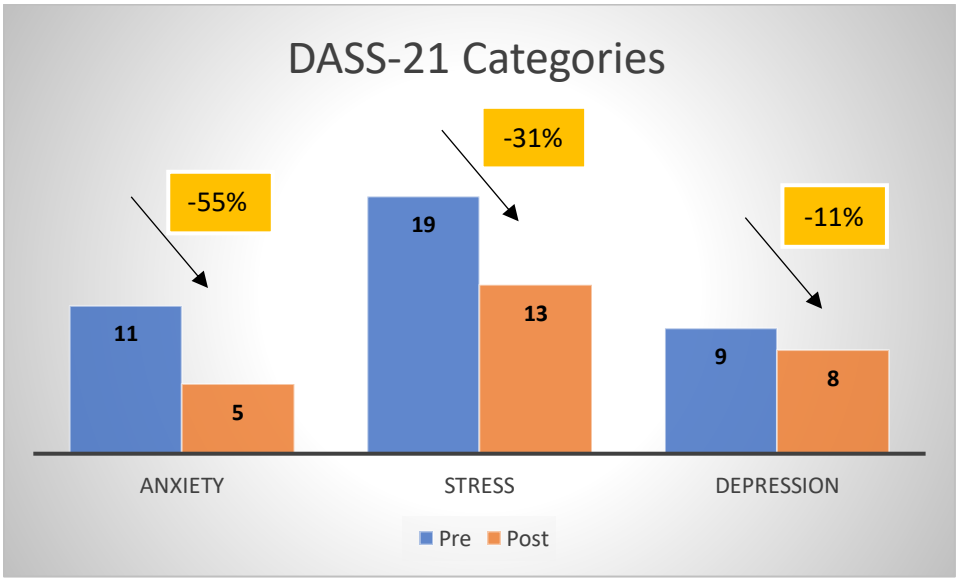


Figure 5: Current Use of a Meditation Application



Pre- and Post-Implementation Data

Figure 6: DASS-21 Category Results



Post-Intervention Evaluation Data

Figure 7: Headspace Application has a User-Friendly Interface

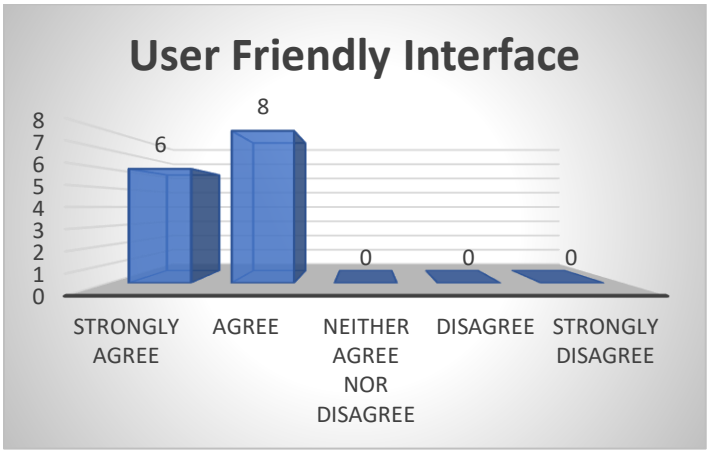


Figure 8: Headspace Application was Easy to Navigate

