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DECREASING SIMULATION ANXIETY IN NURSING EDUCATION

A Scholarly Project Submitted to the Graduate School
in Partial Fulfillment of the Requirements
for the Degree of
Doctor of Nursing Practice

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July 2018

DECREASING SIMULATION ANXIETY IN NURSING EDUCATION

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DECREASING SIMULATION ANXIETY IN NURSING EDUCATION

An Abstract of the Scholarly Project by
Kimberly Byler

The purpose of this quantitative research project was to examine the efficacy of pre-simulation progressive muscle relaxation in decreasing the level of anxiety experienced by nursing students during simulation exercises. Simulation is an important teaching strategy in nursing education; it provides an arena in which to practice skills and decision-making without putting real patients in danger of any mistakes. Student anxiety is a challenge of the simulation teaching strategy, because it can make students feel unsuccessful. Decreasing student anxiety will be important as simulation is used more frequently in nursing education. Our study assessed students' anxiety before simulation and the effect of pre-simulation progressive muscle relaxation on student anxiety and outcomes including student skill performance and student satisfaction with simulation. The data showed students who were involved in PMR had significantly lower state and trait anxiety scores than those who did not experience PMR; students who participated in PMR reported being more satisfied with the simulation experience than those who were not subjected to PMR. Most students were satisfied with PMR, but some were not. PMR should be offered as a method for anxiety reduction for simulations in nursing education; however, students should be encouraged to find the anxiety reduction strategy that works for them, and more research is needed on this topic. Future research should examine the effects of PMR and anxiety on skill performance and possible factors that influence student satisfaction with PMR and other anxiety reduction methods. Further research

should include qualitative methods in order to explore student attitudes about PMR and its use in managing simulation related anxiety.

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Chapter I

Introduction

Simulation is an increasingly popular teaching strategy in nursing education, because it provides a safe place for students to practice skills and critical thinking. Unlike traditional clinical experiences, no real patients are used in the teaching scenario. This allows for trial and error and practice without risk of doing harm to actual patients. As a teaching strategy, simulation can create feelings of anxiety in nursing students. Recent literature describes strategies nurse educators can implement to reduce this anxiety and promote learner outcomes.

Description of the Problem

The nursing profession continues to require more and more competencies and skills of nurses, as the healthcare system grows more complex and patients enter it with more complex health issues. The ability of simulation to teach the practical application of nursing theory and the limited availability of clinical sites will promote further use of this strategy in the future (NLN, 2015). Recent research indicates new nursing graduates are not prepared to manage complex patients (Kavanagh & Szweda, 2017). While clinical hours are required to complete programs of nursing, complex cases cannot be guaranteed during these hours. High-fidelity simulation learning activities can guarantee student exposure to certain high-risk clinical situations such as mock code blue through simulated

clinical experiences, thereby increasing their competence in these clinical situations upon graduation. This can be accomplished in a controlled environment where certain psychomotor and critical thinking skills can be honed and assessed according to learning objectives of each specific course.

As a teaching strategy, simulation promotes a culture of safety in nursing education and provides clinical safety for student experimentations with clinical skills (Badowski & Oosterhouse, 2017). The National League for Nursing (NLN) supports the use of simulation in nursing education and recommends simulation as an evidence-based tool to teach clinical skills with the ability to encourage critical thinking abilities and clinical skills akin to that of actual clinical experiences. Factors cited by the NLN promoting the use of simulation in nursing education include the increasing complexity of the healthcare system, the need for interprofessional collaboration, and the increasing difficulty of securing clinical sites and preceptors for students (NLN, 2015). Research has also shown that simulation is an effective tool to teach cognitive reasoning tasks such as critical thinking, nursing judgment, problem solving skills, and psychomotor skill development. There is also potential for the strategy to offer promotion of effective interprofessional communication. As an effective teaching strategy to provide nursing competence in critical scenarios, simulation can ultimately increase patient safety (Lee & Oh, 2015).

The World Health Organization (WHO, 2009) also supports the use of simulation as an innovative, active learning teaching strategy in schools of nursing. Active learning strategies allow knowledge attainment and skill acquisition. Clinical skills for nursing students and new graduate nurses can be better guaranteed through structured simulation

clinical education than in traditional clinical experiences. This recommendation is detailed in their gold standards for professional nursing education, which are essential elements for excellent nursing programs.

According to the National Council of State Boards of Nursing (NCSBN, 2015), studies have shown that if up to 50% of clinical time is replaced with simulation exercises, NCLEX-RN pass rates do not decrease. This finding could support the continued and increased use of simulation in nursing education. A randomized-controlled trial conducted by the NCSBN showed that replacing up to 50% of clinical hours with simulation provides the same learning outcomes and clinical competence as a program designed with 100% traditional clinical hours (Hayden, Smiley, Alexander, Kardon-Edgren, & Jeffries, 2014).

Students experience a significant level of anxiety related to simulation activities (Beischel, 2013). They feel critiqued or judged, and this leads to stress and anxiety that can result in a hindered ability to learn or effectively practice skills. This anxiety can be a barrier to learning and can decrease the effectiveness of the teaching strategy (Holland, Gosselin, & Mulcahy, 2017). Simulation causes an anxiety response for students, and students tend to view this as detrimental to their performance.

Students experience anxiety because of factors such as:

- Fearing the unknown.
- Fearing judgment from faculty and fellow students.
- Fearing making mistakes.
- Feeling unprepared.

Much of this anxiety has been found to stem from feelings of unpreparedness. Research is needed to test interventions to diminish feelings of anxiety related to simulation activities. In order to promote best learning outcomes, research is needed to discover effective ways to reduce student anxiety related to simulation learning and provide guidelines for best practices in preparing students for simulations (Shearer, 2016).

There is a need to manage the anxiety experienced by nursing students during simulation activities in order to promote the effectiveness of the increasingly popular teaching strategy. While many studies identify anxiety as a problem with utilization of simulation as a teaching strategy in nursing education, the successful management of this anxiety is not well described in the current literature. There are studies declaring successes of specific interventions for decreasing anxiety related to simulations, but these studies identify the need for additional studies to increase understanding of how to decrease stress in simulation.

Problem statement.

Simulation is a popular teaching strategy in nursing education; nursing students experience anxiety during simulation learning activities, and this anxiety can decrease the learning potential of the student during simulations.

Significance to Nursing Education

Nursing is one of the most trusted professions. In order to maintain this honor, nursing education must continue to produce competent new nurses to meet the growing demands of today's complex patients (ANA, 2017). Challenges such as limited clinical site availability will likely lead to increased use of simulation learning activities. In order

to promote learning in this setting, anxiety must be anticipated and managed effectively to allow for an environment that fosters learning and skill acquisition.

Simulation is not a new teaching strategy. It has been used as a military training tool for centuries. It has also been used successfully in the field of aviation for decades to promote competence in emergency situations (Aebersold, 2016). Like aviation, nursing is concerned with safety. As in aviation, simulation can be used in nursing to train for emergency scenarios and increase competence in rare and dangerous situations. As continued research supports simulation as a teaching strategy capable of promoting nurse competence and patient safety, its use will likely continue to grow in nursing education. Simulation as a teaching strategy is valuable in the field of nursing education and in the orientation of new-registered nurses.

In order to provide a positive learning experience for nursing students, interventions should be included to diminish the anxiety experienced by students during simulation activities. Doing so will maximize the effectiveness of the tool and subsequently maximize the preparedness of the nurses to provide safe patient care (Holland, Gosselin, & Mulcahy, 2017).

Significance to Nursing

A study by Kavanagh & Szweda (2017) assessed new graduate nurse competency. Their design included post-hire and pre-start performance assessments of over 5,000 recently graduated nurses at a large medical center over a span of 5 years. Their data provided shocking information: a mere 23% of new nurses were capable of functioning at a minimal entry-level competency and appropriate practice preparedness. Reasons they identified for this finding included:

- Increased acuity and complexity of hospitalized patients.
- Decreased length of patient stay in the hospital.
- Inability of nursing programs to provide deep or meaningful clinical learning with the current curricular standards.

One of their key recommendations resulting from this study was to redesign nursing's curricula to include simulated clinical experiences to provide the deep learning needed to ensure practice readiness and entry-level competency. The authors suggested making clinical scenarios part of formative and summative evaluation of nursing programs.

New graduate nurses must be prepared to deal with an increased acuity of patients, a complex and rapidly changing healthcare system, and a nursing shortage. According to a review by Theisen & Sandau (2013), new nurses struggle in the areas of communication, leadership ability, organizational skills, critical thinking and prioritizing, specific clinical scenarios, and coping mechanisms. The review described strategies for nurse educators to utilize to correct these deficiencies: schools of nursing should provide specific clinical scenarios with a focus on communication and critical thinking mastery through the controlled environment of high-fidelity patient simulation. The review also identified the need for further studies to identify ways students can effectively cope with stress and anxiety through completion of their education and their entry into clinical practice.

Purpose

The purpose of this study was to evaluate the effectiveness of leading students in a progressive muscle relaxation (PMR) exercise before a simulation activity in order to decrease student anxiety and promote student outcomes.

