PRIOR TO MATRICULATION, STUDENT REGISTERED NURSE ANESTHETIST ANXIETY MITIGATION BY PARTICIPATION IN AN ONBOARDING STUDENT-LED SESSION

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Dedication and Acknowledgments

I would like to dedicate this project to two profoundly important people in my life. First, I would like to dedicate this project to my loving and supportive spouse, Mac Emmons. You consistently are an inspiration and a driving force of encouragement. Without you, it would not have been possible for me to complete this program. I cherish every day I get to spend with you and look forward to many more. Thank you for being so wonderful. Secondly, to my mother, Pam Watkins. You raised me from a child to always do my best and achieve great things. I am the person that I am today because of you and dad. This program was difficult, but with your love and support it was bearable. Thank you for being an amazing mother and mentor in life. I wish dad was here to celebrate my accomplishment as well. I hope that I have made you all proud of the man I have become.

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Abstract

Background: Prolonged stress leads to anxiety and potential motivation but can also lead to physical and mental issues in students. Student Registered Nurse Anesthetists have proven to be a population with increased stress and anxiety because of various factors. Incoming students in an anesthesia program, in particular, have elevated stress and anxiety levels. Mitigation of this stress and anxiety helps with performance, skill acquisition, and learning. **Purpose:** The purpose of this project is to determine the efficacy of an onboarding class on anxiety reduction for incoming SRNAs. This was accomplished via an onboarding class with a peer-led, didactic, and hands-on simulation session. The stress reduction and resulting anxiety reduction should facilitate assimilation and transition into an anesthesia program in these individuals. **Methods:** This project was implemented by evaluating existing student anxiety levels, incoming student anxiety levels, and then providing an onboarding class to the incoming students prior to matriculation. This onboarding session was led by senior nurse anesthesia students. Didactic, hands-on, and in-person question-and-answer sessions were held. **Results:** The results, while not statistically significant, were interesting. The intervention population had a cumulative level of anxiety that was lower than the control population after the intervention. They also stated that they felt the onboarding session was needed and helped mitigate their stress and anxiety. **Recommendations and Conclusion:** It is recommended that incoming nurse anesthesia students have a student lead onboarding session prior to matriculation. Further study should be undertaken on this subject, as more data could prove useful in the mitigation of anxiety in this population. Implementation of student-led onboarding sessions would prove advantageous to nurse anesthesia programs by providing them with experiences and peer contacts that can give them effective tools to navigate a difficult and stressful anesthesia program.

Key Words:

SRNA, Student Registered Nurse Anesthetist, Stress reduction, Stress mitigation, Anxiety reduction, Anxiety Mitigation, student led onboarding class, peer led anxiety reduction.

Background and Significance

New Student Registered Nurse Anesthetists (SRNAs) are at a transition point in their lives and experience increased anxiety. Coming into an anesthesia program requires hard work and dedication. These students have spent the last few years working in an intensive care setting and devoting their lives to being the best nurses possible. They are embarking upon a new chapter in their lives, resulting in increased stress and anxiety.

As new SRNAs, there is a vast amount of unknown information during the transition into an anesthesia program. There are very high expectations and commitments required. There are gaps in the incoming student knowledge about expectations from the educational program and faculty.

Elevated anxiety levels lead to a host of issues with both health and learning. Many of the students develop increased anxiety and lack adequate coping skills. These students are at risk for developing unhealthy behaviors to mitigate their anxiety.

There is little research exploring anticipatory stress and anxiety reduction by providing an onboarding informational and hands-on skills session by peers to incoming SRNAs before starting their first-year classes. This project aims to determine if providing an onboarding didactic and introductory skills class before matriculation will lower the anxiety levels of the incoming SRNA students.

Definition of Terms

For this project, the following definitions apply:

1. *Anxiety* is defined as a normal reaction to stressors that causes emotions characterized by feelings of tension, worry, and physical changes that lead to avoidance and mitigation strategies (American Psychiatric Association, 2021; American Psychological Association, 2022).

2. *Anxiety Trait (A-Trait)* is an innate trait in an individual occurring at differing levels. Once a threshold of stress is achieved, it is the likelihood and prevalence of an anxiety reaction occurring (Spielberger, 1972).

3. *Anxiety State (A-State)* represents an individual's experience of stress or perceived threat precipitating the manifestation of anxiety-related symptoms and reactions (Spielberger, 1972).

Purpose

The purpose of this project is to determine the efficacy of an onboarding class on overall anxiety reduction in incoming SRNAs. This will be accomplished by providing an onboarding class with a peer-led, didactic, and hands-on simulation session. The stress reduction and resulting anxiety reduction should facilitate assimilation and transition into an anesthesia program in the individual.

Review of Current Evidence

Introduction

Numerous studies have shown high stress and anxiety levels in existing SRNAs post matriculation. The studies described in this project addressed current students' adverse effects, mitigation strategies, and coping mechanisms once they have begun their respective programs. There were also many research articles found online as part of the requirements for a university as Master’s or Doctoral (thesis/research) projects and were conducted by graduate students.

Students beginning their first semester as SRNA's are beginning a new phase of their lives. They are transitioning from being experts in critical care nursing to novices in a new field. This regression from being experts to novices induces stress which results in anxiety. They do not have the experience in anesthesia to feel confident in their skills. Anxiety reduction will

evolve as they learn their new professional role and apply newfound knowledge to real-world applications and experiences (Benner, 1982; Kless, 1989; Ward, 2008).

Search Tactics

A literature search began with a Google search of the keywords "Student Registered Nurse Anesthetist," "SRNA," "peer-led," "anxiety," "stress," "anxiety mitigation," "onboarding," "simulation." Further search limits were placed. Only articles written in English, within the last 20 years, full text available, were accepted. This search resulted in 62,800 articles. From the first two pages of results, several articles of relevance were found.

PubMed, ProQuest, and CINAHL databases were accessed through the university library website. The exact keywords were used to search the databases for relevant research and journal articles resulting in many links (too many to sift through in a reasonable amount of time). Many of the articles were not relevant beyond the first few pages. Because of this, only the first few pages of results were utilized for relevant publications.

The search resulted in four relevant articles (less than ten years old) on stress and anxiety in SRNAs specifically. The literature search was then expanded to the last twenty-five years for content substance and relevance. More recent publications were then found via Proquest in doctoral program theses and projects by students.

Inclusion required the literature pertain to anxiety or stress in general nursing, clinical students, or nurse anesthesia students. Studies regarding peer-led sessions and simulation were also included if they addressed stress and anxiety.

Exclusion criteria were for non-medical students, studies unrelated to stress or anxiety, and publications regarding other advanced practice nursing disciplines. Many articles were

excluded because they pertained to physicians outside of the operating room or the practice of anesthesia by already licensed CRNAs.

When utilizing all key terms in the search, , no directly relevant studies were found with regards to this specific topic. All searches produced ancillary studies with parts of the keywords. This lack of current literature represents a gap in knowledge in pre-SRNA anxiety and stress levels and its mitigation.

Stress and Anxiety Relationship

Stress and anxiety are directly related. "The difference between them is that stress is a response to a threat in a situation. Anxiety is a reaction to the stress" (ADAA, n.d.). Spielberger (1972) found that Sigmund Freud's work on anxiety was paramount to our understanding of the phenomenon of anxiety. Sigmund Freud defined anxiety as "something felt" (Spielberger, 1972, p. 5). This feeling is a driving force in many people that can cause problems or effects motivation.

