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Assessing the Impact of Simulation Role on Anxiety and Perceived Outcomes in Undergraduate Nursing Students

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Assessing the Impact of Simulation Role on Anxiety and Perceived Outcomes in Undergraduate

Nursing Students

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Abstract

Background: Due to large class sizes and limited resources, students participating in high-fidelity simulation experiences may be assigned to an observer role as opposed to an active, nursing role. It is important for educators to determine if anxiety levels and student learning outcomes are comparable regardless of role.

Methods: A quasi-experimental correlational study composed of 132 prelicensure baccalaureate students was conducted.

Results: There were no significant differences between simulation roles for anxiety levels and perceived outcomes for satisfaction, self-confidence in learning, clinical ability, problem solving, confidence in clinical practice, and collaboration.

Conclusions: These findings suggest that either role is an appropriate assignment during simulation.

Keywords: anxiety, collaboration, clinical ability, confidence, satisfaction, problem solving, undergraduate nursing students, simulation

Chapter I

The clinical component of a nursing program can be an exciting but stressful time for prelicensure, baccalaureate nursing students (Chernomas & Shapiro, 2013; Cowen, Hubbard, & Hancock, 2016; Lei, Jin, Shen, Li, & Gu, 2015). Placed in complex and dynamic healthcare environments, nursing students are challenged with utilizing newly acquired skills and making rapid clinical decisions in the quest to provide safe and quality care. Even with the safety net of a clinical instructor available to supervise and assist, there will be opportunities when students need to use clinical reasoning, perform nursing skills, and function independently. During these encounters, students must possess the necessary knowledge, skills, and attitudes to provide patient-centered care for that unique individual and family (Cronenwett et al., 2007). One teaching modality that nursing educators use to prepare individual students or groups of students for patient care experiences and evaluate performance is high-fidelity simulation (HFS) (Darcy Mahoney, Hancock, Iorianni-Cimbak, & Curley, 2013; Halabi Najjar, Lyman, & Miehl, 2015; Hayden, Smiley, Alexander, Kardong-Edgren, & Jefferies, 2014; Hollenbach, 2016; Hooper, Shaw, & Zamzam, 2015; Megel et al., 2012; Partin, Payne, & Slemmons, 2011). For this type of simulation, full-sized, computer-controlled manikins with the functionality to imitate a patient's physiological responses to illness, injury, and interventions are placed in an environment that mimics a clinical setting. To enhance the realism of the experience, these manikins can also communicate and interact with the students. There is evidence to show that simulation-based education is effective in providing nursing students with safe and realistic environments to practice skills and potentially improve learning outcomes when compared to traditional learning methods (Hayden et al., 2014; Shin, Park, & Kim, 2015).

Problem Statement

Factors such as large class sizes or inadequate resources often necessitate that educators use HFS for group experiences as opposed to having a single student paired with one faculty and one patient simulator (Foronda, Liu, & Bauman, 2013; Kaplan, Abraham, & Gary, 2012). During these group experiences, students are assigned to various roles such as primary nurse, medication nurse, charge nurse, family member, and observer. Students in the varying roles have different experiences based on the level and type of engagement that is appropriate within their assigned role (Zulkosky, White, Price, & Pretz, 2016). Some of the roles allow for an active, hands-on experience, such as the medication nurse who interacts directly with the patient simulator to administer medication and provide patient teaching. Other roles such as the observer may be considered as a more passive role since the student does not interact directly with the patient simulator. One gap identified in simulation research is what roles students should play (Mariani & Doolen, 2016). For nursing educators, it is imperative to know if students in the different roles experience the same levels of anxiety and attain comparable outcomes in important areas such as satisfaction, confidence, clinical ability, problem solving, and collaboration.

Purpose

The purpose of this study was to explore the impact of simulation roles on anxiety and perceived student outcomes of satisfaction, self-confidence in learning, clinical ability, problem solving, confidence in clinical practice, and collaboration in prelicensure, baccalaureate nursing students who participate in HFS. The following objectives and research questions were the focus of this study.

Objectives

This study will determine if:

1. There is a difference in state anxiety level and student outcomes (satisfaction, self-confidence in learning, clinical ability, problem solving, confidence in clinical practice, and collaboration) in those assigned to the active versus observer role.

2. There is a relationship between student demographics, anxiety level, and outcomes (satisfaction, self-confidence in learning, clinical ability, problem solving, confidence in clinical practice, and collaboration).

3. State anxiety levels change from pre-simulation to post-simulation.

Research Questions

Among prelicensure, baccalaureate nursing students enrolled in either a health assessment and basic skills (Skills) course or an adult medical/surgical (M/S) course who are participating in high-fidelity simulation:

1. Is there a difference in state anxiety level and student outcomes (satisfaction, self-confidence in learning, clinical ability, problem solving, confidence in clinical practice, and collaboration) in those assigned to the active versus the observer role?

2. Is there a relationship between student demographics, anxiety level, and outcomes (satisfaction, self-confidence in learning, clinical ability, problem solving, confidence in clinical practice, and collaboration)?

3. Will state anxiety levels change from pre-simulation to post-simulation?

Background Information

With the use of HFS, students have the opportunity to learn, practice, and refine a myriad of cognitive, affective, and psychomotor nursing skills in a setting that does not jeopardize the safety of patients (Hayden et al., 2014). HFS has been used with nursing students to increase self-confidence, satisfaction with learning, knowledge, skill acquisition, and critical thinking

(Doolen et al., 2016; Fisher & King, 2013; Foronda et al., 2013; Gore & Thomson, 2016; Harder, Ross, & Paul, 2013; LaFond & Van Hulle Vincent, 2013).

Since HFS can be time consuming and require expensive, high-fidelity simulators, nursing students are often placed in groups and assigned to different roles (Hooper et al., 2015; Kaplan et al., 2012; Kelly, Hopwood, Rooney, & Boud, 2016). Based on the type of patient contact that their particular role affords them, students within the same group may have different outcomes (Zulkosky, White, & Price, 2016). Simulation researchers sometimes study the primary nurse role and allow every student to have an individual experience with the patient simulator and faculty. However, other researchers merely report that students were in a group and provide group data as if every student were functioning in equivalent simulation roles (Hooper et al., 2015; Partin et al., 2011). If the objective of the simulation experience is to positively impact student outcomes in areas such as anxiety level, satisfaction, self-confidence, clinical ability, problem solving, and collaboration, then it is imperative to know how different simulation role assignments impact these outcomes.

Supporting Data: Summary of Expert Evidence

The use of HFS to augment or substitute for a portion of traditional clinical experiences continues to grow in nursing education (Au, Lo, Cheong, Wang, & Van, 2016; Doolen et al., 2016). Organizations that provide expert guidance and evidence in the use of simulation within prelicensure nursing programs are the National Council on State Boards of Nursing (NCSBN), the International Nursing Association for Clinical Simulation and Learning (INACSL), the National League of Nursing (NLN), and the American Association of Colleges of Nursing (AACN). In the landmark study by the NCSBN (Hayden et al., 2014), researchers found that up to 50% of traditional clinical time could be substituted with high-quality simulation without

significant differences in outcomes related to NCLEX pass rates, end-of-program nursing

knowledge, clinical competency, and perceived readiness for practice. Students in this study

were placed in groups of five and assigned to one of the following roles: two nurses, one family

member, one evaluator, and one observer. Shortly afterwards, the NCSBN developed broad

simulation guidelines for prelicensure nursing programs (Alexander et al., 2015) that address

program commitment, facilities, resources, equipment, faculty, and policies. Standards of best

practice for nursing simulation were developed by INACSL and cover simulation design,

outcomes and objectives, facilitation, debriefing, participant evaluation, professional integrity,

and interprofessional education. Regarding role assignment, the standards state that it is the

facilitator's responsibility to clearly explain assigned scenario roles during the prebriefing

(INACSL Standards Committee, 2016).

     In 2003, the NLN received funding from Laerdal Medical Corporation to develop and test

models for simulation use in nursing education. Since that time the NLN has had various teams

of experts that have studied simulation and published their findings while constructing a

theoretical framework for nursing, the NLN Jeffries Simulation Theory (Jeffries, 2016).

According to this theory, simulation roles are determined while designing the scenario and are

influenced by the simulation purpose, goal(s), and availability of resources.

     The AACN supports the use of simulation in undergraduate baccalaureate programs as a

safe and effective environment for learning and practicing the cognitive and technical skills

needed for nursing practice (American Association of Colleges of Nursing, 2008). They cite the

benefits of simulation as increasing self-confidence with communication and psychomotor skills

and aiding in professional role development. It is viewed as a supplement to traditional clinical

experiences where a balance between the amount of simulation and actual patient care must be carefully considered.

Critical Analysis of Expert Evidence

The recommendations from the expert organizations are supportive for the use of simulation in nursing education but they tend to be general in their guidance. The NLN has the most specific recommendations by informing educators and researchers to design the simulation based on the objectives and available resources (Jeffries, 2016). However, those recommendations still do not inform faculty, clinical instructors, or simulation coordinators as to which simulation roles may have a greater or lesser impact on desired learner outcomes. In the NCSBN landmark study (Hayden et al., 2014), participants were assigned to different roles but there was no analysis of outcomes based on the roles they played. Another limitation of this study was the lack of diversity, with 84% participants being white and 86.1% being female. A more diverse sample may have yielded different overall or role specific results.

Theoretical Framework

The NLN Jeffries Simulation Theory (Jeffries, 2016) served as the framework for this study. Based on rigorous research, extensive literature reviews, and insight from numerous simulation experts across the nation, this theory evolved from a simulation model (Jeffries, 2005) to a mid-range theory intended to guide the implementation and research of simulation in nursing education (Rutherford-Hemming, Lioce, Kardong-Edgren, Jeffries, & Sittner, 2016). The main constructs of this theory are context, background, design, simulation experience, facilitator and educational strategies, participant, and outcomes (Jeffries, 2016). The NLN Jeffries Simulation Theory helps to explain the relationship between the learner, educator, simulator, environment, and outcomes.

Context

The simulated learning activity, from conceptualization to conclusion, occurs within a predetermined context that serves as the foundational structure. The context within the NLN Jeffries Simulation Theory focuses on the circumstances or purpose of the simulation and the setting. It is the starting point for development of the experience and impacts all other constructs (Jeffries, 2016).