Theoretical Framework

The National League for Nursing (NLN)/Jeffries Framework is useful for creation of simulation activities and guides research on the topic of simulation in nursing education (Jeffries & Rogers, 2007). There are five concepts of the framework: teacher, student, educational practices, simulation design characteristics, and outcomes. Teacher demographics and experience can influence learning outcomes according to the model. Educational practices such as use of evidence based activities and interventions also affect student outcomes. One of the simulation design characteristics- student support- correlates with the goals of this project. The ultimate goal of this project was to promote best outcomes for students who experience simulation activities. The concept of outcomes in the framework includes: knowledge acquisition, skill performance, critical thinking, student satisfaction, and learner confidence. These outcomes guided this project's aim of assessing whether or not PMR can improve learner outcomes related to simulation assignments. The model encourages the opportunity for students to provide feedback, and this feedback should be used to direct future simulation activities (Jeffries & Rogers, 2007). The concepts of the model are outlined in Table 1.

Table 1

Teacher	Student	Educational Practices	Simulation Design Characteristics	Outcomes
Demographics and past experiences.	Program, level, and age.	Active learning, feedback, student/faculty interaction, collaboration, high expectations, diverse learning, and time spent on tasks.	Objectives, fidelity, problem solving, student support, and debriefing.	Learning/knowledge, skill performance, learner satisfaction, critical thinking, self-confidence.

The NLN Jeffries Framework (Jeffries and Rogers, 2007, p. 23).

Research Questions

The research questions for this study will be:

- Does PMR prior to simulation decrease student anxiety before simulation?
- Does PMR prior to simulation improve student simulation skill performance?
- Does PMR prior to simulation increase student satisfaction with simulation?
- Are students satisfied with the use of PMR prior to simulation?
- What is the relationship between student anxiety before simulation and student simulation skill performance?
- What is the relationship between student anxiety before simulation and student satisfaction with simulation?
- What is the relationship between student anxiety before simulation and student satisfaction with PMR prior to simulation?
- What is the relationship between student satisfaction with PMR prior to simulation and student satisfaction with simulation?

The questions were designed to help the researchers understand whether or not implementing an evidence-based relaxation technique such as PMR before simulation can decrease student anxiety and promote positive learner outcomes.

Definition of Key Terms

The key terms for the proposed project include: simulation, anxiety, progressive muscle relaxation, and learner outcomes.

- *Simulation*- In this project, *simulation* refers to high-fidelity patient simulation (HFPS). High-fidelity patient simulation experiences create scenarios that closely mimic the actual clinical setting through the use of computerized mannequins as the patient subjects (Bradshaw, M. & Lowenstein, A., 2014).
- *Anxiety*- For this study, *anxiety* specifically means situational anxiety related to exposure to a simulation activity manifested as feelings of uneasiness, emotional distress, and discomfort. According to Spielberger (1983), test related anxiety is a situational condition that causes various levels of feelings of mental tension, feelings of apprehension, nervousness, and excessive worry. These anxieties can also trigger the sympathetic autonomic nervous system, causing symptoms of heart racing or pounding and shortness of breath or difficulty breathing due to increased respiratory and heart rate.
- *Progressive muscle relaxation (PMR)*- *PMR* was developed by Edmond Jacobson (1938) as a technique to reduce the body's response to anxiety. The exercise involves alternating muscle tightening and muscle relaxation through a targeted sequence of muscle groups in the body. This relaxation activity is used to calm the body's response to high anxiety situations and decrease physiological tension.

- *Learner outcomes*- For this scholarly project, *learner outcomes* were defined as they are found in the outcomes concept of the NLN Jeffries Framework for simulation. In the model, outcomes are defined as: “learning (knowledge gained), skill performance, critical thinking, self-confidence, and learner satisfaction” (Jeffries & Rogers, 2007). This project focused on the outcomes of skill performance and learner satisfaction.

Logic Model

The components of the logic model for this project included inputs, activities, outputs, outcomes, and constraints as outlined in Table 2.

The inputs were researcher and faculty efforts for implementation of a PMR activity prior to simulation activities. The major input was researcher and faculty time, as there were minimal physical materials needed to complete this project. The activity was creation and implementation of a guided PMR session before a simulation exercise (see Appendix A). The output of the scholarly project was the inclusion of a PMR activity before simulation exercises. The intended short-term outcome was decreased student anxiety related to a simulation and improved learner outcomes. A desired intermediate outcome was offering of PMR for future simulation activities. An ideal long-term outcome was to contribute to the provision of competent new graduate nurses into clinical practice and subsequent patient safety. The major constraint of the project was the time it took to implement PMR into already busy simulation days for the faculty and students.

Table 2

Inputs	Activities	Outputs	Short-Term Outcome	Intermediate Outcome	Long-Term Outcome	Constraints
Researcher and faculty preparation and time commitment.	Creation of an evidence-based PMR activity for inclusion in a simulation learning activity.	Implementation of a PMR activity before a simulation exercise.	Decreased student anxiety related to simulation and improved learner outcomes.	Offering of PMR for future simulation activities.	Provision of new nurses who are prepared for clinical practice and patient safety.	Time restrictions during the schedule of the simulation clinical day.

Summary of Chapter I

Simulation is an effective teaching strategy in nursing education. The increasing complexity of the healthcare system, the demand for new nurses, and the limited supply of clinical sites will cause simulation to be used to a greater extent in schools of nursing. The NCSBN has approved up to 50% of clinical hours to be replaced by simulation due to the ability of such programs to produce competent nurses. Simulation causes anxiety for students, potentially impeding the effectiveness of simulation. Overcoming anxiety is essential in order to promote student satisfaction and best learner outcomes in regard to simulation strategies. Previous studies have shown PMR to be effective at reducing test anxiety in nursing students. It is not known if PMR is an effective strategy to reduce the anxiety associated with simulation. It was important for our study to discover if PMR can be used effectively in the reduction of student simulation anxiety.

Chapter II

Literature Review

The current literature was reviewed by searching relevant scholarly journals using the PubMed database as well as the Pittsburg State University AXE library search engine, Summon, in order to discover trends that pertain to the structure and goals of this scholarly project: to decrease the anxiety experienced by nursing students during simulation activities through use of an evidence-based tool to decrease anxiety in order to maximize the learning potential of the teaching strategy. Search phrases included: *simulation in nursing education, effectiveness of simulation, student satisfaction with simulation, faculty attitudes toward simulation, barriers to simulation effectiveness, anxiety in simulation, decreasing simulation anxiety in nursing education, and effects of anxiety on learning*. The search was limited to research articles published in peer reviewed scholarly journals within the last 5 years of the time of the review. The resulting literature included 25 research articles; themes from the literature review serve as headings in the layout of this chapter and include: *effectiveness of simulation, student satisfaction with simulation, barriers to simulation effectiveness, anxiety in simulation, and overcoming simulation anxiety*.

Effectiveness of Simulation

The current literature supports HFPS as an effective teaching strategy in nursing education. The National Council of State Boards of Nursing (NCSBN) conducted research in order to discover the effectiveness of simulation opposed to traditional clinical hours. They used the results of their study to recommend replacing up to 50% of the required clinical hours in nursing education with simulation (Hayden, Smiley, Alexander, Kardon-Edgren, & Jeffries, 2014). Simulation can teach clinical psychomotor skill and cognitive knowledge (Lee & Oh, 2015), (Hendrickx, Foerster, Hansen, & Tschetter, 2014). Simulation can provide an increased ability to utilize critical thinking in the clinical setting (Richardson & Claman, 2014). The teaching strategy can increase communication skill and encourage safety practices (Badowski & Oosterhouse, 2017), (Fewster-Thuente & Batterson, 2015).

Replacing traditional clinical hours with simulation.

Nursing programs are continually challenged to provide meaningful clinical experiences for their students in order to prepare them for an increasingly complex healthcare system. The placement of students in appropriate clinical settings is increasingly difficult, and preceptors for students are becoming more difficult to secure. Traditional clinical hours cannot guarantee student exposure to specific emergency patient scenarios such as sepsis and cardiac arrest. As a result, HFPS is becoming more and more popular in schools of nursing. The NCSBN National Simulation Study (Hayden, Smiley, Alexander, Kardon-Edgren, & Jeffries, 2014) was a large randomized controlled study that was performed in order to discover the adequacy of simulation clinical exercises for nursing students. The study followed incoming students in 10 pre-

licensure nursing programs from the fall semester of 2011 through the first 6 months of their careers as new graduate registered nurses. The participants were placed into 3 cohorts:

- Students who spent less than 10% of clinical hours in simulation.
- Students who spent 25% of clinical hours in simulation.
- Students who spent 50% of clinical hours in simulation.

The study found no statistically significant difference in nursing competency between the groups. As a result, the NCSBN recommend replacing up to 50% of clinical hours with simulation exercises in schools of nursing.

The most significant finding of this study is the effectiveness of two types of educational methods: traditional clinical and simulation experiences. In both environments, when structure, an adequately prepared faculty with appropriate resources, dedication, foresight, and vision are incorporated into the pre-licensure nursing program, excellent student outcomes are achieved (Hayden, Smiley, Alexander, Kardon-Edgren, & Jeffries, 2014, p. 38).

Cognitive and psychomotor skills.