There are positive forms of stress, eustress, and negative forms of stress, distress (Chipas et al., 2012). Eustress motivates and stimulates the individual. Distress hinders and produces untoward side effects. Eustress has been found to increase learning and skills, while distress produces anxiety and reduces success (Chipas et al., 2012; Kless, 1989; Ward, 2008).

Research has shown that higher levels of stress produce higher levels of anxiety. As the anxiety builds, the individual attempts to mitigate it by exercising internal and external coping mechanisms. Some coping mechanisms are effective and positive, while others are negative and have deleterious effects. (Chipas et al., 2012; Hollenbach, 2016; Kless, 1989; Phillips, 2010; Ward, 2008). Mitigating the anxiety does not address the root cause of the anxiety, and it may

persist. If the cause of anxiety remains, so will the anxiety. Reducing stress is the only way to get to the root of the problem and alleviate anxiety (Seymour, 2016; Shearer, 2016; Wunder, 2016).

The effects of anxiety are different in every person and manifest themselves differently based on the individual's coping capabilities. Some individuals can adapt and apply practical coping skills, while some have not learned effective coping mechanisms.

SRNA Stressors Creating Anxiety

In the life of the SRNA, there are two primary sources of stress: the educational program and the person's home life. The programs themselves inherently produce stresses affecting students. Expectations, academic challenges, certifications, and clinical experiences contribute to stress (Phillips, 2010; Chipas et al., 2012; Starcher, 2008). Making mistakes in clinical or simulation settings results in anxiety (Shearer, 2016). Shearer (2016) attributed this increase in anxiety to the peer critique phenomenon. Several studies in her work revealed when peer-based evaluation, performance assessments, and general critiques occur, there tended to be an increase in students' anxiety levels (Shearer 2016).

Shearer (2016) describes several studies identifying lack of knowledge resulting in many nursing students experiencing anxiety. In Shearer's meta-analysis (2016), multiple studies identified a lack of preparation, lack of knowledge, and unknown expectations all produced elevated stress levels in nursing students. Many students have never been in a specific simulation, setting, or event and have a general lack of understanding resulting in higher anxiety levels in an educational setting (Shearer, 2016).

Personal stressors come from internal and external sources separate from educational demands. Financial instability and home life changes can cause added stress and anxiety in adult students. Disruptions in regular routines and social interactions tend to increase stress and

anxiety. Physical health changes, financial strains, interpersonal and social changes are all factors leading to increased anxiety and stress (Phillips, 2010; Chipas et al., 2012; Ward, 2008; Starcher, 2008).

Long Term Effects of Stress and Anxiety

Chipas et al. (2012) and Kless (1989) found that students perform better and retain more knowledge in lower-stress environments. While some stress is conducive for motivation and knowledge retention, high-stress levels provoke fight or flight responses and are detrimental to the execution of physical skills, cognitive performance, and information recall (Chipas et al., 2012; Kless, 1989).

Persistent stress and anxiety create other health issues. Several studies have found that students' overall wellbeing and health declined while attending their anesthesia programs (Kless, 1989; Chipas et al., 2012; Phillips, 2010). Due to manifestations associated with stress and anxiety, SRNAs may develop ineffective coping mechanisms which could be detrimental to their physical and mental health, such as depression, suicidal ideation, the increased use of prescription medications, diet changes (unplanned weight gain or loss), and exercise habit changes (Chipas et al., 2012).

Persistent high-stress levels and anxiety produce high levels of depression among SRNAs (Kless, 1989; Chipas et al., 2012; Phillips, 2010). Depression is a severe manifestation of students' ineffective coping ability, resulting in poor academic performance, social problems, home life issues, or suicide.

Mitigation Strategies

Mentors can guide the mentee through the process of dealing with the stressor, as they have previously experienced similar situations. Peer mentoring and shared experiences are one

way to address the lack of coping skills. People who have gone through similar experiences can understand and relate to those actively going through those experiences. There are lower daily perceived stress levels in mentored students and CRNAs, than those that do not have a mentor (Head, 2015). When mentees feel comfortable confiding in their mentors, mentors provide an outlet for stress and anxiety mitigation for the mentee.

Simulation and hands-on experiences help to reduce stress in SRNAs. Simulation allows an SRNA to practice skills and think critically in a safe, controlled, and efficient environment. It allows them to develop the skills necessary to treat future patients without the stress of real-world consequences. Simulations and training sessions have been proven to reduce anxiety, provide clinical experiences, and increase problem-solving skills to handle challenges in the clinical setting. (Adarvishi, et al., 2015; Seymour, 2016; Starcher, 2008). These experiences have been shown to lower anxiety levels in subjects (Adarvishi, et al., 2015; Seymour, 2016; Starcher, 2008).

Academic communities have a key role in stress mitigation. Question and answer sessions and post-activity/clinical debriefings hosted by faculty can provide avenues of stress relief for students. Faculty in anesthesia programs have a responsibility to teach SRNAs practical coping skills, provide events to reduce stress, and relay stress and anxiety mitigation information early in a student's career (Chipas et al., 2012; Phillips, 2010; Kless 1989). Organization, consistent structure, planning, and informational sessions reduce stress and anxiety in SRNAs.

Many of the studies reviewed utilized only qualitative measures to evaluate SRNA stress and anxiety levels. Because stress and anxiety are perceived and experienced phenomena by individuals, individuals experience them differently. Researchers capture individuals' stress and

anxiety levels by allowing them to express those experiences in their own words. This makes it more difficult to quantify than a Likert scale.

Summary

Stress is the root cause of anxiety. Both stress and anxiety do have some benefits. Eustress is a helpful motivator for keeping students on task and working toward a goal. It is a positive driving force for the completion of a task.

Conversely, stress and anxiety may have a litany of adverse effects. Long term, this may cause numerous health and psychological issues. Stress and anxiety can hinder learning and skills development. Many students in anesthesia programs require medications to treat health complications and many students develop harmful coping mechanisms.

Faculty, peers, and university programs have a duty to assist with the acclimation process of new students. These students are in a new field of study and need help navigating the stress and anxiety they are experiencing.

Gaps in the literature

Currently, there is a lack of anxiety and stress research focused on incoming populations of SRNAs. The Principal Investigator's (PI's) literature review has shown that SRNAs actively attending classes have elevated stress and anxiety levels caused by a multitude of factors. There is no research in the incoming student population prior to matriculation. Stress and anxiety may lead to maladaptive coping mechanisms in the students. Many of these coping mechanisms are ineffective and harmful to the student's overall health and wellbeing. Elevated anxiety has also been shown to reduce knowledge and skill acquisition in students who are already taking classes in an anesthesia program.

Numerous studies have evaluated mitigation strategies to ameliorate anxiety in current SRNAs after matriculation. Education by peer support and faculty, simulation sessions, and informational sessions have been shown to reduce anxiety in students who have already started their programs. The literature review found no studies specifically examining anxiety or stress in SRNAs prior to matriculation; all publications referenced students after they had started their classes and clinicals. The lack of published research in this area indicates a gap in knowledge.

Conceptual/Theoretical Framework

A common theory used in many relevant literature sources was Patricia Benner's "Novice to Expert" theory. Benner surmises that nurses obtain their expertise through education and other experiences gained in life (Benner, 1982). She focuses mainly on the acquisition of knowledge and experiences in new nurses, allowing them to grow from a novice to an expert (Benner, 1982).

Benner based her work on the Dreyfus model, stating: "Briefly, the Dreyfus model posits that, in the acquisition and development of a skill, one passes through five levels of proficiency: novice, advanced beginner, competent, proficient, and expert" (Benner, 1982, p.402). She applied these proficiencies to nurses in their respective specialties. As a newly graduated student starts work in the field of nursing, they are novices. As they hone their skills and become more advanced, they work their way through the proficiency levels to becoming an expert. This occurs in tasks, skills, fundamentals, and communication. Eventually, the nurse becomes an expert in their field of nursing.