Background

The theory's background component is the next step in planning a simulated experience. The educator uses the contextual information as the basis to determine the simulation goal, specific expectations, theoretical perspective of the specific simulation, how the simulation fits in the curriculum, and available resources such as time, equipment, and personnel. Decisions regarding whether the simulation will be used for instruction or evaluation are made (Jeffries, 2016).

Design

The background component directly affects the simulation design. This concept includes constructing specific learning objectives, determining the physical and conceptual fidelity needed for the simulation, developing predetermined facilitator responses, deciding whether videography will be used, structuring the progression of activities, and choosing the prebriefing and debriefing strategies (Jeffries, 2016). During this phase, educators determine which roles students will play.

Simulation Experience

The simulation experience should promote an environment of trust between the facilitator and participant while being experiential, interactive, collaborative, and learner centered. This is

in contrast to many traditional classroom environments that are teacher-centered with the student assuming a more passive role in the educational process (Jeffries & Rodgers, 2012). Within the simulation experience, there is a dynamic interaction that occurs between the facilitator and participant with both parties responsible for contributing to this environment (Jeffries, 2016).

Facilitator and Educational Strategies

The facilitator is responsible for communicating the objectives and expected outcomes; creating a safe learning environment; encouraging active learning; promoting and maintaining fidelity; modeling professional integrity; assessing and evaluating the acquisition of knowledge, skills, attitudes, and behaviors; evaluating the effectiveness of the learning experience; providing constructive feedback; and facilitating debriefing (Boese et al., 2013). The skill level, educational techniques, and preparation of the facilitator are attributes that may impact the participant and affect the simulation experience. During the simulation experience, the facilitator may adjust educational strategies based on the participants' needs. Cues from the patient simulator, other role actors, a phone call, or lab report may be used to provide support and feedback to the learner. These cues should provide enough information for learners to progress through critical points in the simulation while allowing them to continue with developing their own problem solving skills (Jeffries & Rodgers, 2012; Jeffries 2016).

Participant

Numerous factors related to the participant, such as age (Fenske, Harris, Aebersold, & Hartman, 2013), gender (Díez et al., 2013), pre-simulation preparation (Beischel, 2013), cognitive load (Fraser et al., 2012), learning style (Shinnick, Woo, & Evangelista, 2012), anxiety level (Shearer, 2016), and self-confidence (O'Donnell, Decker, Howard, Levett-Jones, & Miller, 2014) may affect the individual's simulation experience, performance, and outcomes (Jeffries &

Rodgers, 2012). Some variables that affect the participant's experience, such as motivation and enthusiasm are under the control of the individual (Adamson & Rodgers, 2016; van Soeren et al., 2011). However, many of the variables that affect the participant are influenced by the facilitator and the simulation design (Jeffries, 2016). For example, factors such as role assignment, prebriefing orientation, and group size are determined by the facilitator and based on the simulation context and background (Adamson & Rodgers, 2016; Franklin et al., 2013).

Outcomes

Outcomes of the simulation experience are separated into three categories: participant, patient (or care recipient), and system. Some of the possible participant outcomes include positive changes in satisfaction, self-confidence, knowledge, skills, attitudes, and behavior (Jeffries, 2016). Gore, Hunt, Parker, and Raines (2011) suggested that anxiety is another potential outcome of a simulation experience.

Definitions

In addition to the previously discussed constructs of the NLN Jeffries Simulation Theory, other important concepts are defined for study purposes. High-fidelity simulation is a pedagogy that uses computerized patient simulators to provide a realistic, interactive, and safe environment that mimics an actual clinical situation with the goal to promote, encourage, and improve skills necessary for clinical practice (Meakim et al., 2013). The simulation provided in this study by the Principle Investigator (PI) is high-fidelity.

Active role is a part that a student plays in the HFS that mimics a real-life nursing role. This requires active participation with the patient simulator, in addition to interactions with individuals that may be portraying the roles of family and health care team members. Examples of active simulation roles are primary nurse, medication nurse, education nurse, charge nurse,

and preceptor nurse. Students assigned to the active role will be simulating primary acute care nurse, medication nurse, or documentation nurse duties in this study.

Observer role is a part that a student plays in the HFS that involves viewing the simulation phase and then participating in the debriefing phase. This role involves no interaction with the patient simulator or anyone in an active role during the simulation phase. The observer role can be a directed or non-directed role (O'Regan, Molloy, Watterson, & Nestel, 2016). In a directed observer role, faculty provide the student with resources, such as objectives, an observational tool, a checklist, or prebriefing instructions to guide the observational learning experience. In a non-directed observer role, the student watches without specific guidelines or instructions. In this study, students assigned to the observer role participated in a directed role and observed a live stream of the simulation phase in a nearby conference room.

State anxiety is an individual's subjective feelings of worry or apprehension at a particular time in response to a specific experience (Spielberger & Reheiser, 2009). Also, activation of the autonomic nervous system occurs.

Trait anxiety is an individual's proneness to anxiety (Spielberger & Reheiser, 2009).

Satisfaction is contentment with instruction provided through the simulated experience (Franklin, Burns, & Lee, 2014).

Self-confidence in learning is a belief which the student possesses conveying some level of agreement with content mastery, content applicability, skills development, resource availability, and knowledge regarding how to obtain assistance with problem solving in simulation (Franklin et al., 2014).

Clinical ability is possession of the skill and knowledge needed to provide nursing care for a patient (Chen, Huang, Liao, & Liu, 2015).

Problem solving is engaging in activities that require finding a solution to a problem or complex issue (Chen et al., 2015).

Confidence in clinical practice is a certainty that the student has in the ability to provide nursing care for a patient or solve a patient care problem (Chen et al., 2015).

Collaboration is the skill of communicating and working jointly with other simulation or healthcare team members to provide nursing care for a patient or solve a patient care problem (Chen et al., 2015).

Chapter II

Review of Literature

Anxiety

For undergraduate nursing students, clinical practice experiences are frequently associated with feelings of stress and anxiety (Chernomas & Shapiro, 2013). There is data indicating that nursing students may be more anxious than other college students (Nielsen & Harder, 2013). One teaching strategy used to decrease anxiety in undergraduate nursing students is HFS (Hollenbach, 2016; Megel et al., 2012; Szpak & Kameg, 2013).

Hollenbach (2016) conducted a quasi-experimental study examining anxiety levels for two cohorts of junior-level, baccalaureate nursing students ($N = 61$). The study occurred at the beginning of the obstetrics course. The first cohort had the 7-week obstetric course first and then the 7-week pediatric course. The second cohort had the opposite scheduling for the two courses. Groups of six to eight students participated in a HFS workshop and state anxiety was measured using the State-Trait Anxiety Inventory (STAI) before and after the workshop. The researcher found that the mean state anxiety levels were significantly lower after the HFS workshop when compared to anxiety levels before (pre-simulation $M = 39.91$, post-simulation $M = 34.42$, $p = .001$) (Hollenbach, 2016).

Using a quasi-experimental design, Szpak and Kameg (2013) investigated the use of HFS to decrease anxiety in undergraduate, psychiatric nursing students ($N = 44$) prior to communication with mentally ill patients. Their intervention consisted of a 2-hour lecture followed by a HFS experience. The results revealed that after the intervention, mean state anxiety levels significantly decreased on the STAI and a visual analog scale with both having t-test measurements of 4.9 ($p < .01$) (Szpak & Kameg, 2013).

Megel et al. (2012) used a quasi-experimental, mixed methods study to explore the use of HFS to decrease anxiety and increase satisfaction and self-confidence in pediatric nursing students. Prior to recruitment, researchers designated entire clinical groups as either experimental or attention intervention. Each student in the experimental group ($N = 27$) had a 1-hour HFS experience and each student in the attention control group ($N = 25$) had a 1-hour session practicing new skills on a human patient simulator. Using the STAI to measure anxiety, the researchers found no significant differences between the experimental and attention intervention students' state anxiety scores before or immediately after the intervention. However, state anxiety scores were significantly lower in the experimental group as compared to the attention intervention group before and after the first head-to-toe assessment of a hospitalized child ($F_{(1,50)} = 14.29$, $p = 0.000$). The effect size was 0.72 (Megel et al., 2012).

In two of these previous studies (Megel et al., 2012; Szpak & Kameg, 2013), the intervention was designed to allow each student to individually experience the HFS intervention. This is a time-consuming educational method for faculty and may not be realistic in schools with only one high-fidelity simulator or limited faculty who are qualified to conduct simulation according to best practice standards. In Megel et al. (2012), the researchers noted that after the study, the pediatric faculty adapted the HFS experience to groups of four students and assigned each student to a different role. Important to note is that this adaptation was not investigated in Megel et al.'s (2012) study.

In an integrative review, Foronda et al. (2013) found conflicting reports related to the effect of simulation on anxiety in nursing students. Out of the 11 studies addressing anxiety, the majority suggested that simulation caused anxiety or stress. This anxiety can result from being critiqued or performing in front of faculty and peers (Halabi Najjar et al., 2015; Hooper et al.,

2015; Horsley & Wambach, 2015; Shearer, 2016). Regardless of whether students receive a

grade for the experience, they know that their performance is being informally evaluated by all

who watch (Beischel, 2013).

 Some educators find a small amount of anxiety to be beneficial to the learning process

since it is more realistic of the clinical environment and can provide an opportunity for students

to learn and practice coping skills (Foronda et al., 2013). Other educators believe that increased

anxiety levels may impair student learning and skill performance (Chernomas & Shapiro, 2013;

Foronda et al., 2013; Szpak & Kameg, 2013), which in turn may further increase anxiety levels

and decrease self-confidence (Dearmon et al., 2013). In contrast, Beischel (2013) found that

higher state anxiety scores on the STAI and qualitative findings of extremely high anxiety levels

did not have a negative impact on cognitive learning outcomes.

Simulation Outcomes

 Two outcomes that have been widely studied in relation to simulation are satisfaction and

self-confidence (Adamson, 2015; Mariani & Doolen, 2016; O'Donnell et al., 2014). Even

though satisfaction and self-confidence have been well-studied in simulation research and show

positive outcomes in relation to HFS, it is still recommended to include these outcomes as

covariates. If students have negative perceptions of the simulation experience, then attempting

to translate findings from the study to practice would be difficult (Mariani & Doolen, 2016).

 Regarding satisfaction, some researchers use qualitative studies to explore student

perceptions of satisfaction with the HFS learning experience. Au et al. (2016) investigated

perceptions for replacing a portion of clinical time with HFS and determined that over 70% of

the students had positive feelings toward the simulation activity. Partin et al. (2011) found that

associate degree students in a maternal-child course enjoyed the HFS experience and felt it

facilitated their learning. Also, baccalaureate students in a pediatric course had a positive experience with HFS exercises and a large proportion requested that the exercises be a course requirement (Darcy Mahoney et al., 2013).