According to a meta-analysis of 26 controlled trials, high-fidelity simulation could provide quality cognitive and clinical skill attainment. The trials included 2,031 nursing students. The authors of the review found simulation as a teaching strategy to have a positive impact on both cognitive and psychomotor learning domains for the students. The conclusion of the analysis was:

...the use of HFPS might have beneficial effects on cognitive outcomes (problem solving competency, critical thinking, and clinical judgment) and clinical skill

acquisition. However, the effectiveness of using HFPS on affective outcomes (self-efficacy and learning satisfaction) appeared to be inconclusive (Lee & Oh, 2015, p. 506).

The authors encouraged future studies to focus on the ability of simulation to provide quality knowledge and communication competencies for nursing students.

According to Hendrickx, Foerster, Hansen, & Tschetter (2014), simulation can effectively promote understanding of healthcare challenges in rural environments. A pilot study was formed at South Dakota State University and involved the creation of a mock rural community healthcare scenario with a simulated rural family tree. Students were led through various clinical scenarios with important rural healthcare undertones in an attempt to provide knowledge of rural healthcare needs. The faculty then followed the students' rural clinical setting performance to compare with pre-simulation rural competencies. Their study, which detailed the effectiveness of rural scenarios in HFPS, found that HFPS allowed the students to better understand the application of healthcare practices for rural and underserved populations.

A study by Sorenson et al. (2015) found that simulation in an off site lab was just as effective as actual clinical setting simulations. Using a qualitative design, they interviewed participants in on-site and off-site clinical simulations in four focus groups and then performed content analysis. According to their findings, the authenticity of the clinical scenario being presented in the simulation was much more important to the participants than the location of the activity. Off site and on site simulation participants reported equal satisfaction and confidence in handling the clinical scenario after the simulation activities. Their study was both a randomized controlled trial for on-site and

off-site simulation activities and a qualitative study of the participants' reactions to these educational tools.

Critical thinking skills.

An evidence-based literature review by Richardson & Claman (2014) found that both qualitative and quantitative data from articles found in their systematic search of the literature published from January 2010 to November 2011 supported the ability of simulation to transfer clinical skills and knowledge to nursing students. Simulation scenarios effectively evaluate critical thinking, a concept that has been identified as challenging to teach or to learn. The authors of the review identified simulation as an important tool to augment the traditional clinical experience in nursing education. They also identified the need for additional research on the effectiveness of simulation as a teaching strategy and its ultimate ability to promote best patient outcomes.

Communication skills and safety.

In a study on the effectiveness of HFPS as a teaching strategy in nursing education, Badowski & Oosterhouse (2017) used a quasi-experimental design to assess students' knowledge, skill, communications, and attitudes for promoting safety. The experimental group experienced peer coaching and had better communication and medication skills than the control group. The study was done in small groups, and the authors suggested repeated studies with larger populations. Nursing continues to require more and more competencies. Simulation promotes a culture of safety in this educational process and promotes clinical safety as an effective teaching strategy for nursing.

Fewster-Thuente & Batterson (2015) concluded simulation provided both cost-effective and quality education for clinical skills and interprofessional communication in

diverse healthcare education settings. They reviewed 8 professional healthcare programs using a mixed-methods approach by collecting quantitative data with pre- and post-testing and qualitative data from focus group interviews. A key finding from their study was interprofessional communication, which increases patient safety and improves healthcare outcomes, can be effectively taught through simulation.

Student Satisfaction with Simulation

Previous studies also identified, overall, students are satisfied with simulation as a learning activity in their academic preparation (Mills et al, 2014). Quantitative and qualitative data have shown overall student satisfaction with simulation is high. Student satisfaction with simulation does not seem to be affected by type of simulation or educational level (Toserud, Hedelin, & Hall-Lord, 2013). Student demographics may play a role in learner confidence and satisfaction with simulation (March, Adams, & Robinson, 2014). Nursing students feel simulation prepares them to perform in the clinical setting (Au, Lo, Cheong, Wang, & Van, 2016).

Level of satisfaction.

According to a study by Mills et al. (2014), students are highly satisfied with learning associated with simulation activities. The study surveyed 47 junior BSN students investigating their level of satisfaction. Quantitative data was gathered through the use of a student survey, and interviews gathered qualitative data for analysis and comparison. The quantitative evidence showed high positive responses about simulation as a teaching strategy, and the themes in the interviews supported this evidence. The authors used their findings to promote the value of simulation as a teaching strategy to increase learner satisfaction in the clinical component of nursing education.

Satisfaction and type of simulation.

A study described in an article by Toserud, Hedelin, & Hall-Lord (2013) measured student satisfaction across undergraduate academic levels using measurement tools from the NLN. The students were exposed to a variety of simulation activities from low-fidelity paper/pencil case studies to high-fidelity active patient scenarios in simulation labs. They discovered that, regardless of the level of simulation they were exposed to, students were overall satisfied with the learning experience provided by simulation. Their educational level did not significantly influence their responses. The authors of this study recommended simulation be used throughout a program of nursing education and encouraged further research to discover why students seem to be satisfied with simulation learning opportunities.

Satisfaction and demographics.

A study by March, Adams, & Robinson (2014), sought to explain student satisfaction with simulation related to demographics and perceptions about the teaching strategy. They theorized there would be a relationship between student demographics and perceptions of confidence related to learning provided by simulation. A total of 854 students across educational levels and course materials participated in demographic screening tools and a simulation effectiveness tool after exposure to HFPS activities covering a variety of course content and topics. They found:

- Age, grade point average, and highest degree earned did not affect learning confidence.
- Level in the program did affect confidence in learning.
- Minority status was related to a higher level of learning confidence.

The authors urged faculty to use these findings to design simulations and prepare individuals for simulation and recommended further research about strategies to prepare students for simulation and promote learning confidence with the teaching strategy.

Satisfaction with replacing clinical hours with simulation.

A qualitative study by Au, Lo, Cheong, Wang, & Van (2016) aimed to discover how nursing students feel about replacing clinical hours with simulation activities. The primary results of the study provided two main themes and a dominant negativity:

- Students appreciated simulation activities.
- Students felt simulations made them feel more resourceful in clinical settings.
- Misunderstanding was a negative theme from the study; students did not care about the life of the simulator, so they were inclined to not take the scenario as seriously as they would in real life.

According to the authors, students appreciate simulation. However, misunderstandings can occur. Nursing faculty should strive to prevent misunderstandings in this environment. Students in this study overall viewed replacing clinical hours with simulation activities positively.

Barriers to Simulation Effectiveness

Current research has identified barriers to effective implementation of simulation in nursing education. The implementation of simulation is stressful to schools of nursing and faculty. The cost of simulation lab start-up is daunting (Richardson & Claman). Faculties of schools of nursing have concerns about the increasing use of the teaching strategy including, but not limited to: time constraints, reluctance of students to participate, unclear expectations, and participant anxiety (Abell & Keaster, 2015),

(Dieckmann, Friis, Lippert, & Ostergaard, 2012). Identification of barriers is important in order to allow for effective use of the teaching strategy (Livesay, Lawrence, & Miller, 2015).

Cost of simulation.

A literature review by Richardson & Claman (2014) studied the use of simulation as an effective teaching strategy in nursing education. The review identified barriers to the method: the high cost of simulation labs and equipment and the lack of standardized guidelines. The authors urged that these barriers to the implementation of simulation should not overshadow the usefulness and value of the teaching strategy. They recommended applying for grant monies or sharing labs with other schools as ways to overcome financial barriers. The reviewers believed the teaching strategy was useful enough to be worth the efforts needed to overcome the barriers to the implementation of HFPS.

Faculty barriers.

Implementing simulation into nursing program requires a change process. A study by Abell & Keaster (2012) was designed to test nursing faculty perceptions of implementation of simulation and their perceptions of the change strategies used to carry out the implementation. A demographic survey, change process survey, and nursing practice survey were administered to the participants. The data were then analyzed to find: adoption of simulation correlates with positive attitudes toward the change strategies used for the implementation program. The authors recommended further studies on the topics of barriers to simulation implementation and effective change strategies to utilize for the implementation of simulation in nursing curricula.

A study by Dieckmann, Friis, Lippert, & Ostergaard (2012) described barriers to simulation implementation. In order to optimize simulation in nursing education practice, the authors interviewed 7 educators with varying levels of experience with simulation use to discover goals, successes, and barriers for simulation use. There were a vast array of barriers discovered; some of the most prominent barriers included:

- Unpreparedness or stress of the educators.
- Lack of role clarity or defined responsibilities.
- Unclear briefing or confusing technical terms.
- Reluctance of student participation.
- Time constraints.
- Irrelevant theory to the topic or course.
- Confusing or unclear concepts.
- Failure of educators to engage students in the simulation.
- Participant anxiety and unfamiliarity with expectations or roles.
- Participant fear of embarrassment or of judgment from faculty and peers.
- Technical problems or equipment failure.
- Participants' fear of debriefing.
- An atmosphere of shame.

The authors desired their findings to be used to help educators anticipate barriers to optimal simulation learning in order to overcome the barriers and provide a quality learning experience.

A qualitative study using in-depth interviews of nurse educators to discover their perceptions regarding simulation as a teaching tool in nursing education conducted by

Livesay, Lawrence, & Miller (2015) found common educator concerns regarding implementation of simulation in their courses. Limitation due to resources included concerns about cost efficiency, time restraints, and lack of appropriate equipment. Staff also reported concerns about the high stress placed on students by simulation. The authors recommended having safeguards in place such as student preparation and debriefing to protect both students and staff from overwhelming stressors due to simulation activities.