In conjunction with Benner's "Novice to Expert" theory, the other framework this research was adapted from was the Trait-State Anxiety Theory created by Spielberger in 1972. Spielberger (1972) concluded that all people had inherent levels of Anxiety traits (A-Trait) and a

resulting Anxiety State (A-State). The theory postulates that in situations appraised by an individual as threatening, an A-State reaction will be provoked. A-State experiences are unpleasant. The intensity of the A-State is directly proportional to the intensity of the perceived threat. The A-State will continue so long as the individual perceives the situation as threatening. High A-Trait individuals perceive failure or threats to self-esteem as more threatening than will persons who are low in A-Trait. Elevations in A-State may be expressed directly through behaviors or coping mechanisms perceived as helpful in the past (Spielberger, 1972).

Students experience stress and then adapt and respond to it in various ways. Every person has an inherent amount of A-Trait. While everyone involved in a stressful situation will experience stress in some form or fashion, they will individually experience different A-State responses to a stressor. The resulting A-State is a direct product of the person's stress level and A-trait characteristics (Spielberger, 1972).

During the literature review, most of the research articles were found to have attempted to understand the causes of the stress and anxiety and ultimately provide some remedies to these issues within nurse anesthesia students. Existing SRNAs exhibited stress responses differently than prior research groups on stress and anxiety in general populations. Their stress and anxiety responses resulted in different coping mechanisms than the controls who were non-SRNAs.

The students we are working with have high stress from transitioning from something familiar to something foreign. A lack of knowledge, experience, and communication coming into a new nursing program induces stress and results in anxiety. Every person has different A-Traits, which cause different A-States. Providing an onboarding class may reduce anxiety levels in pre-SRNA students by providing experiences and information concerning deficient areas of knowledge.

Methodology

Design

This project used a quasi-experimental quantitative design. An electronic (online) survey was administered prior to the onboarding intervention class. A follow-up survey was given by the PI and was administered one month after classes had started. The subjects were selected from a convenience sample of SRNA students attending the nursing anesthesia program at a southeastern US public research university. The use of a quasi-experimental design best fits this study because of the time constraints of this university DNP program, the available convenience sample of subjects, and the scope of this project.

Evidence-Based Practice Framework

The general Evidence-Based Practice (EBP) framework which guided this project was the Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care (2017). This model (see Figure 1) can be depicted as a flow chart allowing the investigator to answer one section and then move to the next indicated area until a sufficient change in practice becomes established.

The basic flow of the Iowa Model (2017) is as follows: A research opportunity was discovered. As part of a Doctorate in Nursing Practice requirements at the university attended, a research project and thesis/dissertation must be conducted. A large amount of anxiety before matriculation was found to have existed through discussions with the current student cohort (class of 2022). This anxiety before matriculation led to describing a purpose and a need for this DNP project. A literature review was conducted to appraise and synthesize a body of evidence regarding anxiety in SRNAs. Then a project was designed around anxiety and onboarding

sessions by peers to mitigate anxiety. This can be better visualized by referencing the attached diagram (Figure 1).

Subjects, Setting, & Recruitment

This study intervention population of 27 students involved the use of first-year SRNAs who are currently enrolled at a nursing college at a southeastern US public teaching university concentrating in Nurse Anesthesia. The intervention subjects were within one month of starting their classes and will graduate from the program in 2024. The control population was 28 students who were in their second semester of the same university's Nurse Anesthesia program, will graduate in 2023, and received no intervention onboarding class.

The students in the study were accepted into the college of nursing and the Nurse Anesthesia program based on admission criteria for the respective program and university requirements. Students reside within driving distance from the university to attend in-person at times.

The intervention students completed the presurvey, the onboarding class, and a follow-up survey (which was the same as the first survey) one month later. These participants were compensated with a $10 gift card after completing the postintervention survey. They were also provided refreshments on the day of the intervention. The control participants completed the same presurvey, recruitment, and consent information as the intervention group, but did not receive compensation.

Subjects were recruited via email addresses obtained from the program director. Students in the Nurse Anesthesia program must have internet access and a device to check their emails regularly. The recruitment email was sent to these students two months before the onboarding class. A reminder email was sent to potential participants about the onboarding class

one month before it was held. A final reminder about the session was sent one week before the event.

The control subjects were recruited via email and in person through voluntary participation. The program director provided a list of students and their emails for the class of 2023. These were students who had already started the program and had begun their second semester of classes. They were asked to complete the same presurvey as the intervention group.

The solicitation email and in-person recruitments provided information about the study and general consent. Once the participants agreed to be in the study, a second email was sent with the survey link at the start of the onboarding class for them to complete. The control group received the same email, in-person informational/consent session, and those agreeing to participate were given the second email with the survey link.

Intervention Method & Procedure

Prior studies have shown effectiveness in reducing stress and anxiety in peer-led simulation and onboarding exercises. By providing a classroom session where the incoming students are provided answers to their questions, an overview of what to expect in the program, and hands-on training with simulation, the goal is to reduce the anxiety levels of these students.

Myself, (referred to as the Principal Investigator [PI]) and a classmate (Co-Investigator) administered the peer-led didactic and simulation session. Both student instructors shared a similar lived experience as the controls and the intervention populations, as they are current Nurse Anesthesia students in the same program and at the same college as the participants in this study. Being actively in the SRNA program allows for insight into the workings of the day-to-day program life and skills required for successful completion in the program.

The intervention started with general introductions, a reiteration of voluntary participation, and a basic overview of the day. The subjects were given time to complete a pretest (a presurvey containing the same questions as the final survey). After a short break, the participants were randomly divided into two groups by having them count off by ones and twos. One group was taken to the simulation lab, and the other remained in the classroom.

The simulation lab group had students who were given hands-on experience with the anesthesia gas machine, preop patient questions, moving the patient to the OR table, and applying monitors. Induction of anesthesia, endotracheal intubation, surgery, and extubating were subsequently simulated. Any general questions were answered.

The remaining participants in the classroom were taught basic airway setup, induction medications, intubation equipment and intubation simulation with a mannequin, medications for induction, basic dosage calculations, and airway and med cart setup. They were provided an opportunity to ask any questions at any time.

The groups were then switched with the same peer educator teaching the same session with the other half of the group of volunteers. Both sets of students received the same information and sessions. Questions were allowed to be asked at any time if the volunteers needed clarification. Upon completing the same peer-led session, both groups were convened again in the classroom.

The two sections were then combined with both session administrators present. Lunch was provided, and any questions were answered. A joint final session was provided where home life/work/school balance was addressed, recommendations for success in the program, exercise/sleep/health, homework, jobs, mentors, stress and anxiety mitigation strategies were addressed. Anxiety reduction, such as meditation and practical coping skills, were addressed. A

third follow-up question and answer session was provided at the end. The volunteers were then informed about the follow-up test, which would occur within one month of classes starting.

A follow-up email was sent to those who participated in the intervention. This email asked if they thought the onboarding class effectively reduced their anxiety and stress levels. They were also asked if an onboarding program should continue in the future. The email was sent two weeks after the close of the post-test.

Financial Resources

Funding for the gift cards to complete the questionnaires, the onboarding intervention day, and the participants' meals were split evenly by the PI and the coinvestigator. All expenses and costs associated with this project were the responsibility of the PI and coinvestigator.