Szpak and Kameg (2013) used the Simulation Evaluation Survey to investigate student perceptions of HFS. This is a 4-point Likert-type scale consisting of nine questions. It has a reported Cronbach's alpha of .87 and has undergone several revisions to establish content validity. The researchers reported overall positive findings with student perceptions of HFS except when using it to replace clinical time in the hospital.

The importance of self-confidence as a simulation learning outcome is well supported in the literature (O'Donnell et al., 2014). Self-confidence is recognized as playing a substantial part in student performance, assertiveness, communication, goal setting, and teamwork (Cowen et al., 2016). In a qualitative study using grounded theory as the framework, Halabi Najjar et al. (2015) conducted focus group interviews with three cohorts of baccalaureate students who had participated in HFS four to twelve times per academic year. These students reported that HFS helped them feel more confident in the clinical setting.

One tool used to measure both outcomes of satisfaction and self-confidence is the NLN's Satisfaction and Self-Confidence in Learning Scale (SCLS). Lewis and Ciak (2011) used it with associate degree nursing students enrolled in an obstetric and pediatric course who participated in a daylong HFS lab experience. The overall results were positive for satisfaction with the learning experience ($M = 4.33$) and self-confidence in learning ($M = 4.35$). They did not investigate a correlation between satisfaction and self-confidence. Megel et al. (2012) also used the SCLS in their study exploring anxiety. They found no significant differences between the

experimental group and attention intervention group for satisfaction ($p = 0.08$) or self-confidence ($p = 0.06$) with their respective preclinical experiences.

Using retrospective data analysis from a teaching evaluation tool, Casida and Shpakoff (2012) studied perceptions of senior level baccalaureate students (n = 209) in a critical care course. They found that the students enjoyed and preferred HFS to clinical observation. In addition, the students reported that HFS was effective in assisting them with confidence and clinical decision-making.

Evaluation of learning is an integral part of the educator's role in determining if their simulation pedagogy is effective. The outcome of learning in simulation can be assessed through changes in knowledge, skills, or attitudes (Jeffries, 2016). A meta-analysis completed by Shin et al. (2015) on the effectiveness of patient simulation in nursing education demonstrated that simulation can improve learning outcomes when compared to no intervention or traditional education. Effect sizes were larger in studies using performance-based evaluations as opposed to self-assessment, examinations, or course grades. Also, improvement was greater in student acquisition of psychomotor, affective, or cognitive skills as compared to measuring their reaction to learning. In another meta-analysis, Lee and Oh (2015) found that HFS led to a statistically significant increase in nursing students' problem solving competency, communication, knowledge acquisition, critical thinking, and clinical judgment scores.

The complexity level of the simulation impacts the development of problem-solving skills (Jeffries & Rogers, 2012). During the design phase, the educator must consider the students' skill level and knowledge along with the purpose of the HFS experience. Then the scenario is developed to promote problem solving skills by incorporating opportunities for students to plan, prioritize, and implement nursing care based on their assessment.

O'Donnell et al. (2014) reviewed evidence where researchers used the NLN Jeffries Simulation Framework to design their studies and measure the outcome of knowledge and learning. Despite the variance found in definitions of knowledge and learning, they found that the results were moderately favorable. However, they noted limitations related to inconsistency in reporting reliability and validity measures for the instruments (O'Donnell et al., 2014).

Simulation Roles

With the use of HFS as a teaching modality for various sized groups, consideration must be given to the number of students in each group and the roles that are created for them. Adamson and Rodgers (2016) stated in their research review that there is extensive literature to support the optimal number of students in group simulations. However, when Mariani and Doolen (2016) surveyed registered nurses who are a member of INACSL, these respondents indicated that there is a gap in the research regarding the number of students that should be in a simulation scenario. Partin et al. (2011) found that nursing students expressed dissatisfaction with group sizes larger than six. Hope, Garside, and Prescott (2011) described how smaller simulation group sizes allowed nursing students a greater opportunity to ask questions and collaborate for problem solving. However, the number that constitutes a small group was not disclosed. Rezmer, Begaz, Treat, and Tews (2011) found no significant differences in educational benefit for medical students participating in HFS groups of two, three, or four students. Most researchers agree that the simulation objectives should be one of the crucial determinates (Adamson & Rodgers, 2016). Frequently with large cohorts of nursing students, the availability of resources such as patient simulators, laboratory time, and faculty is the determining factor for group sizes rather than educator or student preference.

Thus, the challenge for educators is determining what roles students will play in these HFS groups and creating significant learning opportunities for all students regardless of their roles (Bethards, 2014; Hooper et al., 2015; Kelly et al., 2016). In addition to group size, the simulation objectives are key in determining the roles. In some scenarios, role fidelity or assuming a role similar to one's profession (Harder et al., 2013) is essential. The nursing role can be divided into parts, such as medication nurse, assessment nurse, documentation nurse, or charge nurse, which allows more students to participant in a role related to their profession. For other scenarios, the role of a health care professional or family member may be incorporated into the scenario to aid with understanding the function of other professions or the healthcare experience from the family's perspective. However, Harder et al. (2013) found that students assigned to non-nursing roles tended to report anxiety related to role-playing a part they felt unqualified for, such as physician or feeling pressured to perform as a difficult family member. In a study by van Soeren et al. (2011), they found that students valued being assigned to play their own professional role as opposed to any other role.

Since many nursing schools have large groups participating in simulation at one time, often students are assigned to the observer role. In a national, multi-site study, Jeffries and Rizzolo (2006) found a few significant differences between nursing students assigned to one of four roles: Nurse 1, Nurse 2, significant other, or observer. Students assigned to the observer role had a lower rating on collaboration, but they concluded that role assignment did not affect overall learning outcomes.

 O'Regan et al. (2016) investigated the observer role through a systematic review of health and education literature databases. They found that enhancement of learning and satisfaction for students in an observer role occurred by providing them with tools to focus their

observational experience, giving clear descriptions for student and faculty roles, and actively

involving observers in the debriefing phase. If the simulation is designed to engage active

observation and promote the value of the observer, then this role offers opportunities for students

to focus on thinking critically and learning the important nursing skill of observation without the

pressure of having their performance critiqued by faculty or peers (Bethards, 2014; Hober &

Bonnel, 2014). Otherwise students in the observer role may view this as merely a passive

exercise where they watch other students performing nursing skills on a patient simulator

(Harder et al., 2013; O'Regan et al., 2016).

Thidemann and Söderhamn (2013) conducted a quasi-experimental study over two years

evaluating different HFS roles for Norwegian, second-year, bachelor of nursing students (N =

144). Students volunteered for roles consisting of nurse, physician, family member, or observer.

Post-simulation knowledge test scores were significantly higher than pre-simulation scores for

all students regardless of role. On the SCLS, the satisfaction (Group 1: Nurse role, M = 24.3, SD

= 1.0; Observer role, M = 23.2, SD = 2.1. Group 2: Nurse role, M = 24.3, SD = 1.4; Observer

role, M = 21.9, SD = 2.3) and self-confidence (Group 1: Nurse role, M = 34.6, SD = 2.6;

Observer role, M = 33.6, SD = 3.4. Group 2: Nurse role, M = 33.9, SD = 2.7; Observer role, M =

30.6, SD = 3.0) with learning scores were high for all students and there were no statistically

significant differences between scores based on their role. However, on the Simulation Design

Scale (SDS), the students in a nursing role showed more positive attitudes toward the design

characteristics and on the Educational Practices in Simulation Scale (EPSS), the students' rating

scores increased proportionally with the degree of practical activity inherent within their role.

The researchers concluded that students in the observer role have the opportunity for vicarious

learning which may increase the perceived value of this role, but the nursing role was still the most preferred role (Thidemann & Söderhamn, 2013).

When planning simulation-based experiences for student groups, it is important to determine which role each student will play. Students may experience different learning outcomes and levels of anxiety based on the amount of engagement inherent in their assigned role. Often there is minimal time and resources to allow every student to assume an active, primary care nursing role and they are placed in an observer role. Currently, there is a sparse amount of evidence on whether or not students in the observer roles have similar anxiety levels and outcomes related to satisfaction, self-confidence in learning, clinical ability, problem solving, confidence in clinical practice, and collaboration. Therefore, this study addresses that gap in the literature.

Chapter III

Methodology

Study Design

This quasi-experimental correlational study aimed to explore the impact of the simulation

role on anxiety levels and perceived nursing student outcomes related to satisfaction, self-

confidence in learning, clinical ability, problem solving, confidence in clinical practice, and

collaboration. Data was collected at three distinct points throughout the study. The first data

collection occurred after recruitment. All students who voluntarily agreed to participate received

a manila envelope from the PI's research assistants. The research assistants in this study were

senior level, undergraduate nursing students. These senior students volunteered to assist and

were trained by the PI. The envelope contained two copies of the written informed consent, the

Demographic Survey, and the T-Anxiety subscale (Spielberger, Gorsuch, Lushene, Vagg, &

Jacobs, 2015). Students were asked to read and sign both copies of the informed consent (see

Appendix A). Also, they were asked to complete the Demographic Survey and T-Anxiety

subscale. Participants were instructed to insert one copy of the consent form into the manila

envelope, seal it, and return it to the research assistants. The other copy of the informed consent

was retained by the students. The participants submitted the Demographic Survey and T-

Anxiety subscale to the research assistants upon completion. The second data collection point

occurred during the prebriefing stage of the HFS experience. After the participants were

assigned to a simulation role, they completed the S-Anxiety subscale and submitted it prior to

continuing with the prebriefing stage. The third collection point occurred after the debriefing

phase of the experience and students completed the Student Satisfaction and Self-Confidence in

Learning Scale (National League of Nursing, 2004), Simulation Learning Effectiveness

Inventory (Chen et al., 2015), and S-Anxiety subscale (Spielberger et al., 2015).