Anxiety in Simulation

The review of the literature supported the idea that simulation activities cause significant anxiety for nursing students. There is a relationship between anxiety and student performance (Chapell et al., 2005). The number of observers in a simulation can affect anxiety levels (Mills, Carter, Rudd, Claxton, & O'Brien, 2016). Simulation raises anxiety levels in students, but it also transiently decreases anxiety after the simulation is completed (Hollenbach, 2016). Students have reported debilitating levels of anxiety but have not been found to perform worse due to this anxiety (Beischel, 2013).

Anxiety and performance.

Chapell et al. (2005) assessed a population of 5,551 undergraduate and graduate students to discover if there was a significant relationship between test anxiety and student performance. Demographic surveys were administered as well as surveys about grades per self-report. The Trait-Anxiety Inventory credited to Spielberger (1983) gathered data about anxiety levels of the student population. The study found a significant negative relationship between student grade point average and anxiety scores in the undergraduate and female graduate populations: high anxiety scores correlated

with lower grades. Male graduate students with high-test anxiety did not have significantly different grades than low-test anxiety male graduate students. The authors of this study recommended further studies to identify the effects of anxiety in students and ways to overcome these anxieties in order to improve school performance.

Anxiety and observers.

A quantitative study by Mills, Carter, Rudd, Claxton, & O'Brien (2016) sought to discover if the number of observers in the room affected nursing student anxiety during simulation. Students who participated in the study were divided into three groups- 1, 2, or 3 observers- and were exposed to the same HFPS activity. The prominent finding from the study was students with 3 observers had significantly higher anxiety and lower performance than the other groups with fewer observers. The authors described a major strength for their study in that it provided statistically significant results of a previously unexplained relationship between number of observers and student anxiety during HFPS scenarios. Findings from the study show being observed or judged by faculty or even peers may increase anxiety and decrease performance in nursing simulation experiences. More research is needed to identify whether high anxiety is related to poor performance in simulation and, ultimately, patient safety.

Effect of simulation on clinical anxiety.

In a study by Hollenbach (2016), two groups of nursing students participated in a simulation activity. Their anxiety levels were measured using the State-Trait Anxiety Inventory before and after the simulation workshop and again one week later before their first on-site clinical experience. Anxiety levels were significantly higher before simulation and on-site clinical than after the simulation activity. This study suggested

simulation lowers anxiety levels but does not sustain the relief long term. The authors recommended using simulation to decrease clinical anxiety in nursing students and urged further studies to discover effective ways to decrease anxiety due to simulation learning activities.

Student perceptions of anxiety related to simulation.

The purpose of a study by Beischel (2013) was to test the effects of anxiety on learning in simulation and discover students' perceptions of the effects of these anxieties. The mixed-methods study collected quantitative and qualitative data from undergraduate nursing students participating in simulation activities. The authors found students reported high levels of anxiety described as debilitating, but high levels of anxiety did not correlate with lower cognitive achievement in the simulation activities. Anxiety was directly affected by student preparation and learning style; strong auditory-verbal learners had the highest anxiety levels. The authors fear their tool may have not been valid, as it did not uphold the theory that high anxiety decreases learning. The authors recommended further studies on the topic and consideration of learning style and perceived effects of anxiety for nursing students in the planning and implementing of simulation activities in nursing education.

Overcoming Simulation Anxiety

Described in current research, there are a variety of evidence-based tools for the management of simulation anxiety in nursing students. Student-led exercises can increase confidence and promote learning while decreasing anxiety (Gwin, Villanueva, & Wong, 2017). Prebriefing is a process that can help students feel prepared for simulation (Chamberlain, 2017). Autogenic training has been shown to decrease anxiety related to

simulation (Holland, Gosselin, & Mulcahy, 2017). Biofeedback (Prato & Yucha, 2013) and PMR (Zargarzadeh & Shirazi, 2014) have been shown to reduce test related anxiety in nursing students.

Flipped learning.

Student developed and led simulation can decrease anxiety and promote clinical skill acquisition. Flipped learning environments can teach both the content of the lesson and can promote knowledge of a particular teaching strategy, such as simulation. Using two teaching methods that are effective can cause them to maximize the potential of each to impart knowledge. In a study by, students were assigned with the creation and implementation of a clinically based medical-surgical simulation exercise. The study found student satisfaction and learning outcomes to be positive with this approach.

Prebriefing.

Chamberlain (2017) described prebriefing as a method to prepare students for nursing simulations and thereby decrease their anxiety. The article detailed a quasi-experimental design that compared outcomes between four groups of nursing students with various levels of pre-simulation preparation ranging from no prebriefing to a detailed prebriefing activity before simulation. The study identified that the students who participated in some level of prebriefing activity had significantly higher confidence and satisfaction with the learning activity. No significant differences were found between the various levels of prebriefing activities. The authors recommended using their findings to incorporate some intervention into simulation practice to improve student outcomes and encouraged further research into effective methods for improving student simulation outcomes.

Autogenic training.

According to Holland, Gosselin, & Mulcahy (2017), students can experience anxiety with simulation exercises. This can be a barrier to learning. Interventions to decrease anxiety should be included in simulation exercises. One such effective intervention described in the study was autogenic training. Essentially, it is a mental, emotional, and physical relaxation technique that has been used to treat anxiety and insomnia among other conditions and can also help reduce anxiety before simulations. Some anxiety promotes learning, but too much is crippling. Participating students were divided into intervention and control groups. Both groups participated in a pre-test anxiety survey derived from Spielberger's STAI and a self-efficacy test. The control group went through a normal half hour preparation period while the intervention group participated in a half hour guided autogenic training exercise. Both groups then participated in post-testing of anxiety and self-efficacy using the same tools as in the pre-testing phase. The authors found the technique to be effective at reducing anxiety and improving learning potential and recommended its implementation in HFPS learning activities.

Biofeedback.

Prato & Yucha (2013) tested the ability of biofeedback to decrease test anxiety in nursing students. Their study tested a biofeedback relaxation activity in order to decrease test anxiety in nursing students. The anxiety of the participants was evaluated using Spielberger's STAI and assessment of skin temperature, heart rate, and rate of respirations. The biofeedback methods that were introduced included autogenic training, PMR, and diaphragmatic breathing. While the various interventions were found to

significantly improve heart rate, respiratory rate, and skin temperature they were not found to lower the subjective anxiety scores gathered from the students after the interventions. The authors encouraged further research on the ability of interventions to decrease test anxiety in nursing students and the satisfaction of students with those interventions.

Progressive muscle relaxation.

To determine if PMR, which is a component of autogenic training, is effective at reducing test related anxiety in nursing students, Zargarzadeh & Shirazi (2014) performed a quasi-experimental designed study using a three stage process: students took a pre-test about anxiety and demographics, then those experiencing test anxiety were divided into control and study groups, then PMR was used to intervene followed by post-test anxiety surveys. The authors found that PMR use in students experiencing test anxiety significantly reduced anxiety levels. They claimed their study identified a cost and time-effective method to reduce anxiety in nursing students: PMR. Although this study provides evidence to support PMR as an effective means to decrease nursing student anxiety related to testing, the authors encouraged continued studies on the topic.

Summary of Chapter II

According to a review of the current literature, simulation is an effective teaching strategy for nursing education and has the ability to promote clinical skills and reasoning as well as communication skills and understanding of concepts such as rural healthcare. The use of HFPS is on the rise in nursing education. Students are satisfied with HFPS, as they feel confident in their skills after simulation activities. While simulation itself causes considerable anxiety for students, it also decreases anxiety about clinical scenarios.

Although simulation is an effective and student accepted teaching strategy, there are barriers to its implementation. In addition to the barriers of cost, equipment availability, and time, faculty also consider the stress and anxiety the strategy can place on nursing students. Simulation can cause anxiety for nursing students. The current literature has not clearly defined how this anxiety can affect learning outcomes or patient safety, and more research is needed on the effects of anxiety in nursing simulation. PMR has been identified in current literature to have the potential to manage nursing student anxiety related to testing, and the current literature encourages more research on this topic. The current research described in this chapter provides a foundation for this project and supports the need for this study.

Chapter III

Methods

Project Design

For this scholarly project, a quantitative research design was used. This study attempted to determine if a relationship between anxiety and student outcomes in simulation exists and to describe the effectiveness of PMR in reduction of anxiety and improvement of outcomes. This design allowed the researchers to gather objective data and examine it statistically in order to attempt to answer the research questions:

- Does PMR prior to simulation decrease student anxiety before simulation?
- Does PMR prior to simulation improve student simulation skill performance?
- Does PMR prior to simulation increase student satisfaction with simulation?
- Are students satisfied with the use of PMR prior to simulation?
- What is the relationship between student anxiety before simulation and student simulation skill performance?
- What is the relationship between student anxiety before simulation and student satisfaction with simulation?
- What is the relationship between student anxiety before simulation and student satisfaction with PMR prior to simulation?

- What is the relationship between student satisfaction with PMR prior to simulation and student satisfaction with simulation?

The quantitative study examined data with both comparative and correlational methods. The comparative aspect of the quantitative study attempted to discover whether or not PMR affects anxiety and outcomes for nursing students in simulation. The correlational component of the project examined whether or not a significant relationship between anxiety and student outcomes in simulation in nursing existed (Boswell & Cannon, 2011). Significant relationships were described using Davis Conventions (1971).