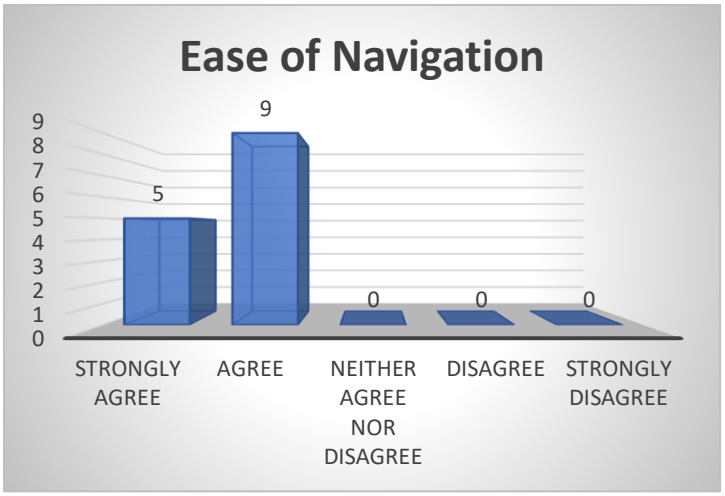


Figure 9: Headspace Application was an Efficient Use of Time

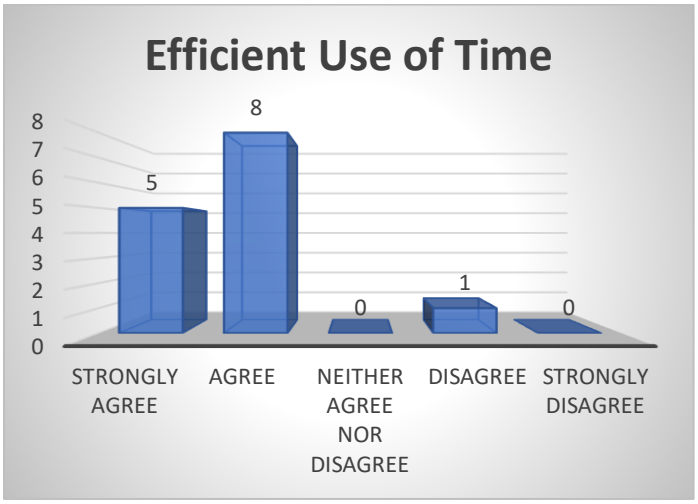


Figure 10: Consistent Use of the Headspace Application

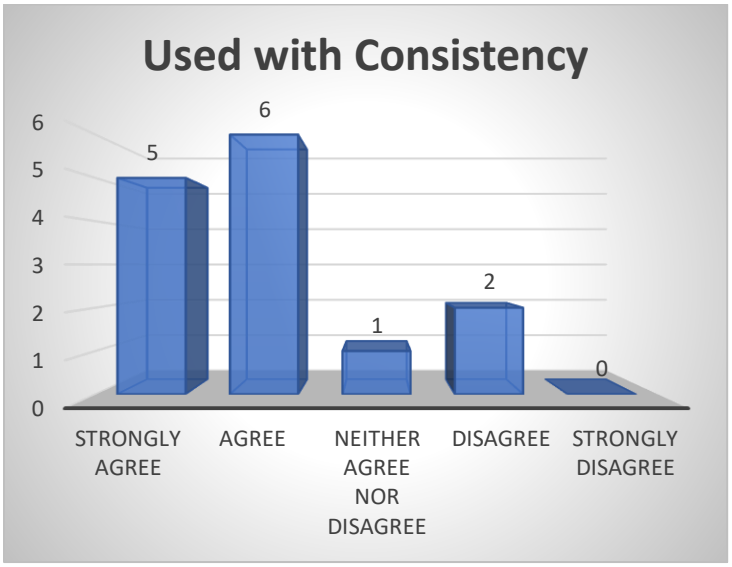


Figure 11: Would Recommend this Mindfulness Application Program to Future Students