The study was implemented in a school of nursing simulation lab at a large, southeastern

research university. The study population was prelicensure, undergraduate nursing students

enrolled in either a Skills course or M/S course. Currently faculty in the Skills course do not use

HFS as a teaching modality, but conducting a minimum of one HFS experience in each clinical

course is a SON goal. Therefore, the Skill's course administrator agreed to integrate the PI's

study simulation into the course curriculum as a requirement for all students. The M/S faculty

use HFS with all students to substitute for a small portion of the traditional, hospital clinical

experience and the course administrator agreed to allow the PI's HFS experience to be the

required simulation activity. In both courses, even though the PI conducted a simulation for all

students, participation in the research study, which consists of completing questionnaires, was

voluntary. Since all students in both courses were required to participate in the HFS experience,

it was unethical to have a control group. The PI was not an instructor in the Skills course or M/S

course and did not assign any grades to these students.

Measures

Demographic Survey. The Demographic Survey was developed by the PI and includes

items such as age, gender, race/ethnicity, native language, program track, GPA, work experience

in health care, and treatment for current anxiety disorder (see Appendix B). Participants were

asked about a current history of an anxiety disorder and treatment since this may impact anxiety

scores (Hollenbach, 2016). Descriptive statistics were used to assess the demographic data

obtained. Measures of central tendency and variability are reported.

State-Trait Anxiety Inventory for Adults. The State-Trait Anxiety Inventory for

Adults (STAI) (Spielberger et al., 2015) contains 40 self-report items that measure both state and

trait anxiety on a 4-point Likert-type scale. The STAI has two subscales: STAI Form Y-1

contains 20 statements that evaluate state anxiety (S-Anxiety), or how an individual feels "right

now at the moment," and STAI Form Y-2 contains 20 statements that assess trait anxiety (T-

Anxiety), or how an individual "generally" feels (Spielberger et al., 2015). Sample items include

rating oneself on how much he or she feels upset, at ease, etc. with answers ranging from 1 =

"Not at all" to 4 = "Very much so."

The range of scores for each subscale is 20 to 80 with higher scores indicating a higher

self-reported level of anxiety. A cut-off point of 39 – 40 on the S-Anxiety subscale has been

suggested as clinically significant for symptoms of anxiety (Julian, 2011). Mean normative

values for college students based on gender are reported. For males, S-Anxiety was 36.47 ($SD =$

10.02) and T-Anxiety was 38.30 ($SD = 9.18$). Whereas females were higher for both anxiety

types, with S-Anxiety reported as 38.76 ($SD = 11.95$) and T-Anxiety as 40.40 ($SD = 10.15$).

Because the total score on the S-Anxiety and T-Anxiety subscales are measured at the

interval/ratio level and the data was not normally distributed, nonparametric testing was used for

statistical analysis of each research question.

Validity and reliability have been established for this instrument (Spielberger et al.,

2015). The Cronbach's alpha coefficients for the S-Anxiety and T-Anxiety subscales were .93

and.90, respectively. In college students, test-retest reliability coefficients for T-anxiety ranged

from .73 to .86. Due to the transient nature of state anxiety, the reliability coefficient for S-

anxiety ranged from .16 to .62, with a median reliability coefficient of .33. Construct and

concurrent validity have been established with considerable supporting evidence (American

Psychological Association, 2016). Throughout the instrument's development process, each

STAI item was required to meet validity criteria to be retained on the inventory (Spielberger et

al., 2015).

      Student Satisfaction and Self-Confidence in Learning Scale. The Student Satisfaction

and Self-Confidence in Learning Scale (SCLS) (National League of Nursing, 2004) is a 13-item

self-report instrument with a 5-item subscale measuring the student's satisfaction with the

simulation learning activity and an 8-item subscale measuring the student's self-confidence in

learning. It uses a 5-point Likert-type scale for each item with students indicating how they feel

about a statement describing their attitudes or beliefs. A sample item includes "I enjoyed how

my instructor taught the simulation," with 1 = Strongly Disagree and 5 = Strongly Agree.

Responses are summed for a total score, with higher scores indicating greater satisfaction with

the simulation activity and greater self-confidence in learning, respectively (Franklin et al.,

2014). Total scores can range from 13 to 65. Previous studies have indicated adequate reliability

of this instrument, with Cronbach's alpha reported as .94 for the satisfaction subscale and .87 for

the self-confidence subscale (National League of Nursing, 2004).

      Simulation Learning Effectiveness Inventory. The Simulation Learning Effectiveness

Inventory (SLEI) is a 32-item self-report instrument with a 5-point Likert scale to measure

students' perceptions of simulation learning effectiveness (Chen et al., 2015). A sample item

includes "Simulation learning boosted my confidence in handling future clinical problems, with

1 = Strongly Disagree and 5 = Strongly Agree.   It is composed of seven subscales based on their

factor attribute: course arrangement (appropriateness in matching student learning needs),

equipment resource (availability of equipment and other resources to facilitate learning), clinical

ability (improving students' ability to perform patient care), debriefing (degree of benefit

obtained from the debriefing), problem-solving (engaging in problem-solving activities), confidence (confidence in clinical practice), and collaboration (opportunity for collaboration and communication). A higher score on each subscale indicates a greater effect of that specific domain. Per the instrument authors, the subscales can be scored individually to represent the sub-concept or can be totaled for an overall learning effectiveness score. Total learning effectiveness scores can range from 32 to 160, with higher total scores indicating a greater student perceived learning effectiveness of the simulation. In addition, the instrument developers further divided the instrument into three second-order factors that assess preparation (course arrangement and equipment resources), process (debriefing), and outcome (clinical ability, confidence, problem-solving, and collaboration) (Chen et al., 2015).

The factors and items for the instrument were developed based on critical concepts found in a review of the literature and within the NLN Jeffries Simulation Framework, which was a precursor to the theoretical framework used in this study. Additionally, the instrument developers had input from an expert panel and a focus group of nursing students. In their study of the SLEI, Chen et al. (2015) recruited a purposive sample consisting of 505 nursing students in Taiwan. Reliability of the instrument was demonstrated by a Cronbach's alpha ranging from .73 to .91 (see Appendix C) and composite reliability ranging from .87 to .91. Convergent and discriminant validities were supported by confirmatory factor analysis One limitation to using this instrument with nursing students in the United States is that the psychometric properties were measured for a Chinese population. Also, no test-retest reliability has been performed and the alpha for the total scale was high ($\alpha = .96$) which may indicate item redundancy (Chen et al., 2015).

Setting

The study's setting was in a school of nursing simulation lab at a large, southeastern university. The school has a diverse undergraduate nursing student population for age, race, and ethnicity. However, gender is predominantly female. Nursing students in this study were prelicensure, baccalaureate students. The SON admits students into one of two program tracks: the traditional track that takes 3 years to complete or the Achieving the Curriculum Expeditiously (ACE) track that takes 18 months to complete. The ACE program is a hybrid accelerated program for students who have already completed all undergraduate core courses and desire a fast-paced, rigorous course of study (Georgia State University, n.d.).

Sample

Once IRB approvals were granted from the study site and the university where the PI was completing a DNP degree program, advertisement for the study opportunity occurred in the Skills and M/S classrooms at the beginning of the semester and was repeated again on recruitment day. Advertisement consisted of a brief presentation on the purpose and requirements of participation. Risks and benefits were discussed. The PI emphasized that participation was totally voluntary and that they could participate or not without loss of any benefit to which they were otherwise entitled. The PI explained that course faculty would not know the identity of participants or non-participants. Also, the PI emphasized that participation or non-participation would not affect their course grade.

For this study, a convenience sample was obtained since it has the advantage of saving time and effort (Kim & Mallory, 2014). Students who consented to participate in the study were not randomized to groups since all students completed the HFS experience in their course-designated clinical groups. On the day of the HFS, students were assigned to an active role or observer role by basic randomization, which consisted of drawing of a role out of a hat (Polit &

Beck, 2008). At this study site, Skills and M/S clinical groups contained seven to nine students.

Since there were not an equal number of students in every clinical group, the number of active

role students remained the same, but the number of observer role students varied. All groups had

the same number of active role students, which included: one primary nurse, one documentation

nurse, and two medication nurses. Then based on the total number of students in a group, the

observer role had three, four, or five students. An a priori sample size calculator indicated that

the total sample size needed to accomplish a medium effect size, alpha of 0.05, and power of

0.80 was 130 students.

Simulation Intervention

Using the NLN Jeffries Simulation Theory as the framework, the simulation intervention

was developed, implemented, and evaluated. The simulation context was for instructional

purposes and occurred in the academic HFS laboratory at the SON.

Study Background. The driving force for the background component was evidence-

based guidelines from the INACSL Standards of Best Practice: Simulation[SM] (INACSL

Standards Committee, 2016). The overall goal of HFS within the nursing school's curriculum is

to provide students with an opportunity to improve clinical reasoning, practice utilizing the

nursing process, and refine communication and teamwork skills in a safe environment. Also, the

availability of resources such as the patient simulator, the HFS lab, and the Simulation

Coordinator played a key part in determining when the HFS group sessions were scheduled. The

simulation resources are used by five other health care programs at the study site.

The high-fidelity, simulated hospital consists of two private rooms with each containing

the Laerdal adult simulator, SimMan. The control room is not adjacent to the simulated hospital

but is located on the same floor. Each simulated hospital room is equipped with cameras and

microphones to record and stream a live simulation to the control room and nearby classrooms. Instructors and students can observe from the control room, through the windows of the simulated hospital rooms, or in classrooms. For this HFS experience, classrooms were scheduled for prebriefing, viewing of the HFS live stream, and debriefing.

Study Design of Simulation. For this study, the clinical questions and INACSL Standards of Best Practice: Simulation (INACSL Standards Committee, 2016) guided the construction of learning objectives, selection of fidelity level, progression of activities, and prebriefing and debriefing strategies. The student learning objectives (see Appendix D) for the simulation were the same regardless of whether the participant was in the Skills or M/S course or assigned to an active or observer role.

Based on the SON's most recent NCLEX program report from the NCSBN, one area where students needed additional instruction was caring for patients experiencing an alteration in gastrointestinal (GI) functioning. Therefore, the PI implemented the NLN's SimMan scenario featuring Maria Gonzales, a 46-year-old Hispanic patient with acute pancreatitis. Using the NLN Jeffries Simulation Theory (Jeffries, 2016) and standards of best practice (INACSL Standards Committee, 2016) as a guide, the complexity of the scenario was slightly different for the Skills and M/S students based on the expected knowledge and skill level for students in each course.