Target Population

The target population for this scholarly project was pre-licensure baccalaureate nursing students. This researcher planned to target junior and senior baccalaureate nursing students in community, obstetrics, and medical surgical health courses through the Spring 2018 semester at the Irene Ransom Bradley School of Nursing.

Priori power analysis through Cohen's (1992) method is commonly utilized in nursing research when determining the minimum number of study participants needed to obtain statistically significant results (Hayat, 2013). According to power analysis, a sample size of 85 was necessary in order to find statistically significant results for this project. With a predetermined effect size of $r = 0.30$, a significant $\alpha = 0.05$, and a statistical power of 0.80, a sample of 85 participants was necessary to test the desired relationships (Cohen, 1992).

Target population recruitment.

The project utilized convenience sampling to gather the target population. Subjects were readily available for research activities as they gathered for their scheduled simulation dates.

Inclusion and exclusion criteria.

Inclusion criteria for the study were: pre-licensure baccalaureate nursing students in the courses chosen for the study and their presence on simulation dates. Exclusion criteria for the project were: age younger than 18 years and non-English speaking students; however, no participants were excluded due to these criteria.

Protection of human subjects.

IRB approval was obtained from the Irene Ransom Bradley School of Nursing and from Pittsburg State University. All participation was voluntary and involved adults over the age of 18 years. All measurement tools were filled out voluntarily and anonymously. Part of the analysis included student outcomes, and student skill performance scores were used as data for these studies. Informed consent was obtained from the participants. Participation in the study did not affect students' grades or evaluation for the simulation activities included in the study.

Instruments

The key variables analyzed for this study were anxiety (total, state, and trait), skill performance, satisfaction with simulation, and satisfaction with PMR. A demographic questionnaire was used to assess participant grade (junior or senior), gender, age, and previously diagnosed anxiety disorders (see Appendix C). Spielberger's (1983) STAI was used for analysis of total anxiety, state anxiety, and trait anxiety. An individual item to

assess student satisfaction with simulation and an individual item to assess student satisfaction with PMR were utilized in the form of Likert-type scales (see Appendix D). Skill performance was recorded as percentage of expected behaviors performed for each simulation.

To measure anxiety the students included in the study faced due to simulation, Spielberger's (1983) State-Trait Anxiety Inventory (STAI), a 40-item tool to measure anxiety, was used. Permission to reproduce this tool was purchased from the publisher, Mind Garden, by this student at a cost of \$200. This tool has been used in numerous similar studies and has been described as both valid and reliable at measuring both state and trait anxiety. The instrument has been shown to require a fourth grade reading level and, on average, can be completed in 10 minutes. Participants were asked to rate how intensely they experience certain feelings on a scale of 1-4 on Likert-type scales. Scores for the tool range from 20 (minimal anxiety) to 80 (high anxiety) (Spielberger et al., 1970). This measurement tool provided ratio data for statistical analysis using SPSS.

To measure student outcomes, we utilized the established scoring tools for the simulation activities. The tools were checklists of expected actions and competencies and served as grading rubrics to provide a range of scores and were filled out by course faculty members. This tool provided ratio data for analysis.

We developed a simulation satisfaction item utilizing a Likert-type scale ranging from 1-5 and a PMR satisfaction item using a Likert-type scale ranging from 1-5 (see Appendix D). These individual items provided interval data for statistical analysis.

Procedure

After project committee approval of the proposed research activity and IRB approval, informed consent was obtained from the participants before beginning the simulations.

Data collection for this project took place on 8 simulation dates in the Spring 2018 semester (January 31, February 13, February 21, March 14, March 29, April 10, April 11, and April 12). The 155 community, obstetrics, and medical surgical course students were divided into 2 morning groups of 4-5 students each and 2 afternoon groups of 4-5 students each for their assigned simulation dates. On each of the simulation dates, 2 groups participated in the morning simulation session and 2 separate groups participated in the afternoon simulation session. There were 3 different simulation activities for the students- one designated for each course (community, obstetrics, and medical surgical).

On each simulation date, the 2 morning groups of 4-5 students each were divided into one control and one intervention group. In the afternoon of each simulation day, the 2 groups of 4-5 students each were also divided into one control and one intervention group. Control groups were randomly assigned by course faculty and assessed for anxiety and outcomes without PMR by this researcher. Intervention groups were also randomly assigned by course faculty and assessed for anxiety and outcomes after inclusion of PMR prior to their simulation experiences by this researcher. The intervention groups were guided to another room that was away from the simulation environment for a 5-10-minute PMR activity (see Appendix A). Then, demographic and STAI surveys were administered to morning or afternoon control and intervention groups once reassembled in

the simulation classroom after PMR. The 2 individual satisfaction items were administered after the simulation (see Appendix D). The intervention group answered both individual items: one about satisfaction with simulation and one about satisfaction with PMR. The control group answered only the simulation satisfaction item about satisfaction with simulation, as they did not participate in PMR.

The PMR exercise was a simple 5-10 minute activity guided by this researcher (see Appendix A). PMR occurred before the simulation, and data collection occurred before and after the simulation. Outcomes measurement was assessed during the simulations using the faculty established grading rubric; results were recorded as a percentage of expected student behaviors.

Resources needed for project completion included: all aspects of established simulation activities for the three courses involved with the study. These resources included faculty and staff cooperation, technology and simulation details, evaluation rubric, and time. The anxiety tool alone took an average of 10 minutes to complete per group, and the PMR exercise (see Appendix C) took up 5-10 minutes of time for the intervention groups.

Evaluation Methods

After data collection was complete, responses were coded and analyzed using SPSS. Statistical analysis included the use of descriptive statistics, frequencies, comparison of means, correlational analysis using Eta and Pearson's as appropriate for the type of data being analyzed, and independent samples t-test for analysis of variances.

To answer the research question: *Does PMR prior to simulation decrease student anxiety before simulation?*, the data collected from the STAI inventories was coded to

yield ratio data for comparison studies between the responses on the STAI between the control and interventions groups. After coding the responses in SPSS and calculating the mean scores of the control and intervention groups, the software was used to run Eta correlation to analyze whether or not there was a statistically significant difference in anxiety scores between the control and intervention groups.

To answer the research question: *Does PMR prior to simulation improve student simulation skill performance?*, the researchers collected data from the subjects using the faculty established and scored grading rubrics during the simulation activities. The rubric provided ratio data, and the mean scores were calculated using SPSS. The mean scores were used to report comparison of means. For statistical analysis between group type as nominal dichotomous data and skill performance as ratio data, we used Eta correlation to discover the relationship between PMR and skill performance.

To answer the research question: *Does PMR prior to simulation increase student satisfaction with simulation?*, the interval data gathered from the Likert- type scale to measure participant satisfaction with simulation and group type as nominal dichotomous data were used for statistical analysis with Eta correlation to discover the relationship between PMR and simulation satisfaction.

To answer the research question: *Are students satisfied with the use of PMR prior to simulation?*, a frequency distribution of responses on the Likert-type scale PMR satisfaction item was used to describe the satisfaction students felt toward PMR.

To answer the research questions: *What is the relationship between student anxiety before simulation and student simulation skill performance?*, *What is the relationship between student anxiety before simulation and student satisfaction with*

simulation?, *What is the relationship between student anxiety before simulation and student satisfaction with PMR prior to simulation?*, and *What is the relationship between student satisfaction with PMR prior to simulation and student satisfaction with simulation?*, interval/ratio data were analyzed with other interval/ratio data using Pearson's correlation to discover significant relationships between the variables.

The statistical analysis described above was used to describe the value of PMR exercises in simulation activities. If the tool were found to decrease anxiety, improve student simulation skill performance, or increase student satisfaction with simulation, it would be worth offering for future simulation activities. The overall goal of the statistical analysis portion of this project was to assess the value of PMR as a method to reduce simulation related anxiety in nursing education and provide evidence for its value for further use in nursing education. This study also discovered future research needs.

Chapter IV

Results

Purpose

The overall purpose of this project was to implement PMR exercises into simulation activities for nursing education as an evidenced based means to reduce test anxiety. A curiosity that guided this project was if the ability of PMR to reduce test anxiety, as found in the literature review, would translate into an ability to reduce simulation anxiety. Data were collected and analyzed with the goals of discovering PMR's effect on student anxiety prior to simulation, skill performance during simulation, and satisfaction after simulation. The data were collected with the goal of answering the research questions:

- Does PMR prior to simulation decrease student anxiety before simulation?
- Does PMR prior to simulation improve student simulation skill performance?
- Does PMR prior to simulation increase student satisfaction with simulation?
- Are students satisfied with the use of PMR prior to simulation?
- What is the relationship between student anxiety before simulation and student simulation skill performance?
- What is the relationship between student anxiety before simulation and student satisfaction with simulation?

- What is the relationship between student anxiety before simulation and student satisfaction with PMR prior to simulation?
- What is the relationship between student satisfaction with PMR prior to simulation and student satisfaction with simulation?

Analysis of Data

Data analysis was completed using SPSS software. Descriptive statistics, comparison of means, Eta, Pearson's, and Independent samples t-test were utilized. To describe the population, descriptive statistics were used. Comparison of means was used to begin to answer the research questions. Correlations were discovered using Eta to compare nominal dichotomous and interval/ratio data (such as group type and total anxiety) and using Pearson's to compare interval/ratio to other interval/ratio data (such as total anxiety and simulation satisfaction). Independent samples t-test was used to analyze variance in total anxiety between those with preexisting anxiety and those without preexisting anxiety (Norusis, 1990).