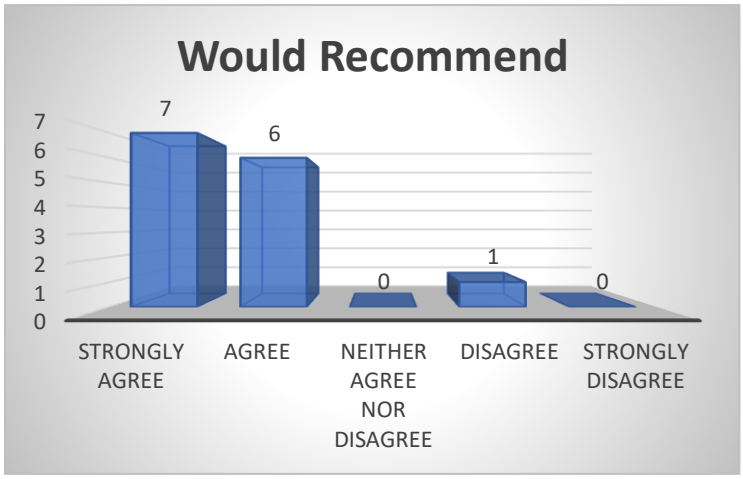


Figure 12: Intention to Continue Using Headspace Application

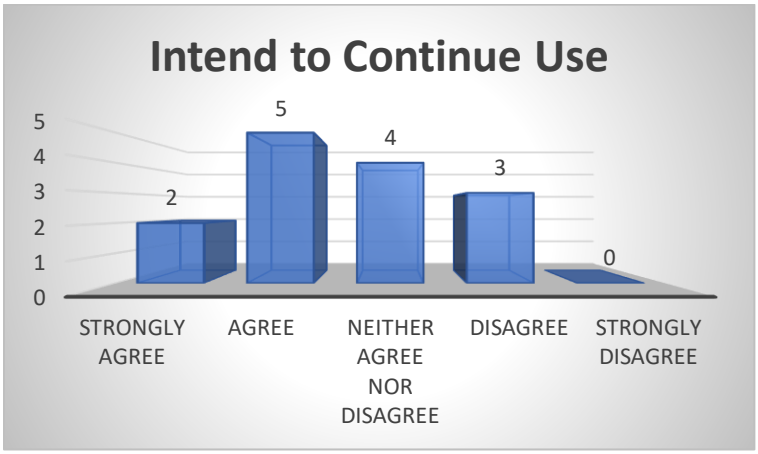


Table 1: Free Text Responses from Participants

Response 1	"Implementing the Headspace app could help students who are just beginning the program. I remember when I first started, I was panicking about how I would balance all of the assignments, studying, and class time. It was a very challenging beginning to the program, and having a resource intended to ease the mind to allow some stress relief could be beneficial. I think constant guidance from the faculty on using the tool will help students tremendously."
Response 2	"I prefer the mindfulness I was using previously better than headspace. I will continue to practice meditation, but using a different application as it is easier to navigate."
Response 3	"I would continue to use if we were able to get a subscription through the program."
Response 4	"Would be a useful outlet for SRNA students who experience numerous variations of stress."
Response 5	"Unfortunately, I did not consistently use the app due to a lack of time. It was not something that I felt I had much time for this semester due the demand from the DNP course and clinicals. I wish I could have had more time."

Table 2: DASS-21 Anxiety Unpaired t-test Results

Group	Anxiety Pre	Anxiety Post	Final Result
Mean	0.8243	0.3700	-
SD	0.3008	0.1257	-
Two-tailed P value	-	-	0.0031=very statistically significant
95% Confidence Interval of this difference	-	-	From 0.1858 to 0.7227
t	-	-	3.6871
df	-	-	12
Standard error of difference	-	-	0.123

Table 3: DASS-21 Stress Unpaired t-test Results

Group	Anxiety Pre	Anxiety Post	Final Result
Mean	1.3957	0.8914	-
SD	0.3958	0.2019	-
Two-tailed P value	-	-	0.0110= statistically significant
95% Confidence Interval of this difference	-	-	From 0.1384 to 0.8702
t	-	-	3.0029
df	-	-	12
Standard error of difference	-	-	0.168

Table 4: DASS-21 Depression Unpaired t-test Results

Group	Anxiety Pre	Anxiety Post	Final Result
Mean	0.6643	0.5457	-
SD	0.4048	0.3152	-
Two-tailed P value	-	-	0.5523= not statistically significant
95% Confidence Interval of this difference	-	-	From -0.3039 to 0.5411
t	-	-	0.6115
df	-	-	12
Standard error of difference	-	-	0.194

Appendix J

DASS-21 Scoring Instructions

Depression, Anxiety, and Stress Scale – 21 Items (DASS-21)

The Depression, Anxiety, and Stress Scale – 21 Items (DASS-21) is a set of three self-report scales designed to measure the emotional states of depression, anxiety, and stress.

The three DASS-21 scales contain 7 items, divided into subscales with similar content. The depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia. The anxiety scale assesses automatic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The stress scale is sensitive to levels of chronic non-specific arousal. It assesses difficulty relaxing, nervous arousal, and being easily upset/agitated, irritable/ over-reactive, and impatient. Scores for depression, anxiety, and stress are calculated by summing the scores for the relevant items.

DASS-21 Scoring Categories:
Depression Questions: 3, 5, 10, 13, 16, 17, 21
Anxiety Questions: 2, 4, 7, 9, 15, 19, 20
Stress Questions: 1, 6, 8, 11, 12, 14, 18

Recommended cut-off scores for conventional severity labels (normal, moderate, severe) are as follows:

Scores on the DASS-21 will need to be multiplied by 2 to calculate the final score.

	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	28+	20+	34+

Survey adapted from Lovibond & Lovibond, P.F. (1995), *The Depression Anxiety Stress Scale-21 (DASS-21)*