Prior to the day of their scheduled HFS, the M/S students were required to complete an assigned textbook reading on nursing care of a patient with acute pancreatitis and be prepared to answer one question during prebriefing. The question was: "What is something that you learned from the assigned reading that would help a nurse provide safe and quality care for a patient with acute pancreatitis?" Since there were seven to nine students in a group and each student was

required to provide a different answer, they were instructed to come prepared with several

answers. The Skills students were not required to complete a pre-simulation assignment, but

were encouraged to read about nursing care of a patient with acute pancreatitis.

The experience was designed for the PI to function as the HFS facilitator. Thus,

promoting an environment of trust between the PI and the students was viewed as essential for

the success of the simulation (Jeffries, 2016) and began during recruitment. The benefits for

participating in the study along with the importance of simulated educational experiences in

preparing students for traditional clinical rotations, providing a safe environment for practicing

skills, and improving clinical decision-making were explained during each encounter with the PI.

The PI emphasized that students would have the opportunity to discuss nursing care for the

scenario patient and practice skills prior to the scenario to support successful achievement of the

learning objectives and a learner-centered experience (Jeffries, 2016). The simulation

experience was designed as a practice opportunity as opposed to being used as an evaluation

method. To promote a psychologically safe environment, the PI explained that there would be

no penalties for making mistakes. The HFS experience was not video recorded for debriefing or

student evaluation. The PI encouraged the students to call or email at any time with questions or

concerns related to the study or scheduled simulation experience.

Supporting roles were incorporated into the design to enhance the progression of the

scenario, increase the realism of the simulated experience, and allow the PI to remain in the

facilitator role. The supporting roles included the charge nurse, staff, floater, and simulation

operator. Senior level, undergraduate nursing students were used in the supporting roles of

charge nurse, staff, and floater, and an occasionally as simulation operator. These students

volunteered for this educational opportunity and were trained by the PI. They received 1-to-1

credit hours for their assistance. These hours were applied towards the premium experience

component of their senior practicum course. The charge nurse assisted active role students with

issues regarding patient care or functionality of equipment. Positioned at the nurses' station,

charge nurses were instructed not to intervene or provide any cues except upon request by active

role students. The staff role student answered the phone as the hospital operator. Then they

assumed the role of whomever the active role nurse was calling. For example, if the primary

nurse called the operator and asked to speak with the on-call provider, then the operator would

reply, "Please hold while I transfer you to Dr. X." Then the operator (staff role senior student)

would assume the role of the requested staff and reply, "This is Dr. X. How may I help you?"

Skills and M/S students were expected to use SBAR for communication with the provider since

both levels had been instructed in this technique in their clinical courses. This expectation was

shared with students during the prebriefing. The floater role students" responsibilities consisted

of answering questions for observer students, functioning as the pharmacy or central supply tech

to deliver supplies to the active role students, and assisting the simulation operator with resetting

the simulated hospital in-between groups. The simulation operator ran the simulator during the

scenario and was the voice of the patient simulator.   Any cues that the students needed to

progress through the scenario were provided by the patient, Ms. Gonzalez.

      Study Simulation Experience. The HFS experience was composed of three phases:

prebriefing, simulated scenario, and debriefing. A timed schedule was developed to ensure

consistency between groups (see Appendix E). Students participating in the study completed

research questionnaires during the prebriefing and debriefing phases.

      The PI conducted the prebriefing phase and used a script to decrease inconsistencies

between groups. The script varied slightly for the Skills and M/S students since the Skills

students did not have the same knowledge base or pre-simulation assignment as the M/S

students. For example, during the prebriefing portion when nursing care of the patient with acute

pancreatitis was addressed, the sessions with the Skills students consisted predominantly of a

lecture style. However, that same prebriefing portion for the M/S students was student-led since

each individual shared the results of their pre-simulation assignment.

During the prebriefing phase, the PI reviewed the HFS objectives (see Appendix F) and

nursing care for a patient with acute pancreatitis; provided general functional guidelines, such as

a description of the roles, time allotments, conduct and confidentiality; promoted a safe

environment; and oriented the students to the simulation manikin, hospital, and equipment

(Meakim et al., 2013; Page-Cutrara, 2014). In addition, all students were given the opportunity

to practice a medication calculation and withdrawing an IV medication from a vial. Transfer of

care report was given during the prebriefing so that all students, regardless of their role, would

have the opportunity to practice the skill of receiving report and asking pertinent questions to the

nurse reporting off. The PI functioned in this role and read a scripted report.

During prebriefing, the students were randomly assigned to their simulation roles by

drawing a role out of a hat. For each group, the student simulation roles were observer role ($n =$

3, 4, or 5) and active role ($n = 4$), which was subdivided into primary nurse ($n = 1$), medication

nurse #1 ($n = 1$), medication nurse #2 ($n = 1$), and documentation nurse ($n = 1$). The

responsibilities for the active roles and observer role were explained (see Appendix F) along with

the observation tool (see Appendix G) that the observer role students completed during the

simulated scenario phase. All students were given a large nametag showing their role and

instructed to wear it for the remainder of the experience.

During the last portion of the prebriefing, the PI escorted the active role students to the simulated nurses' station and introduced them to their charge nurse. Next, the PI escorted the observer role students to the classroom where the live simulation was streamed, answered questions, and reinforced the importance of the observer role. Both the active and observer role students were given 10 minutes to collaborate and plan for the scenario.

The next phase of the HFS experience was the simulated scenario. The PI used the overhead speaker system to announce the beginning of the scenario. The active role students had 20 minutes to complete the initial assessment, medication administration, and symptom management for Ms. Gonzalez. At the end of this period, the PI announced that that the scenario was finished.

Immediately after the simulated scenario was completed, the PI and active role students joined the observer role students in the observation room for the debriefing phase. Based on INACSL's recommendations to incorporate reflective thinking and discussion within simulation, the method of debriefing used was guided reflection (Dreifuerst & Decker, 2012; INACSL Standards Committee, 2016). To ensure consistency between groups, the PI constructed and used a list of open-ended questions to engage students in both the active and observer roles (see Appendix H). The questions were learner-focused and students were asked to reflect on their feelings, accomplishment of the objectives, what went right, what went wrong, what could be done differently next time, and application to the clinical setting (Dreifuerst & Decker, 2012; Jeffries & Rogers, 2012)

Study Facilitator and Educational Strategies. Over the last 11 years, the PI has gained experience with planning, designing, implementing, and evaluating HFS for undergraduate and graduate nursing students along with interprofessional healthcare students (Cranford & Bates,

2015). Since the PI functioned as the facilitator, the PI used evidence-based educational

strategies throughout the experience to address emerging learning needs (Jeffries, 2016) .

      Study Participant Attributes and Outcomes. This study was designed to assess

participant attributes and outcomes. Data regarding participant variables that may be

confounders such as age, gender, and previous healthcare experience were collected on the

Demographic Survey and trait anxiety was measured on the T-Anxiety subscale of the STAI

(Spielberger et al., 2015). Students who participated in the study will be contributing to the state

of simulation science since the PI intends to disseminate the findings through publication. Also,

the study results will inform the Skills and M/S course administrators about attributes and

learning outcomes from an internal sample of students.

Human Subjects Protection

      This process began by obtaining necessary approval from those entities and individuals

with the overall responsibility for protection of nursing students in a university setting. Prior to

beginning recruitment of participants, approval was obtained from the IRB at the PI's university

and the study location. Approvals from the SON administration and both course coordinators

were also obtained.

      After approval was obtained from both IRBs, the study was explained to all eligible

students including benefits and risks. Students were informed that participation in the study was

voluntary, that they could withdraw from the study at any time, and that their decision would not

have any effect on their course grade. Students were informed that they may refuse to answer

any question(s) on the Demographic Survey requesting information that they preferred not to

disclose. Participants received $5 in cash as compensation for completing the study.

Confidentiality was maintained. On the consent form, an identification number was given to each student. This was their identifier to record on any instrument they completed. After the student signed the consent form with the identification number, they placed it in an envelope and sealed it. The sealed envelopes were stored in a locked file cabinet in the PI's office. Data entered into the electronic database was password protected and no identifying information was stored in the database.   All data will be destroyed three years from study completion.

Potential risks were minimal. No physical harm resulted from this study. Occasionally students may experience increased performance anxiety in a simulated learning environment when being observed. The PI and Simulation Lab Coordinator monitored for this since it is the normal protocol with any high-fidelity simulation experience. There were no verbal or nonverbal indications of abnormal anxiety levels noted during the simulation. The PI had a plan and was prepared to stop the simulation and intervene as needed to alleviate any abnormal student anxiety. Based on the level of anxiety, the PI had planned to talk with the student about any concerns or anxiety, refer the student to their university's student counseling center, or escort the student to the counseling center. The PI had brochures from the counseling center available for any student who needed this resource information. There were no indications of abnormally high anxiety noted during the simulation experience.

Chapter IV

Results

The results of this quasi-experimental correlational study exploring the impact of the

simulation role on anxiety levels and perceived nursing student outcomes related to satisfaction,

self-confidence in learning, clinical ability, problem solving, confidence in clinical practice, and

collaboration are discussed in this chapter. Reported findings include descriptive information

concerning participant demographics, trait anxiety scores, pre-simulation and post-simulation

state anxiety scores, and perceived student outcome scores on satisfaction, self-confidence,

problem solving, clinical ability, and collaboration. Reliability of the instruments used and

statistical data addressing each of the research questions are also presented.

IBM SPSS Statistics for Windows, Version 23 was used for data analysis. The analysis

and cleaning began with assessing for missing or erroneous values, outliers, and

multicollinearity. There were a few instances of random missing data but no more than one item

for any participant. The method used for dealing with the missing data was mean replacement.

Outliers were identified using scatterplots and box plots. The variables were non-normally

distributed, and therefore nonparametric testing was used to analyze the data. Correlations were

analyzed for all study variables and no multicollinearity was noted.

Sample Description

A total of 135 participants enrolled in the study. During the prebriefing, three

participants withdrew from the study for personal reasons. Findings in this study are reported on

the 132 participants who completed the entire HFS learning activity along with all pre-simulation

and post-simulation instruments. Eight Skills clinical groups containing the following numbers

of students completed the study: four groups with eight students and four groups with nine

students. For the M/S clinical groups, there were a total of nine groups with the following

numbers of students: one group with seven students, seven groups with eight students, and one

group with nine students. All groups had the same number of active role students, which

included: one primary nurse, one documentation nurse, and two medication nurses. Then the

number of observer role students varied as follows: groups of seven students had three observer

students, groups of eight students had four observer students, and groups of nine students had

five observer students.