Population

Description of the population was possible due to the demographic questionnaire. The number of participants in the study was 146; this exceeded the amount needed for statistical significance. According to power analysis, at least 85 participants were needed. There were a total of 73 participants in the control group and 73 participants in the intervention. A majority of the respondents were female with 87% being female and 13% being male. Juniors made up 49.3% of the respondents, and 50.7% were seniors. The majority of respondents were in the 18-25 year old age range at 97.3%; 2.1% were in the 26-35 year old range, and 0.7% were in the 36-45 age range (see Table 3). Of the

participants, 17.1% had preexisting diagnosed anxiety disorders, and 82.9% did not have preexisting diagnosed anxiety disorders. The incidence of anxiety in our study population (17.1%) was above the national average (15.8%) according to ACHA (2015).

Table 3: Age

		Frequency	Percent
Valid	18-25 years of age	142	97.3
	26-35 years of age	3	2.1
	36-45 years of age	1	.7
	Total	146	100.0

Description of Variables

For this study, the independent variables were: age, gender, level of nursing school (junior or senior), preexisting diagnosed anxiety disorders, and PMR. The dependent variables of this study were those that may have been affected by PMR. These variables included total anxiety, state anxiety, trait anxiety, percent of achieved expected student behaviors, satisfaction with PMR, and satisfaction with simulation. Any differences between control and intervention groups for these variables could have been affected by PMR. These variables were assessed using STAI, expected behaviors checklists, and 2 individual satisfaction items.

Analysis of Project Questions

- Does PMR prior to simulation decrease student anxiety before simulation?

Comparison of means was completed followed by use of Eta to determine if a relationship existed between mean state, trait, or total anxiety scores and PMR. The mean state, trait, and total anxiety scores from the STAI tools were compared between control and intervention groups. The mean state anxiety score for the control group was 36.96;

the mean state anxiety score for the intervention group was 30.32. The mean trait anxiety score for the control group was 39.93; the mean trait anxiety score for the intervention group was 38.84. The mean total anxiety score for the control group was 76.89; the mean total anxiety score for the intervention group was 69.15.

After a comparison of means (see Table 4), correlational statistics were run with Eta to discover if a significant relationship existed between PMR and anxiety using SPSS. Eta showed a low association between group type and total anxiety with total anxiety as the dependent variable ($r_{\text{Eta}} = .210$) (see Table 5). Eta showed a moderate association between group type and state anxiety with state anxiety as the dependent variable ($r_{\text{Eta}} = 0.318$) (see Table 5). Eta showed a negligible association between group type and trait anxiety with trait anxiety as the dependent variable ($r_{\text{Eta}} = .056$) (see Table 5).

Table 4: Comparison of Means: State, Trait and Total Anxiety; Simulation Score; Simulation and PMR Satisfaction

Group Type		State	Trait	Total	Score	Simulation	PMR
Control	Mean	36.96	39.93	76.89	71.96	2.33	9.00
	N	73	73	73	73	73	73
	Std. Deviation	10.998	10.701	20.571	9.803	1.740	.000
Intervention	Mean	30.32	38.84	69.15	71.59	1.97	2.08
	N	73	73	73	73	73	73
	Std. Deviation	8.852	8.958	15.437	11.005	1.490	1.422
Total	Mean	33.64	39.38	73.02	71.77	2.15	5.54
	N	146	146	146	146	146	146
	Std. Deviation	10.492	9.849	18.535	10.387	1.625	3.612

Table 5: Group Type and Anxiety

			Value
Nominal by Interval	Eta	Group Type Dependent	.581
		Total Dependent	.210
			Value
Nominal by Interval	Eta	Group Type Dependent	.544
		State Dependent	.318
			Value
Nominal by Interval	Eta	Group Type Dependent	.551
		Trait Dependent	.056

- Does PMR prior to simulation improve student simulation skill performance?

Comparison of means showed that the mean score on the expected student behaviors was 71.96% for the control group and 71.59% for the intervention groups (see Table 1). To analyze correlation between group type, Eta was used. There was a negligible association between group type and simulation skill performance with skill performance as the dependent variable ($r_{\text{Eta}} = .018$) (see Table 6).

Table 6: Group Type and Simulation Score

			Value
(Nominal by Interval	Eta	Group Type Dependent	.854
		Score Dependent	.018

There was a negligible association between group type and simulation score with simulation score as the dependent variable ($r_{\text{Eta}} = .018$).

- Does PMR prior to simulation increase student satisfaction with simulation?

A comparison of the mean satisfaction with simulation showed that the control group mean response on the Likert-type scale was 2.33 and the intervention group mean response was 1.97 (see Table 1). On the scale, 1 represented “strongly agree” and 5

represented “strongly disagree” with the item: *I am satisfied with my learning experience through today’s simulation*. Thus, it appeared the intervention group was more satisfied with their simulation experience than the control group. Eta correlation showed low association between group type and simulation satisfaction with simulation satisfaction as the dependent variable ($r_{\text{Eta}}=.110$) (see Table 7).

Table 7: Group Type and Simulation Satisfaction

			Value
Nominal by Interval	Eta	Group Type Dependent	.163
		Simulation Dependent	.110

There was a low association between group type and simulation satisfaction with simulation satisfaction as the dependent variable ($r_{\text{Eta}}=.110$).

- Are students satisfied with the use of PMR prior to simulation?

Descriptive statistics using SPSS were used to discover student satisfaction with PMR. The individual item: *I am satisfied with the use of progressive muscle relaxation in today’s learning experience*, was a Likert-type scale ranging from 1-5 with 1 meaning “strongly agree” and 5 meaning “strongly disagree.” Frequencies for the responses in the intervention groups were: strongly agree- 53.4%, agree- 17.8%, unsure- 5.5%, disagree- 13.7%, and strongly disagree 9.6%. Thus, 71.2% either agreed or strongly agreed they were satisfied with PMR, 5.5% were unsure, and 23.3% either disagreed or strongly disagreed they were satisfied with PMR (see Table 8).

Table 8: PMR Satisfaction Frequencies

		Frequency	Percent
Valid	1.00	39	53.4
	2.00	13	17.8
	3.00	4	5.5
	4.00	10	13.7
	5.00	7	9.6
Total		73	100.0

- What is the relationship between total student anxiety before simulation and student simulation skill performance?

In order to compare total anxiety as ratio data with skill performance as ratio data, Pearson's correlation was used. The probability (.498) calculated with the test statistic ($r=0.056$) was greater than alpha (.05) so we accepted the null hypothesis (H_0). There is no relationship between total anxiety and student skill performance (see Table 9).

Table 9: Total Anxiety and Simulation Skills Performance

		Total	Score
Total	Pearson Correlation	1	.056
	Sig. (2-tailed)		.498
	N	146	146
Score	Pearson Correlation	.056	1
	Sig. (2-tailed)	.498	
	N	146	146

There was no statistically significant relationship between total anxiety and student skill performance.

- What is the relationship between total student anxiety before simulation and student satisfaction with simulation?

Pearson's correlation was used to determine a possible relationship between total student anxiety and simulation satisfaction. The probability (.172) calculated with the test statistic ($r=0.114$) was greater than alpha (.05) so we accepted the null hypothesis (H_0). There is no relationship between total student anxiety and student satisfaction with simulation (see Table 10).

Table 10: Total Anxiety and Simulation Satisfaction

		Total	Simulation
Total	Pearson Correlation	1	.114
	Sig. (2-tailed)		.172
	N	146	146
Simulation	Pearson Correlation	.114	1
	Sig. (2-tailed)	.172	
	N	146	146

There was no statistically significant relationship between total anxiety and student satisfaction with simulation.

- What is the relationship between total student anxiety before simulation and student satisfaction with PMR prior to simulation?

Pearson's correlation was used to determine if a relationship existed between total anxiety and PMR satisfaction. For this analysis, the null hypothesis was: There is no relationship between total student anxiety before simulation and student satisfaction with PMR. The probability (.008) calculated with the test statistic ($r=0.220$) was less than alpha (.50), so we rejected the null hypothesis (H_0). According to Davis Conventions (1971), there was a low association between total student anxiety and satisfaction with PMR ($r= 0.220$) (see Table 11).

Table 11: Total Anxiety and PMR Satisfaction

		Total	PMR
Total	Pearson Correlation	1	.220**
	Sig. (2-tailed)		.008
	N	146	146
PMR	Pearson Correlation	.220**	1
	Sig. (2-tailed)	.008	
	N	146	146

** . Correlation is significant at the 0.01 level (2-tailed).

There was a low association between total student anxiety and satisfaction with PMR ($r=0.220$).

- What is the relationship between student satisfaction with PMR prior to simulation and student satisfaction with simulation?

Pearson's correlation was used to determine if a relationship existed between student satisfaction with PMR and student satisfaction with simulation. The null hypothesis (H_0) for this correlation was: There is no relationship between student satisfaction with PMR and student satisfaction with simulation. The probability (.000) calculated with the test statistic ($r=0.899$) was less than alpha (.05) so we rejected the null hypothesis (H_0). According to Davis Conventions (1971), there was a very strong association between student satisfaction with PMR and student satisfaction with simulation ($r=0.899$) (see Table 12).