Ethical Considerations and Consent

Institutional Review Board approval was granted by the IRB at the University of North Carolina Greensboro. Privacy was ensured by keeping all data password protected on computers kept in locked offices or rooms. Protections were taken to de-identify individual responses from the questionnaire tools so identification of participants from the data would be minimized. Part of the subject protections provided by Mind Garden Inc. is allowing for data to be de-identified. Deidentified subject data was selected for all tools administered to the volunteers to provide added confidentiality to them and their data. Deidentification ensured answers could not be associated with any individual respondent.

Information and consent forms (see appendix 2) were emailed to all potential participants. They were informed of their minimal risk, voluntary participation, and the opportunity to discontinue participation at any point.

Instrument/measurements

Most of the research questionnaire tools found in the literature review were a modified version of the one developed by Anthony Chipas in 2010. His original study had a Cronbach alpha of 0.8 and good reliability. Other studies used the State Trait Anxiety Index (STAI) to determine the anxiety trait and anxiety state in an individual. The STAI categories contain an alpha of 0.9 or greater, with only one area being 0.86. This alpha level provides good reliability for the tool. Because of this reliability, the PI selected the STAI as the ideal tool for this project.

Mind Garden, Inc. and mindgarden.com host and supply the STAI tool for the anxiety assessment tool. Licensed online questionnaires were obtained from them to administer the assessment. The tool has been used in over 14,000 studies as of 2014. The tool is comprised of a 40 question Likert-style questionnaire. There are 20 questions about anxiety state and 20 questions about anxiety traits. More than 6,800 subjects were used in the precursor tool (Form X) to develop the tool's current version (Form Y).

Permission for the use of the STAI was requested and granted by Mind Garden Inc. (see appendix 3). I have provided a limited version of the tool which Mind Garden Inc. allows to be presented in this research (see appendix 4). Because the tool is proprietary, they provide a limited example of the questions. This is to protect the integrity of the tool for future studies.

The State Trait Anxiety Inventory (STAI) assesses two forms of anxiety. The Anxiety State (AS) and the Anxiety Trait (AT) of an individual. As previously established, the AS is the currently experienced amount of anxiety. This is situational and can change based on settings and perceived threat. AT is the innate amount of anxiety an individual has at baseline. It represents the likelihood of an individual developing AS at differing levels. Persons high in AT

tend to be higher in AS, even in relatively neutral situations (Spielberger 2020). This correlation is indicative of higher overall AS in people with higher AT.

Items on the questionnaire are scored with a range of 20-80 on each of the individual sections. The overall score correlates with a given anxiety level. The higher the overall score a respondent has indicated, the higher the respondent's anxiety level. Standard values (controls) are provided in the STAI Adult Manual. The norms are divided into four subgroups. Working adults and college students are the two areas we focused on. These are further broken down by gender, along with age range group demographics in the STAI.

STAI Reliability and Validity

The STAI tool has good reliability and validity concerning AS and AT identification. The Form Y norms (most current revision) for working adults are based on a total of 1,838 employees of the Federal Aviation Administration. The sample of college students consisted of 855 students. The high school sample consisted of 424 tenth-grade students. The norms for military recruits are based on two samples: 1,701 male Air Force recruits and 263 Navy recruits (Spielberger 2020).

Spielberger obtained Test-Retest coefficients to establish reliability. On form X, The AT for the college students ranged from 0.73 to 0.86, with the median for college and high school students 0.765 and 0.695, respectively (Spielberger, 2020). For the AS scale, the stability coefficients for college and high school students were relatively low, ranging from 0.16 to 0.62, with a median reliability coefficient of only 0.33 (Spielberger 2020). The intervals for these data were 1 hour to 104 days. The STAI manual notes that the AS scale detects transitory data, which would cause the test-retest coefficients to be lower in the anxiety state numbers. Because of this, Cronbach alphas were conducted on the groups within the tool.

The subjects were broken into working adults, college students, high school students, and military recruits. All but one of the AS Cronbach alphas were above 0.90 (the lowest was 0.86 in high school students). The samples had a median coefficient of 0.93. The alpha coefficients for the AT had a median coefficient of 0.90.

To further add to the reliability, item remainder correlations were also computed for the normative samples in the tool. The median AS item-remainder correlation was 0.63 for the working adults, 0.59 for the college students, 0.55 for the high school students, and 0.61 for the military recruits. The corresponding AT item-remainder correlations were 0.56, 0.57, 0.54, and 0.52, respectively (Spielberger 2020).

Data Analysis

The Principal Investigator (PI) performed all statistical analyses utilizing Microsoft Excel and the analysis tool pack. Assistance with statistical computing and analysis was provided by the department statistician within the Department of Nursing. Descriptive statistics were used to describe the sample using means and standard deviation (SD).

An ANOVA (Analysis of Variance) single factor test was done to calculate significance between the preintervention, postintervention, control, and the standardized norms obtained from the STAI tool. Because the ANOVA was significant for two comparisons, the null hypothesis was rejected. This means there is a difference between the control and the pre-intervention and the control and post-interventions.

F-Test 2 sample for variances was done to determine if the two samples from two independent populations have equal variance or not. This was done to determine the type of t-test to be conducted (equal variances if >0.05, or unequal variances <0.05). This testing was conducted for all six pairs: AS control and pretest, AS control and post-intervention, AS pre and

post-intervention, AT control and pretest, AT control and post-intervention, and AT pre-intervention and post-intervention. The P(F<=f) value for one tail was then multiplied by two since I am conducting a two-tailed test. T-test two samples for equal variance and T-tests for unequal variances were utilized on the appropriately corresponding comparison groups based on the F-Test results. T-tests were conducted on the following groups: pre-intervention and post-intervention, control and pre-intervention, control and post-intervention. These T-tests were done to comparatively determine any difference in the participants' anxiety level.

A Bonferroni adjustment was then conducted to counteract issues related to comparing multiple data groups. If the P-value two-tail was found to be greater than 0.016667, then no statistically significant difference was found. If the P-value was less than 0.01667, a significant difference was found.

Results

One of the 28 potential control subjects opted out of the project resulting in 27 control subjects (n=27). 100% of the potential intervention subjects completed the pretest (n=27). Two participants opted not to complete the post-test, and one did not complete the post-test within the timeframe given for data collection resulting in 24 of the 27 (n=24) intervention subjects completing the pre and the post-assessment for anxiety and stress.

The STAI scores (considered to be the baseline averages from the assessment tool) were 35.6 out of 80 for the AS and 34.9 out of 80 for the AT. These numbers (considered the norm) were used as the basis of comparison of the control, pre, and post-intervention groups.

When analyzing the STAI scores of the control data, the average AS (Anxiety State) was 48.7 out of 80, and AT (Anxiety Trait) was 45.3 out of 80 (see Figure 1). Standard deviations

were calculated to determine the group agreement in responses. An agreement (SD) of 0 would indicate complete agreement. The control group SD for the AS was 10.9, and AT was 10.4.

In the preintervention subjects, STAI base scores for the average AS was 37.6 out of 80, and AT was 36.9 out of 80 (see Figure 1). Group SD was AS 7.5 and AT 7.8. A SD of 0 would indicate complete agreement.

In the post-intervention population, subjects' STAI base scores for the average AS was 39.6, and AT was 38 out of 80 (see Figure 1). Group SD was AS 7.1 and AT 5.5. A SD of 0 would indicate complete agreement.

An ANOVA: single factor on the Anxiety Trait and Anxiety State control, pre, and post-data was conducted with an alpha of 0.05, and the Anxiety State P-value was found to be 0.000269547. The Anxiety Trait P-value was found to be 0.007478613. We, therefore, reject the Null Hypothesis for both and find there are statistically significant test results because both categories are smaller than the alpha level 0.05 (see Figure 2).