The mean age of the study sample was 23.2 years with a range of 19 to 37 years. The

majority of participants were female (87.1%), spoke English as their native language (77.3%),

did not have a history of an anxiety disorder (84.8%), had not been granted any special

accommodations at the university (98.5%), and had no previous nursing course failure (97%).

The sample race/ethnicity was diverse and composed of African American (38.6%), Caucasian

Non-Hispanic (29.5%), Asian (19.7%), and other ethnicities (12.1%). There was a nearly

equivalent number of participants in the traditional (50.8%) and ACE (49.2%) program tracks

and those enrolled in the Skills (51.5%) and M/S (48.5%) courses. A small number of students

reported being treated for an anxiety disorder (12.9%) with medication (9.1%), psychotherapy

(3%), or other therapeutic interventions (0.8%). Only two students reported that they had

accommodations granted by the university. The mean GPA was 3.78 with a range of 3.12 to

4.18. Less than 1% of the students had any previous employment experience in healthcare

involving direct patient care.

Table 1

Sample Characteristics

Characteristic	n	%

Gender

    Male 17 12.9

    Female 115 87.1

Race/Ethnicity

    African American 51 38.6

    Asian 26 19.7

    Caucasian Non-Hispanic 39 29.5

    Other 16 12.1

Native Language: English

    Yes 102 77.3

    No 30 22.7

Program Track

    Traditional 67 50.8

    ACE 65 49.2

Course

    Skills 68 51.5

    Medical/Surgical (M/S) 64 48.5

Anxiety Disorder

    Yes 20 15.2

    No 112 84.8

Anxiety Disorder Treatment

    Medication 12 9.1

    Psychotherapy 4 3.0

Other	1	0.8
University Granted Accommodations		
Yes	2	1.5
No	130	98.5
Type of Accommodations		
Extended time	1	0.8
Audio recorder	1	0.8
Scheduled breaks	1	0.8
Previous Nursing Course Failure		
Yes	4	3
No	128	97
Healthcare work experience		
Yes	13	10.2
No	119	89.8
Length of healthcare work experience[a]		
0 – 12 months	5	38.5
13 – 24 months	5	38.5
25 – 36 months	1	7.7
37 – 60 months	2	15.4

Characteristic	*M (SD)*	**Range**
Age (years)	23.2 (4.3)	19 - 37
Grade point average (GPA)	3.78 (0.2)	3.12 – 4.18

Note. [a]n = 13.

On the STAI subscales, the sample mean for the T- Anxiety was 38.45 (SD = 10.14), the

pre-simulation S-Anxiety was 40.00 (SD = 12.95), and the post-simulation S-Anxiety was 33.55

(SD = 10.98). The T-anxiety and post-simulation S-Anxiety scores indicated low levels of

anxiety for the participants whereas the pre-simulation S-Anxiety score indicated a possible

clinically significant level of anxiety (Julian, 2011). The possible range for both the T-Anxiety

and S-Anxiety subscales is 20 to 80 with observed ranges of 21 to 69 for the T-Anxiety, 20 to 75

for the pre-simulation S-Anxiety, and 20 to 64 for the post-simulation S-Anxiety. The reliability

was strong for the T-Anxiety (α = .93) and S-Anxiety subscales at the pre-simulation (α = .95)

and post-simulation (α = .94) measures.

Table 2

State-Trait Anxiety Inventory for Adults

Subscale	Possible Range	Observed Range	Mean (SD)	Cronbach's Alpha
T-Anxiety	20 - 80	21 – 69	38.45 (10.14)	.93
S-Anxiety (Pre-Simulation)	20 - 80	20 - 75	40.00 (12.95)	.95
S-Anxiety (Post-Simulation)	20 - 80	20 - 64	33.55 (10.98)	.94

For the SCLS, the total scale mean was 56.68 (SD = 6.50), indicating high satisfaction

and self-confidence in learning. The SCLS had a possible range of 13 to 65 and an observed

range of 23 to 65. The Satisfaction with Current Learning subscale had a mean of 22.54 (SD =

3.00), possible range of 5 to 25 and an observed range of 6 to 25. The Self-Confidence in

Learning subscale had a mean of 34.14 (SD = 3.98), possible range of 8 to 40, and an observed

range of 17 to 40. Reliability measures were strong for the total scale (α = .90) and Satisfaction

subscale (α = .92) and satisfactory for the Self-Confidence in Learning subscale (α = .78).

Table 3

Student Satisfaction and Self-Confidence in Learning

Scale	Possible Range	Observed Range	Mean (SD)	Cronbach's Alpha
Total Scale	13 - 65	23 - 65	56.68 (6.50)	.90
Subscales				
Satisfaction	5 - 25	6 - 25	22.54 (3.00)	.92
Self-Confidence in Learning	8 - 40	17 - 40	34.14 (3.98)	.78

The SLEI total scale mean was 138.82 (SD = 16.73), indicating overall high learning

effectiveness for participants. The SLEI had a possible range of 32 to 160 and an observed score

of 63 to 160. The subscale scores of interest for this study were: Clinical Ability (M = 22.36, SD

= 2.87), Problem Solving (M = 29.13, SD = 4.12), Confidence in Clinical Practice (M = 20.45,

SD = 4.00), and Collaboration (17.89, SD = 2.28). The total scale reliability coefficient was .97

with the subscales ranging from .81 to .92.

Table 4

Simulation Learning Effectiveness Inventory

Scale	Possible Range	Observed Range	M (SD)	Cronbach's Alpha

Total Scale	32 - 160	63 - 160	138.82 (16.73)	.97
Subscales				
Course Arrangement	3 - 15	3 - 15	13.18 (1.82)	.84
Equipment Resource	4 - 20	10 - 20	17.41 (2.51)	.81
Clinical Ability	5 - 25	13 - 25	22.36 (2.87)	.88
Debriefing	4 - 20	4 - 20	18.39 (2.15)	.91
Problem-Solving	7 - 35	14 - 35	29.13 (4.12)	.86
Confidence in Clinical Practice	5 - 25	5 - 25	20.45 (4.00)	.92
Collaboration	4 - 20	10 – 20	17.89 (2.28)	.86

Research Questions

Among prelicensure, baccalaureate nursing students enrolled in either a Skills course or M/S course and participating in high-fidelity simulation, the following research questions were analyzed.

Research Question 1: Is there a difference in state anxiety level and student outcomes (satisfaction, self-confidence in learning, clinical ability, problem solving, confidence in clinical practice, and collaboration) in those assigned to the active versus the observer role?

Since none of these variables were normally distributed, the Mann-Whitney U was used to determine if there were any significant differences. The results showed no significant differences in pre-simulation state anxiety ($U = 2005.5$, $p = .432$), post-simulation state anxiety ($U = 1899.0$, $p = .204$), satisfaction ($U = 2114.5$, $p = .763$), self-confidence in learning ($U = 1983.5$, $p = .374$), clinical ability ($U = 2102.0$, $p = .721$), problem solving ($U = 2102.5$, $p = .726$), confidence in clinical practice ($U = 2097.0$, $p = .710$), and collaboration ($U = 2074.0$, $p = .623$) in

those assigned to the active versus the observer role. These findings indicate that there is no

difference in outcomes for students assigned to either simulation role, suggesting that either role

is an appropriate assignment during simulation.

Table 5

Differences in Students Assigned to Active Role and Observer Role

Variables	Mean Rank	Sum of Ranks	*U* Score	*Z Score*	*P Value*
State-Trait Anxiety Scale					
Pre-simulation State Anxiety			2005.5	-.785	.432
Active role	69.11	4561.50			
Observer role	63.89	4216.50			
Post-simulation State Anxiety			1899.0	-1.271	.204
Active role	62.27	4110.00			
Observer role	70.73	4668.00			
Satisfaction and Self-Confidence in Learning Scale					
Satisfaction			2114.5	-.301	.763
Active role	65.54	4325.50			
Observer role	67.46	4452.50			
Self-Confidence in Learning			1983.5	-.890	.374
Active role	69.45	4583.50			
Observer role	63.55	4194.50			
Simulation Learning Effectiveness Inventory					
Clinical Ability			2102.0	-.357	.721
Active role	65.35	4313.00			

Observer role	67.65	4465.00			
Problem Solving			2102.5	-.351	.726
Active role	65.34				
Observer role	67.66				
Confidence in Clinical Practice			2097.0	-.372	.710
Active role	65.27	4308.00			
Observer role	67.73	4470.00			
Collaboration					
Active role	68.08	4493.00	2074.0	-.492	.623
Observer role	64.92	4285.00			
Equipment Resource			1944.0	-1.088	.277
Active role	62.95	4155.00			
Observer role	70.05	4623.00			
Course Arrangement			1885.0	-1.373	.170
Active role	70.94	4682.00			
Observer role	62.06	4096.00			
Debriefing			1981.0	-.951	.342
Active role	69.48	4586.00			
Observer role	63.52	4192.00			
Learning Effectiveness			2126.5	-.235	.815
Active role	65.72	4337.50			
Observer role	67.28	4440.50			

Research Question 2: Is there a relationship between student demographics, anxiety

level, and outcomes (satisfaction, self-confidence in learning, clinical ability, problem solving,

confidence in clinical practice, and collaboration)?

Non-parametric testing was used to determine if any relationships existed between the

demographic variables and state anxiety levels since none of the variables were normally

distributed. Spearman's rho analysis revealed that there was a moderate, positive correlation

between trait anxiety levels and pre-simulation anxiety ($r_2 = .570$, $p = .000$), and a slightly lower,

positive correlation with post-simulation anxiety ($r_2 = .485$, $p = .000$). These findings indicated

that students with higher trait anxiety scores had higher, self-reported pre-simulation and post-

simulation anxiety scores. Regarding pre-simulation anxiety, Spearman's rho analysis showed

that anxiety disorder diagnosis and treatment both had a small, positive correlation with anxiety

levels prior to the simulation ($r_2 = -.215$, $p = .013$; $r_2 = -.179$, $p = .041$, respectively), indicating

that students with an anxiety disorder reported higher pre-simulation anxiety levels. For post-

simulation anxiety, there was a small, negative correlation with age ($r_2 = -.174$, $p = .047$), which

indicated as the students' age increased, their post-simulation anxiety tended to decrease.

Chi square analysis was attempted to determine a correlation between race/ethnicity and

pre-simulation and post-simulation anxiety levels since the data for this variable was divided into

four groups. However, this test was not performed because the cell frequency assumption was

violated regardless of the number of groups that the variable was divided into. Thus based on the

percentages for each race and ethnic group listed in Table 1, the groups were recoded into

"African American" and "Other." Then Spearman's rho analysis was performed and there was

no statistically significant correlation found between race/ethnicity and state anxiety levels.