Table 12: Student Satisfaction with PMR and Student Satisfaction with Simulation

		PMR	Simulation
PMR	Pearson Correlation	1	.899**
	Sig. (2-tailed)		.000
	N	73	73
Simulation	Pearson Correlation	.899**	1
	Sig. (2-tailed)	.000	
	N	73	73

** . Correlation is significant at the 0.01 level (2-tailed).

There was a very strong association between student satisfaction with PMR and student satisfaction with simulation ($r= 0.899$).

Additional Analysis

After answering the project questions, additional analysis was conducted in order to discover if there were any other significant relationships between preexisting anxiety and total, state, or trait anxiety, preexisting anxiety and simulation score, or preexisting anxiety and satisfaction with simulation or satisfaction with PMR. Analysis was also performed to assess variance between those with preexisting anxiety and those without preexisting anxiety.

Preexisting anxiety and total anxiety.

To determine if a relationship existed between preexisting diagnosed anxiety disorders and total anxiety, Eta correlation was used. There was a moderate association between preexisting anxiety and total anxiety with total anxiety being the dependent variable ($r_{\text{Eta}}= .445$) (see Table 13).

Table 13: Preexisting Anxiety and Total Anxiety

			Value	
Nominal by Interval	Eta	Previous Diagnosis of Anxiety	.807	
		Dependent		
			<hr/>	
			Total Dependent	.445

There was a moderate association between preexisting anxiety and total anxiety with total anxiety being the dependent variable ($r_{\text{Eta}} = .445$).

Preexisting anxiety and state anxiety.

To determine if a relationship existed between preexisting diagnosed anxiety and state anxiety, Eta correlation was used. There was a moderate association between preexisting anxiety and state anxiety with state anxiety as the dependent variable ($r_{\text{Eta}} = .402$) (see Table 14).

Table 14: Preexisting Anxiety and State Anxiety

			Value	
Nominal by Interval	Eta	Previous Diagnosis of Anxiety	.704	
		Dependent		
			<hr/>	
			State Dependent	.402

There was a moderate association between preexisting anxiety and state anxiety with state anxiety as the dependent variable ($r_{\text{Eta}} = .402$).

Preexisting anxiety and trait anxiety.

To determine if a relationship existed between preexisting diagnosed anxiety and trait anxiety, Eta correlation was used. There was a moderate association between preexisting anxiety and trait anxiety with trait anxiety as the dependent variable ($r_{\text{Eta}} = .410$) (see Table 15).

Table 15: Preexisting Anxiety and Trait Anxiety

			Value
Nominal by Interval	Eta	Previous Diagnosis of Anxiety	.600
		Dependent	
		Trait Dependent	.410

There was a moderate association between preexisting anxiety and trait anxiety with trait anxiety as the dependent variable ($r_{\text{Eta}} = .410$).

Preexisting anxiety and simulation score.

To determine if a relationship existed between preexisting anxiety and simulation skill performance, Eta was used. There was a negligible association between preexisting anxiety and simulation score with simulation score as the dependent variable ($r_{\text{Eta}} = .048$) (see Table 16).

Table 16: Preexisting Anxiety and Simulation Score

			Value
Nominal by Interval	Eta	Previous Diagnosis of Anxiety	.262
		Dependent	
		Score Dependent	.048

There was a negligible association between preexisting anxiety and simulation score with simulation score as the dependent variable ($r_{\text{Eta}} = .048$).

Preexisting anxiety and simulation satisfaction.

To determine if a relationship existed between preexisting anxiety and student satisfaction with simulation, Eta was used. There was a low association between preexisting anxiety and student simulation satisfaction with simulation satisfaction as the dependent variable ($r_{\text{Eta}} = .126$) (see Table 17).

There is no difference in total anxiety scores between those with preexisting anxiety and those without preexisting anxiety (see Table 19).

Table 19: Independent Samples t-test for Variance between Those with Preexisting Anxiety and Those without Preexisting Anxiety

		Levene's Test for Equality of Variances		t	df
		F	Sig.		
State	Equal variances assumed	3.648	.058	5.266	144
	Equal variances not assumed			4.283	29.474
Trait	Equal variances assumed	4.869	.029	5.396	144
	Equal variances not assumed			4.508	29.976
Total	Equal variances assumed	3.887	.051	5.970	144
	Equal variances not assumed			4.946	29.815
Simulation	Equal variances assumed	.906	.343	1.526	144
	Equal variances not assumed			1.514	34.385
PMR	Equal variances assumed	2.796	.097	1.002	144
	Equal variances not assumed			1.062	36.830
Score	Equal variances assumed	.061	.806	-.577	144
	Equal variances not assumed			-.566	34.031

There is no statistically significant difference in total anxiety scores between those with preexisting anxiety and those without preexisting anxiety.

Summary of Chapter IV

The goal of this project was to implement PMR into simulation activities in nursing education and to discover its effects on student anxiety, student skill performance, and student satisfaction with simulation. According to statistical analysis of the data, there was a significant relationship between PMR and total anxiety; those who experienced PMR had lower total anxiety than those that did not. Also, there was a statistically significant relationship between PMR and state anxiety; the intervention group had lower state anxiety than the control group. PMR was related to decreased total and state anxiety in this study. Those who experienced PMR were more satisfied with

simulation than those who did not experience PMR. More than half of the intervention group strongly agreed they were satisfied with the inclusion of PMR into their simulation day.

Chapter V

Discussion

Purpose

The purpose of this scholarly project was to implement an evidenced based method for reducing student anxiety, PMR, into nursing simulation activities and to assess the effects of PMR on student anxiety, student skill performance, and student satisfaction. Data analysis allowed researchers to find that those who experienced PMR had lower state and total anxiety than those who did not experience PMR. Those who experienced PMR were statistically more satisfied with simulation than those who did not experience PMR. More than half of the intervention group strongly agreed they were satisfied with the inclusion of PMR into their simulation assignments.

Results Compared to Current Literature

- Does PMR prior to simulation decrease student anxiety before simulation?

Those who experienced PMR had statistically significant lower state and total anxiety scores than those who did not participate in PMR. There was no significant difference between control and intervention groups for trait anxiety. We expected this finding, as PMR has been shown to reduce test anxiety in nursing students, which is a type of state anxiety (Zargarzadeh & Shirazi, 2014). This finding expands the current

literature and supports the use of PMR as a method for reducing both test and simulation anxiety for nursing students.

- Does PMR prior to simulation improve student simulation skill performance?

Data analysis did not show a significant difference in skill performance between intervention and control groups. According to current literature, lower anxiety correlates with better student performance (Chapell et al., 2005). We anticipated that lowering anxiety could cause increased skill performance scores. There are many factors that may have contributed to this finding. Different faculty members scored the students for different classes. Confounding variables such as student grade point average, student learning style, student assertiveness and confidence, student communication style, and number of students in the group could have contributed to this finding.

- Does PMR prior to simulation increase student satisfaction with simulation?

Data showed that those who experienced PMR were more satisfied with simulation than those who did not experience PMR. This was expected, as the current literature recommends decreasing student anxiety in order to increase student satisfaction with learning activities (Beischel, 2013). This finding was not described in previous literature.

- Are students satisfied with the use of PMR prior to simulation?

PMR is described in current literature as a way to decrease student test anxiety in nursing education (Zargarzadeh & Shirazi, 2014). Part of the aim of this study was to discover the effectiveness of PMR at reducing student anxiety related to simulation in nursing school and to discover student satisfaction with PMR. More than 70% of the respondents either strongly agreed or agreed that they were satisfied with PMR.

However, more than 20% of students reported that they either disagreed or strongly disagreed that they were satisfied with the inclusion of PMR into their simulation day. The majority of the students were satisfied, but a percentage of the students were not satisfied. Student attitude toward the extra time required to complete PMR may have caused reported dissatisfaction with PMR. It is possible students were reluctant to admit they needed or benefitted from PMR, as society is encouraged to save face due to pressures from social media to appear perfect. Like learning styles, anxiety reduction strategies should be tailored to individual student needs and preferences. More research is needed in order to discover why some students did not appreciate PMR and if factors such as learning style and personality style correlate with what anxiety reducing strategies will be effective.

- What is the relationship between student anxiety before simulation and student simulation skill performance?

Lower anxiety was related to higher student scores according to a study by Chapell et al. (2005), but performance was not found to be associated with anxiety in another study by Beischel (2013). It was anticipated that lower anxiety would be related to higher scores in our study. However, there was only a negligible statistical association between student anxiety and student skill performance. This could help explain how PMR decreased anxiety but was unable to increase skill performance- because skill performance did not appear to depend on anxiety in this study.

- What is the relationship between student anxiety before simulation and student satisfaction with simulation?

There was a low association between student anxiety and student satisfaction with simulation. This helps support the finding that PMR increased student satisfaction. The current literature supports the use of anxiety reduction strategies in order to increase student satisfaction with learning activities Beischel (2013). It stands to reason that if PMR correlates with increased simulation satisfaction and PMR decreased anxiety that lower anxiety would correlate with increased simulation satisfaction.

- What is the relationship between student anxiety before simulation and student satisfaction with PMR prior to simulation?