F-Test Two-Sample for Variances was done on the AS control and pre-intervention data. This was performed to determine the type of t-Test to do. P(F<=f) one-tail result was 0.022113392. This number was multiplied by 2 to account for two tests, resulting in 0.044226785. This represents unequal variances and a t-Test: Two-Sample Assuming Unequal Variances would be indicated because the result was less than a P = 0.05. This test was then run on the data resulting in a P(T<=t) two-tail of 0.000461643.

A Bonferroni adjustment was made to the alpha level of 0.05/3 (0.016667) due to 3 pairs of tests. The two-tail value was compared to the new level of 0.016667. If the P-value two-tail was greater than 0.016667, then no difference was found. If it was less than 0.016667, a significant difference was found. Because the P(T<=t) was less than the Bonferroni adjustment,

there was a significant difference found between the control and the pre-intervention subjects (see Figure 3).

F-Test Two-Sample for Variances was done on the AS control and post data. This was performed to determine the type of t-Test to do. P(F<=f) one-tail result was 0.015022645. This number was multiplied by 2 to account for two tests, resulting in 0.03004529. This number represents unequal variances, and a t-Test: Two-Sample Assuming Unequal Variances would be indicated because the result was found to be less than a P = 0.05. This test was then run on the data resulting in a P(T<=t) two-tail of 0.004136764.

A Bonferroni adjustment was made to the alpha level of 0.05/3 (0.016667) due to 3 pairs of tests. The two-tail value was compared to the new level of 0.016667. If the P-value two-tail was found to be greater than 0.016667, then no difference was found. If it was less than 0.016667, a significant difference was found. Because the P(T<=t) was less than the Bonferroni adjustment, there was a significant difference found between the control and the post-intervention subjects (see Figure 3).

The F-Test Two-Sample for Variances was conducted again on the AS pre-intervention and post-intervention data to determine which t-Test to conduct. The P(F<=f) one-tail was 0.400810909. It was multiplied by two as well to account for two datasets. The result was 0.801621818, indicating equal variances. This represents equal variances and a t-Test: Two-Sample Assuming Equal Variances would be indicated because the result was found to be greater than a P = 0.05. This test was then run on the data resulting in a P(T<=t) two-tail of 0.346538544.

A Bonferroni adjustment was made to the alpha level of 0.05/3 (0.016667) due to 3 pairs of tests. The two-tail value was compared to the new level of 0.016667. If the P-value two-tail

was greater than 0.016667, then no difference was found. If it was less than 0.016667, a significant difference was found. Because the P(T<=t) was greater than the Bonferroni adjustment there was no significant difference found between the pre-intervention and the post-intervention subjects (see Figure 3).

F-Test Two-Sample for Variances was done on the AT control and pre-intervention data. This was performed to determine the type of t-Test needed. P(F<=f) one-tail result was 0.046880528. This number was multiplied by 2 to account for two tests, resulting in 0.093761057. This represents equal variances and a t-Test: Two-Sample Assuming Equal Variances would be indicated because the result was found to be greater than a P = 0.05. This test was then run on the data resulting in a P(T<=t) two-tail of 0.009521278.

A Bonferroni adjustment was made to the alpha level of 0.05/3 (0.016667) due to 3 pairs of tests. The two-tail value was compared to the new level of 0.016667. If the P-value two-tail was greater than 0.016667, then no difference was found. If it was less than 0.016667, a significant difference was found. Because the P(T<=t) was less than the Bonferroni adjustment, there was a significant difference found between the control AT and the pre-intervention AT subjects (see Figure 4).

F-Test Two-Sample for Variances was done on the AT control and post-intervention data. This was performed to determine the type of t-Test needed. P(F<=f) one-tail result was 0.000755509. This number was then multiplied by 2 to account for two tests, resulting in 0.001511019. This represents unequal variances and a t-Test: Two-Sample Assuming Unequal Variances would be indicated because the result was less than a P = 0.05. This test was then run on the data resulting in a P(T<=t) two-tail of 0.017689506.

A Bonferroni adjustment was made to the alpha level of 0.05/3 (0.016667) due to 3 pairs of tests. The two-tail value was compared to the new level of 0.016667. If the P-value two-tail was found to be greater than 0.016667, then no difference was found. If it was less than 0.016667, a significant difference was found. Because the P(T<=t) was greater than the Bonferroni adjustment, there was not a significant difference found between the control and the post-intervention subjects (see Figure 4).

The F-Test Two-Sample for Variances was conducted again on the AT pre-intervention and post-intervention data to determine which t-Test to conduct. The P(F<=f) one-tail was 0.048166162. It was multiplied by 2 as well to account for two datasets. The result was 0.096332323, indicating equal variances. This number represents equal variances, and a t-Test: Two-Sample Assuming Equal Variances would be indicated because the result was found to be greater than a P = 0.05. This test was then run on the data resulting in a P(T<=t) two-tail of 0.586034834.

A Bonferroni adjustment was made to the alpha level of 0.05/3 (0.016667) due to 3 pairs of tests. The two-tail value was compared to the new level of 0.016667. If the P-value two-tail was found to be greater than 0.016667, then no difference was found. If it was less than 0.016667, a significant difference was found. Because the P(T<=t) was greater than the Bonferroni adjustment, there was no significant difference found between the pre-intervention and the post-intervention subjects (see Figure 4).

Several students emailed or called the PI and wanted to thank me for the onboarding program. Because of this, an informal follow-up email was sent to the subjects about the onboarding class to determine if they felt it was effective in reducing their stress and anxiety. They were also asked if they felt it should be implemented in future cohorts. 90% of the students

following up via phone, email, or in-person said it was beneficial to reduce their anxiety and stress. All intervention participants would recommend an onboarding class to future cohorts, and the current program should implement an onboarding class taught by upperclassmen.

Discussion

Data were compared between the students assessed and the STAI standard norms. The STAI standard averages (n=1838) were compared to the control and intervention populations. When looking at Figure 1, a higher mean score of AS and AT in the control, the pre, and post-intervention populations are noted than the STAI aggregated. This indicates a higher AS and AT in both the studied control and intervention populations than average adults. As previously stated in the literature review, SRNA programs are inherently more stressful and anxiety-producing than day-to-day life. This could be attributed to the increase in this population's overall AS and AT levels. According to that STAI, the average population of working adults have a AT level of 34.9 and a AS of 35.6. This population has scores higher than this value indicating elevated anxiety state and traits.

Bonferroni adjustments indicated a significant difference between the AT control and the pre-intervention groups. The AT of the control group was significantly higher than the AT of the intervention subjects. This indicates a significant difference in the AS control and pre and the AS of the control and post-intervention group. The Bonferroni adjustment did not determine a difference in the pre- and post-intervention groups for either the AT or AS.

The literature review has shown anxiety mitigation interventions enacted upon current SRNAs and their response to stress, and the resulting anxiety should be lower. The pre intervention population had lower AT and AS scores than both the control and the post intervention groups. Having a higher AS and AT in the post intervention group than the pre

intervention group indicates that both AS and AT elevated slightly instead of declining over the month after the intervention. The PI would have predicted a decrease in the AS and AT. The opposite happened.

Figure 1 shows that the pre- and post-intervention study subjects reported increased anxiety levels post-intervention, but those levels remained lower than the studied control student population. The results indicated that subjects continue to have high levels of stress and anxiety, but the AS and AT levels are slightly lower than those of students not receiving an onboarding class.