 Table 6

Relationship Between Demographic Variables and State Anxiety Levels

	Pre-Simulation State Anxiety		Post-Simulation State Anxiety	
	r_s	p	r_s	p
Gender	-.152	.082	-.071	.420
Age (Years)	-.015	.869	-.174	.047[b]
Ethnicity[a]	.058	.506	.044	.620
Native Language: English	-.124	.156	-.052	.550
Program Track	.012	.894	.029	.737
Course	.056	.526	.053	.549
Healthcare Work Experience	.003	.971	.024	.781
Anxiety Disorder Diagnosis	-.215	.013[b]	-.170	.052
Anxiety Disorder Treatment	-.179	.041[b]	-.051	.560
University Accommodations	-.015	.868	-.040	.650
Previous Nursing Course Failure	-.004	.963	-.027	.756
Current GPA	-.042	.630	.000	.998
Trait Anxiety Score	.570	.000[b]	.485	.000[b]

Note. [a]Ethnicity was coded into a dichotomous variable of African American and Other in order to use Spearman's rho analysis. [b]$p = < .05$.

Since the variables measured on the SCLS were not normally distributed, Spearman's rho analysis was used to determine if any statistically significant relationships existed between the demographic variables and the student outcomes of satisfaction and self-confidence in learning. The only statistically significant finding was a small negative correlation between trait anxiety and self-confidence in learning ($r_2 = -.238$, $p = .006$). Students who scored higher on the trait

anxiety scale rated themselves significantly lower for self-confidence in learning after

participating in the high-fidelity simulation experience than those with lower trait anxiety.

Table 7

Relationship Between Demographic Variables and Student Outcomes on SCLS

	Satisfaction		Self-Confidence in Learning	
	r_s	p	r_s	p
Gender	-.028	.746	-.021	.807
Age (Years)	.009	.920	-.082	.350
Ethnicity[a]	-.071	.421	-.091	.301
Native Language: English	-.095	.279	-.063	.475
Program Track	-.034	.695	.010	.906
Course	.086	.324	-.010	.913
Healthcare Work Experience	.052	.554	-.002	.980
Anxiety Disorder Diagnosis	-.003	.974	.127	.146
Anxiety Disorder Treatment	.011	.899	.064	.467
University Accommodations	-.131	.135	-.054	.539
Previous Nursing Course Failure	.019	.826	.041	.638
Current GPA	-.032	.716	.026	.771
Trait Anxiety Score	-.134	.126	-.238	.006[b]

Note. [a]Ethnicity was coded into a dichotomous variable of African American and Other in order to use Spearman's rho analysis. [b]$p = < .05$.

The Spearman's rho analysis was used to determine if any relationships existed between

the demographic variables and student outcomes measured on the SLEI (clinical ability, problem

solving, confidence in clinical practice, and collaboration) since all variables were not normally distributed. The analysis revealed that trait anxiety had a small negative correlation with problem solving ($r_2 = -.186$, $p = .033$) and confidence in clinical practice ($r_2 = -.207$, $p = .017$). Students who scored higher on the trait anxiety scale rated their problem-solving skills and confidence in clinical practice significantly lower than those with lower trait anxiety.

Table 8

Relationship Between Demographic Variables and Student Outcomes on SLEI

	Clinical Ability	Problem Solving	Confidence in Clinical Practice	Collaboration
	r_s (p)	r_s (p)	r_s (p)	r_s (p)
Gender	.042 (.635)	-.077 (.381)	.038 (.663)	-.092 (.295)
Age (Years)	-.045 (.612)	-.085 (.334)	-.025 (.778)	-.128 (.145)
Ethnicity[a]	.036 (.680)	-.089 (.311)	-.047 (.590)	.019 (.826)
Native Language: English	-.097 (.269)	.005 (.950)	-.025 (.779)	-.034 (.703)
Program Track	.133 (.128)	-.001 (.989)	.023 (.789)	.030 (.737)
Course	-.017 (.850)	.117 (.183)	.036 (.684)	.133 (.128)
Healthcare Work Experience	.052 (.553)	.104 (.234)	-.004 (.962)	.025 (.777)
Anxiety Disorder Diagnosis	.055 (.531)	.051 (.558)	.039 (.656)	-.045 (.607)
Anxiety Disorder Treatment	.098 (.266)	.101 (.251)	.021 (.814)	.042 (.631)
University Accommodations	-.138 (.115)	-.117 (.181)	-.136 (.119)	-.135 (.122)

Previous Nursing Course Failure	.059 (.500)	.108 (.217)	.023 (.790)	-.043 (.621)
Current GPA	.005 (.952)	-.113 (.196)	.044 (.620)	-.045 (.609)
Trait Anxiety Score	-.103 (.242)	-.186 (.033)[b]	-.207 (.017)[b]	-.109 (.212)

Note. [a]Ethnicity was coded into a dichotomous variable of African American and Other in order to use Spearman's rho analysis. [b]$p = < .05$.

Research Question 3: Will state anxiety levels change from pre-simulation to post-simulation?

A Wilcoxon signed-rank test was used to test the hypothesis that state anxiety levels would change from pre-simulation to post-simulation. A statistically significant decrease in state anxiety levels occurred from pre-simulation (*Mdn* = 39.00) to post-simulation (*Mdn* = 31.00), $z = -6.66$, $p = .000$, $r = -.41$.

Chapter V

Discussion

This quasi-experimental correlational study was performed to explore an identified gap in the research regarding what roles students should be assigned in simulation-based learning activities (Mariani & Doolen, 2016). The HFS roles investigated were active role, which was divided into acute care primary nurse, medication nurse, and documentation nurse, and observer role. The findings and conclusions regarding the impact of these simulation roles on anxiety and perceived student learning outcomes are discussed in this chapter. Also, strengths, limitations, and implications for practice and future research are presented.

Research Question 1: Differences in Anxiety and Student Outcomes Between Roles

In this study there were no significant differences found in self-reported state anxiety level and student outcomes in those assigned to the active role as compared to the observer role. The evidence indicates that students experience anxiety related to the use of simulation-based education (Beischel, 2013; Gantt, 2013; Halabi Najjar et al., 2015; Paige & Morin, 2015). This trend was reflected in this study with the overall pre-simulation S-Anxiety score indicating a possible clinically significant level of anxiety (Julian, 2011). As expected, students in this study had higher pre-simulation than post-simulation state anxiety scores. Interestingly though, there was no significant difference in pre-simulation or post-simulation state anxiety level between students based on role assignment. Students in the observer role who were not performing in front of their peers still reported comparable levels of state anxiety to students who were in the active roles being observed through live streaming.

There were varying levels of student engagement based on the role they played. The primary care nurse had more hands-on experience with the patient simulator than any other role.

Yet, similar to previously reported findings, there were no significant differences in perceived learning outcomes based on any role assignment (Hober & Bonnel, 2014; Jeffries & Rizzolo, 2006; Kaplan et al., 2012; Smith, Klaassen, Zimmerman, & Cheng, 2013; Thidemann & Söderhamn, 2013). Also there were no differences in outcomes between primary nurse, medication nurse, and documentation nurse roles. Overall students reported a high level of satisfaction, self-confidence in learning, clinical ability, problem solving, confidence in clinical practice, and collaboration, regardless of assigned role. This is in contrast to the findings of Harder et al. (2013) where students perceived the observer role as passive and preferred not to be assigned to it. The differing results may be due to the level of engagement planned for the observer role participants. In the current study, the students functioned in a directed observer role (O'Regan et al., 2016) and were instructed on the importance of their role, provided with an observation tool, trained during prebriefing, and included as a significant part of debriefing. In addition, the observer role participants were encouraged to discuss the simulation while observing it to facilitate improvement of teamwork and collaboration skills. Discussions among peers during observational experiences also assists nursing students in comparing their judgment with others and possibly correcting inaccurate thought processes (Bethards, 2014).

Research Question 2: Relationships Between Student Demographics, Anxiety, and Outcomes

This study had a diverse racial and ethnic sample of students in comparison to many studies that are predominantly composed of Caucasian Non-Hispanic participants (Graham & Atz, 2015; Hayden et al., 2014). The majority of the students in this sample self-identified as African Americans (38.6%), followed by Caucasians (29.5%), Asians (19.7%), and other minority groups (12.1%). The patient in the scenario was Hispanic and the manikin's skin tone

was white. Despite the disparity between the racial/ethnic groups represented in this study and

the simulated patient, there were no significant differences in anxiety levels or learning outcomes

based on student race/ethnicity. This seems to indicate that the skin tone and race/ethnicity of

the simulated patient was not a perceived barrier to students of a different racial or ethnic

background. Graham and Atz (2015) reported a lack of simulation literature related to the

effectiveness of HFS with diverse groups and the perceptions of minority group students for this

teaching method. Findings from this study address that gap. This diverse sample, which

included minority students, had similar perceived learning outcomes, including satisfaction with

the learning experience.

       Considering gender and anxiety levels, females reported higher levels of state and trait

anxiety than males, which is consistent with normative values for college students (Spielberger et

al., 2015). Demographic variables that significantly impacted some of the participants' S-

Anxiety were age, anxiety disorder diagnosis, and current treatment for an anxiety disorder. As

the students' age increased, the level of S-Anxiety decreased after the simulation, but age had no

significant effect on anxiety experienced prior to the simulation. Fenske et al. (2013) found that

age affected self-assessment compared to actual performance during simulation, but there were

no significant results found in the simulation literature related to S-Anxiety and age. For

students with an anxiety disorder diagnosis and those undergoing any treatment for anxiety, they

reported higher pre-simulation S-Anxiety than their counterparts but comparable post-simulation

S-Anxiety scores. Thus, even though these students started out with higher anxiety levels, they

were able to decrease their anxiety level by the end of the experience and achieve similar

learning outcomes to those without an anxiety disorder diagnosis or undergoing current

treatment.

In regard to T-anxiety, students with higher trait anxiety scores had higher pre-simulation and post-simulation S-Anxiety scores than those with lower T-Anxiety. According to Spielberger et al. (2015), the stronger the T-Anxiety, the more likely that an individual will experience a greater increase in S-Anxiety in any situation perceived as threatening. Higher trait anxiety scores also negatively impacted students' confidence levels and problem-solving skills. Students who scored higher on the trait anxiety scale tended to rate their self-confidence in learning, confidence in clinical practice, and engagement in problem solving as significantly lower.