This relationship was not described in the review of current literature. We found a negligible association between anxiety and PMR satisfaction. It is interesting that there was a more significant relationship between anxiety and simulation satisfaction than was found between anxiety and PMR satisfaction. This suggests that PMR reduced anxiety whether or not the student was satisfied with PMR.

- What is the relationship between student satisfaction with PMR prior to simulation and student satisfaction with simulation?

This relationship was not described in the review of the current literature. There was a very strong association between student satisfaction with PMR and student satisfaction with simulation. More research is needed to discover why this finding occurred. It is possible that students felt overall positive or negative about the entire experience; their attitude toward simulation matched their attitude toward PMR.

Observations

While this was not a qualitative study, the researchers did notice comments made by the students pertaining to the use of PMR. Comments made to the lead researcher after

PMR activities included: “You have a very relaxing voice.” “I almost fell asleep.” “You have the perfect voice for that.” One student commented on how cold the room was after the PMR activity. A student commented to a researcher how nice it would be if the school of nursing would provide a relaxation room were students could go through relaxation exercises before tests and simulations. Future studies should be conducted on this topic utilizing qualitative methods to ascertain student attitudes toward PMR and other anxiety reducing strategies.

Evaluation of Theoretical Framework

The theoretical framework for this project was the NLN/Jeffries framework. One concept of this framework, student support, guided the design of this project. The idea of student support is to prepare students for a successful learning environment. While skill performance was not increased by PMR or anxiety reduction, the students who experienced PMR did have lower state and total anxiety than those who did not experience PMR. Those who experienced PMR were more satisfied with their simulation experience than those who did not experience PMR. Thus, the project results followed the theoretical framework; providing student support through PMR increased student satisfaction- one of the student outcomes from the NLN/Jeffries framework. The NLN/Jeffries framework provided a successful structure for completion of this project.

Evaluation of Logic Model

Project results support the logic model described in Chapter I. The input of researcher time toward the implemented activity of PMR into simulation activities was successful. The PMR activity was implemented as an output of the logic model. According to statistical analysis, the projected short-term goal of reducing student anxiety

and improving learner outcomes was partially met, as those in the intervention group had lower total and state anxiety scores and increased satisfaction with simulation than those in the control group. However, skill performance was not increased by PMR. These findings support offering PMR as an anxiety reduction strategy. However, it should not be required as more than 20% of the respondents were not satisfied on some level with PMR. The project required an additional 20 minutes of time for each morning and afternoon simulation session; however, all groups finished their assigned simulation on time or early.

Limitations

Convenience sampling was used, as students were readily available during their assigned simulation times. It is possible that reading the informed consent document and understanding the goal of the project could have caused the students to lean toward reduced anxiety scores due to their helping nature.

While the same researcher led each PMR activity, the room the activity took place in varied from day to day. Most took place in a classroom, 2 sessions took place in a conference room, and 2 sessions took place in a computer testing room. While all rooms were dark and quiet, the room type could have affected anxiety. For example, students may have had higher anxiety in a classroom or computer testing room than in a conference room where they have not experienced test anxiety and that has larger more comfortable chairs than the other rooms. However, during statistical analysis there was no significant difference in anxiety between the different simulation dates.

On the simulation date 2/21/18, the students asked a question about graduation time at the end of the semester prior to data collection. This discussion led to the

discovery that the graduation time had changed, and this could have affected both student and faculty anxiety; but the data analysis did not show significant anxiety differences between the simulation dates.

The community and medical-surgical courses had a morning and afternoon session for their simulation dates. The obstetrics course had their sessions in the morning only with no afternoon sessions. Statistical analysis did not find significant relationship between anxiety and time of day (morning or afternoon) and between course (community, medical-surgical, and obstetrics) and anxiety.

The expected student behavior checklists were standardized for each course. However, there could have been scoring differences between the faculty members that scored them. Overall, the same faculty scored the checklists for all groups in each course, but there were 2 instances that a teaching assistant took the place of the regular faculty due to illness or other absence of the faculty members. Again, there were not significant differences in skill performance between the simulation dates.

Time was a factor for project completion. About 20 minutes were required for data collection and PMR for each simulation group. Commonly asked questions during informed consent were, “How long will this take?” and “Will we still get out on time?” Worrying about time constraints could have affected student anxiety. In addition to time cost, permission to use the STAI for this project cost \$200.

Implications for Future Projects and Research

PMR decreased state and total anxiety. Those who experienced PMR were more satisfied with their simulation day than those who did not experience PMR. However, more than 20% of the students reported not being satisfied with PMR. PMR should be

offered as a means to reduce test and simulation anxiety in nursing education, but it should not be required. Future projects should use qualitative methods to discover student attitudes toward and perspectives on PMR. Other possible variables affecting student satisfaction with PMR and other anxiety reducing strategies should be considered in future projects. The results of this study support the provision of relaxation rooms at schools of nursing. Comparison of means showed that those who experienced PMR scored lower on expected skills checklists than those who did not experience PMR, however there was not a statistically significant relationship. More research is needed on the effects of anxiety on student skill performance and of PMR on student skill performance. The incidence of preexisting anxiety in this study's population (17.1%) was higher than the published national average of incidence of anxiety in college students (15.8%) according to the ACHA (2015). Future research projects should compare the incidence of anxiety in nursing students to the incidence of anxiety for other majors.

Implications for Nursing Education

Nurse educators should provide student support by preparing them for simulation and providing optional anxiety reduction strategies. However, study findings show that not all students were satisfied with PMR, so anxiety reduction strategies should be optional and customized for the needs of each individual student; ways to accomplish this should be the focus of future research.

Conclusion

The current literature described PMR as an evidenced based method for reducing test anxiety in nursing students. The overall goal of this project was to implement PMR into simulation activities in nursing education and to analyze the effect of PMR on

student anxiety, skill performance, and satisfaction. The data revealed PMR reduced total and state anxiety and increased student satisfaction with simulation. While not a qualitative study, comments made by students were overall positive. Our findings support offering anxiety reduction strategies for students before simulation tailored to each student's individual needs and preferences. One possible way to do this is to provide a relaxation room where students can go before stressful learning activities and participate in an anxiety reduction activity of their choice. Future research should include qualitative methods to assess student attitudes toward PMR, the effects of PMR and anxiety on student skill performance, and factors influencing student satisfaction with PMR and other relaxation strategies.

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APPENDIX

Appendix A

Decreasing Simulation Anxiety in Nursing Education

Example of Progressive Muscle Relaxation

Each round of muscle tension will last approximately 5 seconds followed by a 15 second interval of relaxation. The goal is to recognize the difference between tension and relaxation and harness the ability to consciously control these feelings of tension and relaxation.

1. Take a slow, deep breath in. As you fill your lungs, concentrate on gently curling your toes. Feel the tension in the muscles of your feet. As you slowly exhale, relax your feet back to neutral relaxed position. Notice the difference in how tension and relaxation feel in the muscles of your feet. Take another slow deep breath in as you focus on this feeling of relaxation, and then gently exhale. Then try to relax even more as you inhale and exhale again.
2. As you take another slow, deep breath in, tighten the muscles in your calves gently by pointing your toes toward your face. As you exhale, relax your calf muscles. Take another slow deep breath and enjoy the feeling of relaxation in your calves. Relax your muscles even deeper as you inhale and exhale again.
3. Now, tighten the muscles of your thighs as you gently fill your lungs with a deep breath, and as you exhale relax the tension away. Enjoy the relaxed feeling in your thigh muscles as you inhale and exhale again. Then relax even more as you take another slow deep breath in and out.
4. Next, pull your stomach muscles in; imagine pulling your bellybutton toward your spine as you inhale. Then slowly exhale and release all tension in your abdominal muscles. Savor the relaxed state as you slowly take another deep inhale and exhale. Then relax even more as you inhale and exhale again.
5. Tighten your neck and shoulder muscles by shrugging your shoulders toward your ears as you gently inhale, then exhale and blow away all the tension. Focus on how much better the relaxed state feels as you take another slow deep inhalation and exhalation. Then continue relaxing as you take another deep breath in and out.
6. Tighten the muscles in your forehead by raising your eyebrows as high as you can as you gently inhale, then exhale and release all the tension in your head and face. Take a moment to notice the contrast between tension and relaxation as you slowly take another deep breath then gently let it out. Now focus on removing all tension from your body and enjoy the feeling of being relaxed as you take one more deep breath in and out.

Appendix B

Decreasing Simulation Anxiety in Nursing Education

Demographic Questionnaire

1. What grade are you in? (Please check one)

_____ Junior _____ Senior

2. What is your gender? (Please check one)

_____ Male _____ Female

3. What age range are you in?

_____ under 18 years

_____ 18-25 years

_____ 26-35 years

_____ 36-45 years

_____ 46-55 years

_____ 56-65 years

_____ over 65 years

4. Do you have a pre-existing diagnosed anxiety disorder?

_____ Yes _____ No

Appendix C

Decreasing Simulation Anxiety in Nursing Education

Please mark each statement with the appropriate response:

1- Strongly Agree, 2- Agree, 3- Unsure, 4- Disagree, 5- Strongly Disagree

Satisfaction Item:

I am satisfied with my learning experience through today's simulation.

1 2 3 4 5

Progressive Muscle Relaxation Item:

I am satisfied with the use of progressive muscle relaxation in today's learning

experience. 1 2 3 4 5