These results could indicate that while the intervention subjects had increased anxiety, it could have been due to other factors not addressed in the onboarding class. The post-intervention subjects had a statistically significant lower anxiety score than the control, indicating that while the pre and post subjects had an increase in anxiety, there may have been a reduction overall in the potential level of anxiety if there was no intervention. If there was no reduction, we should have seen a higher level of AS and AT (closer to that of the control group) in the post-intervention subjects. We did not see this, suggesting less of an anxiety gain over the month than the control anxiety levels.

A change in the stressors and anxiety present before classes may have occurred once classes began. Some pre-intervention stressors may have remained, but new stressors and resulting anxiety may have also developed. New stressors such as the actual classes and new program requirements once these students started classes could potentially account for an elevation in AS and AT in this population. Assessing the anxiety levels earlier in the semester or before classes start may yield better results in determining the efficacy of peer-led onboarding classes for SRNAs.

The overall AT and AS in the intervention group remained lower than the control group. This indicates that the intervention population may have benefited from the onboarding as their levels were lower than the student control. The control group potentially had different stressors at the time due to clinicals obligations and classes. The intervention group had only didactic classwork to manage.

While the data suggests no benefit, 90% of the respondents stated that they felt the onboarding was beneficial to reduce their anxiety and stress. The overall levels of AS and AT remained lower than those who did not receive the peer-led onboarding class. The intervention population also felt that an onboarding class taught by upper-class students should continue in the future cohorts.

Limitations

Due to convenience sampling and time constraints to complete this project, the sample size may be an issue and a source of error. The subjects were all from within driving distance to the school and geographic differences in stressors and anxiety may have been present. There may also be differences in coping abilities and maturity levels between cohorts due to age variations and sociodemographic backgrounds.

The control subjects had already started clinicals, were in different classes, and they were in a different program phase than the intervention volunteers. These factors could account for different stress levels of both the AT and AS of the control population.

Recommendations for Future Study

Further study is needed because we do not know what specific anxiety-inducing stressors are present in incoming SRNAs. This would be a critical area of future study because identifying

the actual anxiety-inducing stressors would help faculty and mentors target them in the onboarding session.

This study hypothesized that by providing incoming SRNA students with mentors, question and answer sessions, and hands-on experiences, their stress and anxiety levels would be lower than those not receiving these experiences during their tenure in an anesthesia program. Further study should be conducted on the anxiety levels of each cohort. A longitudinal study could follow multiple student groups throughout their respective programs to determine anxiety levels and changing stressors throughout an anesthesia program.

Longitudinal increases and decreases in stressors and anxiety could be studied to mitigate future negative impacts in a student's career in an anesthesia educational program. These onboarding and training experiences would provide SRNAs a way to mitigate the anxiety-inducing aspects of starting their first year and better prepare them for success throughout an anesthesia program. Past studies in the literature review have shown promise in this area. Further anxiety testing throughout an SRNA's first year could provide more insight.

The participants stated they believed the onboarding experience was beneficial in anxiety reduction, but the data showed otherwise. There was a disconnect between the intervention population's perceived anxiety levels and their actual levels. Further study to evaluate the disconnect between perceived and actual anxiety levels could be beneficial in reducing anxiety in this population.

Relevance and Recommendations for Practice

Incoming students should be assigned to an upperclassman to help them navigate the unknown aspects of an anesthesia program. Having a mentor and someone to go to for help could encourage positive coping strategies in the incoming students. Peer mentors also provide

an outlet for questions without the intimidation factor of faculty and without the fear of feeling inferior or dumb.

Faculty in anesthesia programs should play an active role in student anxiety mitigation by being involved with SRNA's stress management. They should support SRNAs by providing simulation experiences and giving them as much information and structure as possible. They should provide a coping lecture and a transition to the new world of the SRNA.

By reducing their stress and anxiety, SRNAs will be better able to grow and learn during their studies. They will be better prepared to attain new skills and will be able to retain the knowledge they are acquiring.

Implications and Recommendations

Students entering an anesthesia program are about to become part of a professional cohort shown to have high stress and anxiety levels with adverse outcomes. SRNA students are well studied, and the incoming students are the precursors to this population. Many first-year SRNAs are not equipped with appropriate coping mechanisms prior to matriculation. Incoming students may be ill-equipped to handle the stress and anxiety associated with their first few semesters in anesthesia school. Mitigation of stress and anxiety is paramount to their success. Interventions and mitigation tactics should be incorporated early into their respective educational program to facilitate learning and confidence in the next generation of anesthesia providers.

Conclusion

As SRNAs progress through their education, they modify and add coping mechanisms as their stressors change and evolve. Often, these are detrimental to their physical and mental wellbeing. Chipas et al. (2012) reported many SRNAs also develop increased illnesses,

decreased health, weight fluctuations, and become generally unwell. Many SRNAs develop depression and contemplate suicide (Chipas et al., 2012).

By ensuring students have lower levels of stress, they will also have lower anxiety levels. High levels of anxiety are generally detrimental to students by decreasing productivity and learning (Ward 2008). Lower anxiety levels would contribute to the SRNA's overall positive learning experience.

Simulation provides a lower-stress environment for students to learn valuable hands-on skills (Seymour, 2016). Education and information, coupled with hands-on skills practice in simulation, reduce anxiety while increasing performance and learning. By providing hands-on experience, students will have lower stress and anxiety levels during emergencies and have better preparation during stressful events in class and in clinical.

Upper-level students have gone through many of the same experiences as first-year students. Mentorship by upper-level students reduces stress and anxiety in mentees (Head, 2015). As students progress through anesthesia programs, their stressors change, and coping mechanisms are refined (Phillips, 2010). SRNAs have reduced stress and anxiety when mentoring and educational sessions are provided after classes have begun. The sharing of coping mechanisms by mentors would help the underclassmen by providing them resources, successful adaptations, and coping skills.

Incoming students face many unknowns. Their personal and educational stressors are developing and evolving as they get closer to starting classes. Uncertainty and a lack of knowledge are potential stressors in an individual which result in increased anxiety.

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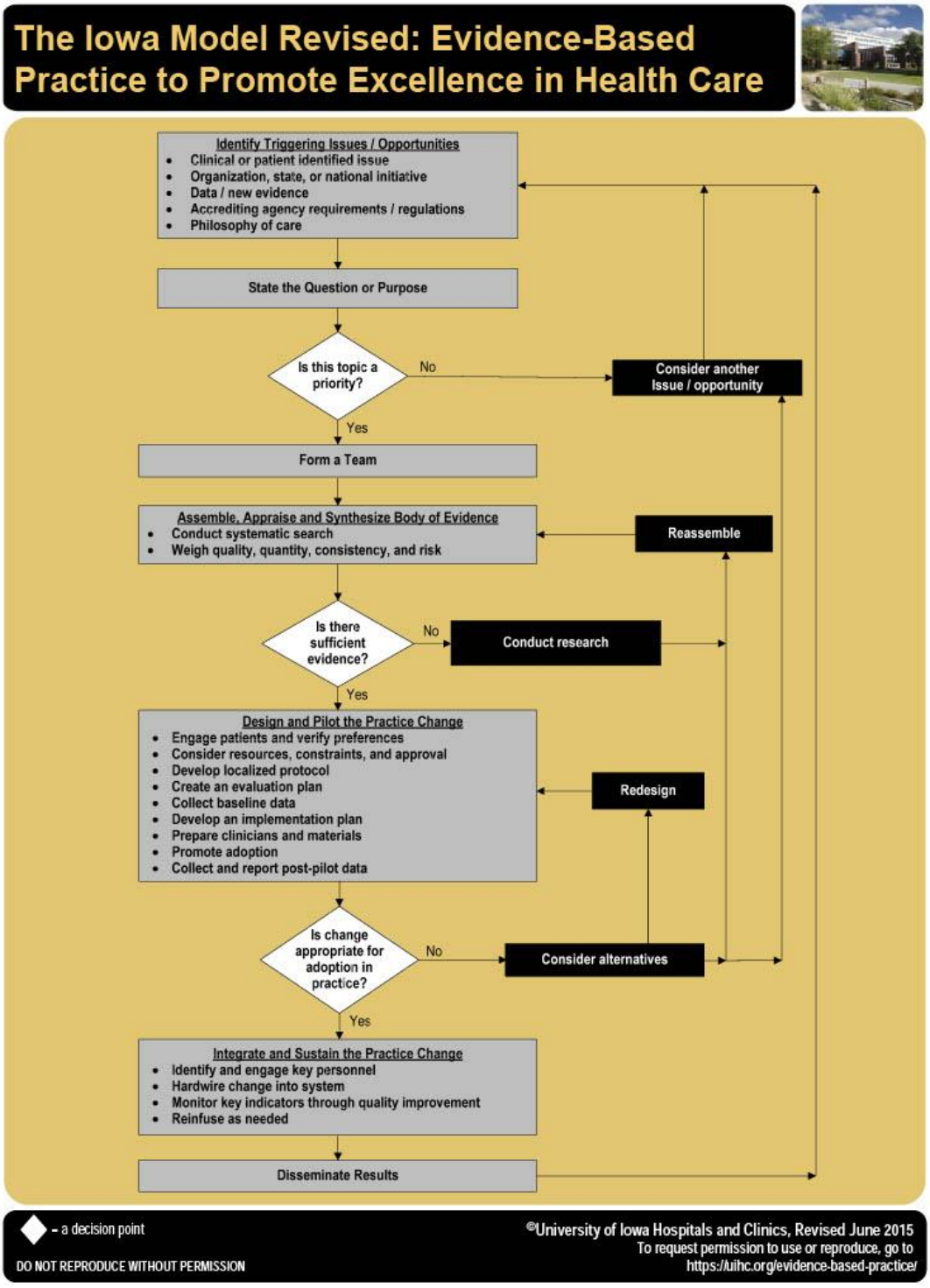
Appendacees and Figures



Appendix 1: Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care (2017).

IRB Information Sheet

Project Title: Prior to Matriculation, Student Registered Nurse Anesthetist Anxiety and Stress Mitigation by Participation in an On-boarding Student Led Session.

Principal Investigator: Jared Watkins
Co-Investigator: Sarah Porter
Faculty Advisor: Dr. Terry Wicks

What is this all about?
We are asking you to participate in this research study because onboarding sessions in other studies have been shown to decrease stress and anxiety. Sessions such as this one have been shown to reduce stress and anxiety in the student registered nurse anesthetist after classes have started. This research project will take approximately 4 hours for the class of 2024 and you will be asked to complete a pre and post survey along with attending an onboarding classroom style session. For the class of 2023, participation will be roughly 40 minutes and will involve you completing 2 surveys. Your participation in this research project is completely voluntary.

Will this negatively affect me?
There are minimal risks to you. These include confidentiality breach and embarrassment. Confidentiality breach is rare due to the use of deidentified data, no names or ID on the questionnaires used, If electronic, if possible, the IP address will be turned off. Embarrassment is rare, and persons will all be new to CRNA skills and equipment, the protocol has been reviewed by the experienced CRNA faculty member, investigators will use a non-judgmental attitude and provide breaks, Q&A time during the sessions, and will not call out any individual for a response to a question. Participants can take a break or stop participating in the study at any time.

What do I get out of this research project?
We do not guarantee any benefits, but there may be a benefit to participants and future classes of SRNAs at UNC-G or other programs. Anxiety and stress levels may be reduced prior to matriculation with regard to future classes. As a participant, you may experience reduced stress and anxiety levels prior to and during your education at UNC-G.

Will I get paid for participating?
The co-investigators will provide lunch for the class of 2023 the day of survey disbursement. Lunch will also be provided for the class of 2024 on onboarding session day. The participants of the class of 2024 will also receive a $10 gift card upon successful completion of the pre-test, the onboarding session, and the post-test. Failure to complete all requirements will result in not receiving the gift card.

What about my confidentiality?
We will do everything possible to make sure that your information is kept confidential. All information obtained in this study is strictly confidential unless disclosure is required by law. We will not disperse any identifying information. All information obtained from the survey will be kept on a password protected computer. Absolute confidentiality of data provided through the Internet cannot be guaranteed due to the limited protections of Internet access. Please be sure to close your browser when finished so no one will be able to see what you have been doing.
Additionally, the privacy/security policy of the Mind Garden, Inc and Survey Monkey hosting the anxiety and stress surveys is available on their websites. To view the current policies and practices of these companies you may go to their websites at:
https://www.surveymonkey.com/mp/legal/privacy/ https://www.surveymonkey.com/mp/legal/security/
https://www.mindgarden.com/content/22-privacy

What if I do not want to be in this research study?
You do not have to be part of this project. This project is voluntary and it is up to you to decide to participate in this research project. If you agree to participate, at any time in this study, you may stop participation without penalty. Study participants who complete the pre-test, the onboarding session, and the posttest receive a $10 gift card upon successful completion. Failure to complete all 3 requirements will result in not receiving the gift card.

What if I have questions?
You can ask Jared Watkins j_watki3@uncg.edu (cell) 404-502-8878, Sarah Porter seporter@uncg.edu (cell) 304-688-5676, or Dr. Terry Wicks tcwicks@uncg.edu (work) (336) 553-5591 anything about the study. If you have concerns about how you have been treated in this study call the Office of Research Integrity Director at 1-855-251-2351.

Appendix 2: IRB informational sheet given to potential subjects

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Appendix 3: Permission from Mind Garden to reproduce their exam

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The above-named person has made a license purchase from Mind Garden, Inc. and has permission to administer the following copyrighted instrument up to that quantity purchased:

State-Trait Anxiety Inventory for Adults

The four sample items only from this instrument as specified below may be included in your thesis or dissertation. Any other use must receive prior written permission from Mind Garden. The entire instrument may not be included or reproduced at any time in any other published material. Please understand that disclosing more than we have authorized will compromise the integrity and value of the test.

Citation of the instrument must include the applicable copyright statement listed below.
Sample Items:

I feel at ease
I feel upset
I lack self-confidence
I am a steady person

Sincerely,

Robert Most
Mind Garden, Inc.
www.mindgarden.com

Appendix 4: Permission to administer the STAI exam

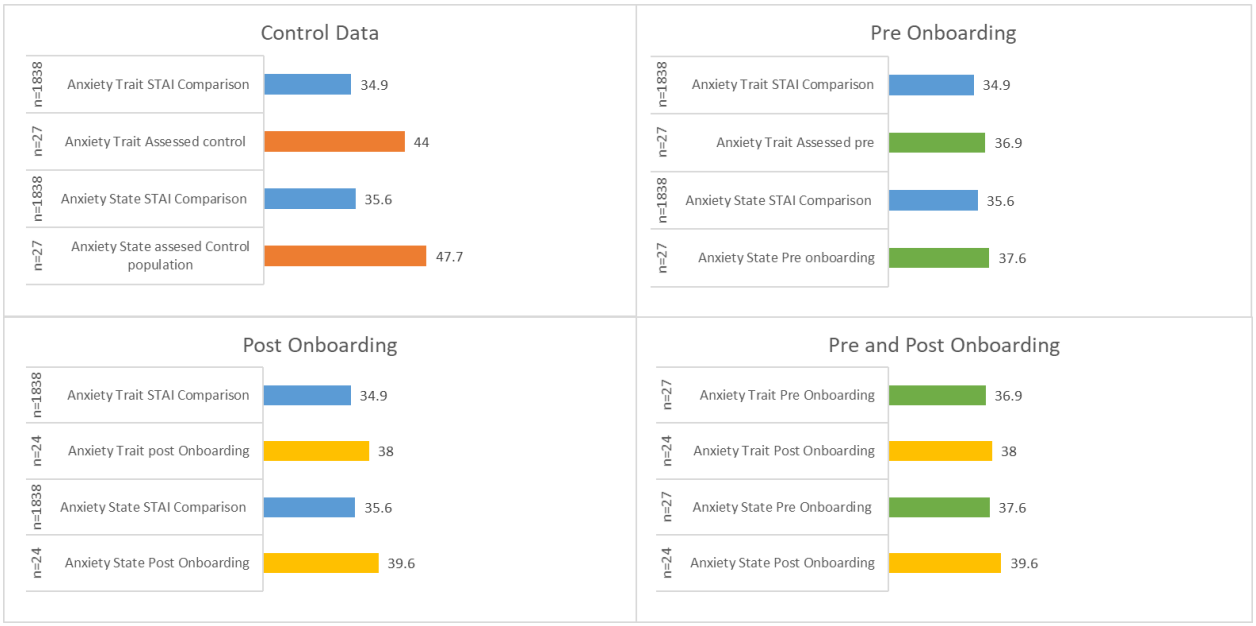

Figure 1: Data results in graphical form

Anova: Single Factor Anxiety State

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control State-Anxiety	27	1287	47.667	131.77
Pre State-Anxiety	27	1016	37.63	58.781
Post State-Anxiety	24	951	39.625	52.853

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1511.8736	2	755.94	9.189	0.00027	3.118642
Within Groups	6169.9213	75	82.266			
Total	7681.7949	77				

Anova: Single Factor Anxiety Trait

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Control Trait-Anxiety	27	1189	44.037	124.58
Pre Trait-Anxiety	27	997	36.926	63.764
Post Trait-Anxiety	24	912	38	31.826

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	784.98	2	392.49	5.2297	0.00748	3.118642
Within Groups	5628.81	75	75.051			
Total	6413.79	77				

Figure 2: ANOVA data for Anxiety State and Anxiety Trait

Anxiety State		
F-Test Two-Sample for Variances control and pre		
	Control	*Pre*
Mean	47.66667	37.62963
Variance	131.7692	58.78063
Observations	27	27
df	26	26
F	2.241712	
P(F<=f) one-tail	0.022113	
F Critical one-tail	1.929213	
0.044226785	unequal variances	

Anxiety State		
F-Test Two-Sample for Variances control and post		
	Control	*Post*
Mean	47.66667	39.625
Variance	131.7692	52.85326
Observations	27	24
df	26	23
F	2.493114	
P(F<=f) one-tail	0.015023	
F Critical one-tail	1.988137	
0.03004529	unequal variances	

Anxiety State		
F-Test Two-Sample for Variances Pre and post		
	Pre	*Post*
Mean	37.62963	39.625
Variance	58.78063	52.85326
Observations	27	24
df	26	23
F	1.112148	
P(F<=f) one-tail	0.400811	
F Critical one-tail	1.988137	
0.801621818	equal variances	

Anxiety State		
t-Test: Two-Sample Assuming Unequal Variances		
	Control	*Pre*
Mean	47.66667	37.62963
Variance	131.7692	58.78063
Observations	27	27
Hypothesized Mean Difference	0	
df	45	
t Stat	3.778184	
P(T<=t) one-tail	0.000231	
t Critical one-tail	2.1954	
P(T<=t) two-tail	0.000462	
t Critical two-tail	2.486781	
0.000461643	< 0.01667	significant difference

Anxiety State		
t-Test: Two-Sample Assuming Unequal Variances		
	Control	*Post*
Mean	47.66667	39.625
Variance	131.7692	52.85326
Observations	27	24
Hypothesized Mean Difference	0	
df	45	
t Stat	3.021697	
P(T<=t) one-tail	0.002068	
t Critical one-tail	2.1954	
P(T<=t) two-tail	0.004137	
t Critical two-tail	2.486781	
0.004136764	<0.01667	significant difference found

Anxiety State		
t-Test: Two-Sample Assuming Equal Variances		
	Pre	*Post*
Mean	37.62963	39.625
Variance	58.78063	52.85326
Observations	27	24
Pooled Variance	55.99839	
Hypothesized Mean Differ	0	
df	49	
t Stat	-0.950469	
P(T<=t) one-tail	0.173269	
t Critical one-tail	2.189741	
P(T<=t) two-tail	0.346539	
t Critical two-tail	2.478945	
0.346538544	>0.01667	no significant difference found

Figure 3: F-Test and t-Tests for Anxiety State

Anxiety Trait		
F-Test Two-Sample for Variances		
	Control	*Pre*
Mean	44.03704	36.92593
Variance	124.5755	63.76353
Observations	27	27
df	26	26
F	1.953711	
P(F<=f) one-tail	0.046881	
F Critical one-tail	1.929213	
0.093761057	equal variances	

Anxiety Trait		
F-Test Two-Sample for Variances		
	Control	*Post*
Mean	44.03704	38
Variance	124.5755	31.82609
Observations	27	24
df	26	23
F	3.914257	
P(F<=f) one-tail	0.000756	
F Critical one-tail	1.988137	
0.001511019	unequal variances	

Anxiety Trait		
F-Test Two-Sample for Variances		
	Pre	*Post*
Mean	36.92593	38
Variance	63.76353	31.82609
Observations	27	24
df	26	23
F	2.003499	
P(F<=f) one-tail	0.048166	
F Critical one-tail	1.988137	
0.096332323	equal variances	

Anxiety Trait		
t-Test: Two-Sample Assuming Equal Variances		
	Control	*Pre*
Mean	44.03704	36.92593
Variance	124.5755	63.76353
Observations	27	27
Pooled Variance	94.16952	
Hypothesized Mean Difference	0	
df	52	
t Stat	2.69246	
P(T<=t) one-tail	0.004761	
t Critical one-tail	2.186088	
P(T<=t) two-tail	0.009521	
t Critical two-tail	2.473889	
0.009521278	<0.01667	significant difference

Anxiety Trait		
t-Test: Two-Sample Assuming Unequal Variances		
	Control	*Post*
Mean	44.03704	38
Variance	124.5755	31.82609
Observations	27	24
Hypothesized Mean Difference	0	
df	39	
t Stat	2.477027	
P(T<=t) one-tail	0.008845	
t Critical one-tail	2.206117	
P(T<=t) two-tail	0.01769	
t Critical two-tail	2.50165	
0.017689506	>0.01667	no significant difference

Anxiety Trait		
t-Test: Two-Sample Assuming Equal Variances		
	Pre	*Post*
Mean	36.92593	38
Variance	63.76353	31.82609
Observations	27	24
Pooled Variance	48.77249	
Hypothesized Mean Difference	0	
df	49	
t Stat	-0.548213	
P(T<=t) one-tail	0.293017	
t Critical one-tail	2.189741	
P(T<=t) two-tail	0.586035	
t Critical two-tail	2.478945	
0.586034834	> 0.01667	no significant difference

Figure 4: F-Test and t-Tests for Anxiety Trait