This study included students in their first clinical course and during their M/S course, but it was the first HFS experience for both groups. Despite their different placement in the nursing program and different pre-simulation assignment, there were no differences in state anxiety levels or perceived learning outcomes.

Research Question 3: Change in Pre-Simulation to Post-Simulation Anxiety

There was a statistically significant decrease in self-reported state anxiety from the pre-simulation to the post-simulation measure. This finding is consistent with other studies where anxiety decreased after the simulation experience (Hollenbach, 2016; Megel et al., 2012; Szpak & Kameg, 2013; Teixeira et al., 2014). Surprisingly, there was no significant difference between pre-anxiety levels between active role versus observer role. Both students who had hands-on experience and those observing had higher levels of anxiety prior to the simulation than after they completed the experience.

Additional Findings

It is vital for educators to evaluate their clinical pedagogy to determine if they are helping students learn how to think and act like a nurse. Learning effectiveness is the degree to which

the learning method employed is successful in producing desired outcomes (Chen et al., 2015). In this study, the learning method was HFS and students rated its effectiveness as high in improving their outcomes related to clinical ability, problem solving, confidence in clinical practice, and collaboration.   Results of the SLEI revealed that the students also rated other aspects of the HFS experience as effective, including the debriefing phase, equipment resources, and appropriateness of the HFS to match their learning needs. Interesting to note is that there were no significant differences in learning effectiveness scores between students in any of the active roles or when comparing active role to observer role participants. This suggests that not only is the primary nurse role effective in producing the desired outcomes, but that the medication nurse, documentation nurse, and observer role are all appropriate assignments during simulation. In addition, the guided reflection method for debriefing appears to have similar degrees of benefit for students in all roles.

Strengths and Limitations

Several strengths of this study are noted. In this study, all phases of the HFS experience were designed, implemented, and evaluated based on INACSL's standards of best practice (INACSL Standards Committee, 2016), the NLN Jeffries Simulation Theory (Jeffries, 2016), and evidence-based literature. A standardized NLN simulation scenario was used along with the same facilitator for each simulation session. To ensure further standardization and rigor of the study, a prebriefing script was used, there was consistency of reflection questions posed during debriefing, and self-report instruments with good psychometric properties were employed. Two of the instruments used in this study, the STAI and SCLS, have both been used frequently in nursing research. Thus, data obtained from these two instruments can continue to build on previous research findings.

This study promoted and evaluated the development of the Quality and Safety Education for Nurses (QSEN) competency for teamwork and collaboration (Cronenwett et al., 2007). Both the active role and observer role students were encouraged to work as a team and collaborate with their peers during all phases of the simulation-based experience. This study indicates that HFS may be an effective teaching and learning strategy for the development of teamwork and collaboration in student groups. Also, being part of a team, receiving peer support, and learning from peers have been reported as important variables for building self-confidence (Chesser-Smyth & Long, 2013).

Role fidelity is indicated as an important component of simulation for students because it gives the novice an opportunity to explore and practice their future role (van Soeren et al., 2011). Also, playing non-nursing roles, whether it is physician or family member, can increase student anxiety (Harder et al., 2013). In this study, role fidelity was maintained by creating roles based on activities that registered nurses typically perform in the acute care setting, such as administering medications and documenting care. Even the observer role was developed as a directed role and students were given an observation tool to assist them. This allows students the opportunity to practice the critical nursing skill of observation and to engage them in the learning experience (Hober & Bonnel, 2014; O'Regan et al., 2016).

There were some limitations with this study. A convenience sample from a single baccalaureate nursing program at a southeastern, urban university was used. Thus, the results may not be generalizable to other programs or geographical regions. Students were assigned to groups based on their clinical group and not randomized. This could have impacted their responses on certain outcomes such as teamwork, collaboration, and problem solving. If the students already had a rapport built due to working together in the traditional clinical setting,

then they may have scored these outcomes as higher than if they were in a simulation experience

with students that they had minimal previous contact. There was no control group to compare

learning outcomes between students who participated in this simulation-based educational

intervention and those exposed to traditional clinical methods only. Since the study occurred on

multiple days over a 3-week period, contamination may have occurred between groups. Finally,

this study relied on students' self-reported perceptions for learning outcomes and anxiety. As

with any self-report measures, there is the risk of social-desirability bias (Rosenman, Tennekoon,

& Hill, 2011). Since the PI is a nursing faculty member at the study site and will be a future

course instructor for all of the participants, it could be that the participants responded in a more

favorable manner than what accurately represented their perception of the experience.

Implications for Practice and Future Research

Findings from this study have implications for nursing educators and researchers. Since

there were no significant differences found in self-reported state anxiety level and perceived

student outcomes in those assigned to the active role as compared to the observer role, then

either role assignment may be appropriate for students during HFS. Active roles' group sizes of

four with the roles of primary nurse, medication nurse, and documentation nurse yielded

comparable results between those roles as did observer role groups of three, four, and five

students. More research is needed to determine the optimal group size for the observer role

students. If additional students are added or a live simulation is streamed into a large classroom,

it is important to determine if students still will be able to interact with other students to achieve

learning outcomes related to teamwork, collaboration, and problem solving.

Based on the study findings, high satisfaction levels and other desired learning outcomes

may be achieved with HFS for diverse groups and minority groups even when educators have

limited equipment resources to provide cultural diversity. The patient's scenario story, attire, or family members may be designed to include aspects of various cultures. In this study, the patient was Hispanic and shared with the nurses how important family was in her culture. None of her family was present with her in the hospital and she was distraught about that.

In regard to anxiety associated with HFS, educators should be aware that it exits in both hands-on or observer roles. Attempts should be made to moderate anxiety levels prior to the simulation. Additional research is needed to determine if the pre-simulation S-Anxiety level would be as high for these students with repeated exposure to HFS experiences. Since higher trait anxiety affects students' state anxiety, self-confidence in learning, confidence in clinical practice, and problem solving, then these students need to be identified and interventions developed to help them better manage their anxiety.

Replicating this study with multisite locations would allow for more generalization of findings. Adding a control group to compare learning outcomes between students who engage in HFS experiences and those who participate in traditional clinical experiences only would be beneficial. One of the most important research areas involves determining if these perceived learning outcomes are translated into clinical practice. If the students' perceived improvements in clinical ability, problem solving, confidence, and collaboration are not evidenced when these students are providing direct patient care, then the learning effectiveness of the HFS experience may need to be re-evaluated and improved.

Finally, additional research is needed to examine the HFS assigned roles and their outcomes from the nursing faculty's perspective. This study focused on the student's perspective related to similar outcomes, regardless of assigned role. While an important first step, the next

logical step would be to confirm that all roles are comparable in meeting learning outcomes through summative evaluation methods.

Conclusion

One method that undergraduate nursing educators use to improve student anxiety levels and learning outcomes is HFS. Due to inadequate resources related to time, space, equipment, and trained faculty, along with large numbers of nursing students in clinical courses, not every student has the opportunity to function in a hands-on, active nurse role. This study aimed to investigate an identified gap in the simulation research regarding what simulation role should students play. This quasi-experimental correlational study assessed the impact of anxiety levels and perceived learning outcomes of students assigned to an active simulation role as compared to those in a directed observer role. A convenience sample of 132 undergraduate baccalaureate students enrolled in either a Skills or M/S course in a large, urban university participated. The findings indicated that there is no difference in outcomes for students assigned to either an active or observer simulation role, suggesting that either role is an appropriate assignment during simulation. Also there were no differences in outcomes between primary nurse, medication nurse, and documentation nurse. An unexpected finding was that there were no differences in perceived learning outcomes or anxiety levels based on racial or ethnic groups. Pre-simulation state anxiety levels were high regardless of role, but the mean state anxiety level decreased significantly after the simulation. Based on these findings, it is suggested that HFS with students assigned to a variety of roles is effective in achieving student learning outcomes.

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Appendix A

Georgia State University

Byrdine F. Lewis School of Nursing

Informed Consent Form

Title: Assessing the Impact of Simulation Role on Anxiety and Perceived Outcomes in
         Undergraduate Nursing Students

**Principal Investigator: Teresa Bates, RN, MSN, Clinical Assistant Professor, Byrdine F.
Lewis School of Nursing, Georgia State University**

I.   Purpose

You are invited to join a research study. The purpose of the study is to investigate how assigned
simulation roles may affect anxiety level and outcomes, such as satisfaction, self-confidence,
problem solving, clinical ability, and collaboration in undergraduate nursing students
participating in a simulation exercise using a computerized manikin. You are invited to join
because you are an undergraduate nursing student that will be participating in a simulation
exercise as part of your course requirement. About 130 undergraduate students in the school of
nursing will be asked to be in the study. Taking part in this study is totally voluntary. You will be
asked to fill out questionnaires at three times. The first time is today after you sign the consent
form. The second and third times will occur on the day of the simulation exercise. The total time
that you will need to spend in this study is about 1 hour.

II.   Procedures

If you decide to participate in this study, you will be asked to answer some questions three times.
The first time will be today after you sign this consent form. You will fill out 2 questionnaires.
One questionnaire has general questions about you such as age, ethnicity, program track, school
performance, work experience, and mental health. The other questionnaire asks about your
feelings. It will take about 15-20 minutes to finish the forms. The second time will be on your
simulation day and will occur during the orientation period. You will fill out another
questionnaire about your feelings. This will take about 5-10 minutes. Immediately after the
simulation exercise is finished, you will complete 3 questionnaires. The questionnaires ask about
your feelings, opinions, and experiences related to the simulation exercise. This will take about
20-25 minutes.

III.   Risks

In this study, you will probably not have any more risks than you would in a normal day.
However, it is possible that some of the questions that ask you to think about your feelings may
cause you to be sad or upset. If being in the study causes you to become upset, then please let

Appendix A (Cont'd).

Teresa Bates know if it occurs during the simulation exercise since she will be there with you. If it occurs at any other time, then you can contact Ms. Bates at 770-883-7636. If you need counseling because of being upset about the experience, then Ms. Bates will talk with you about the student resources available on campus at the Georgia State University Counseling Center.

IV.   Benefits

Participation in this study may not benefit you personally. Overall, we hope to gain a better understanding of how different roles that students are assigned to during a simulation exercise affect their anxiety and the outcomes that occur in areas such as satisfaction, self-confidence, problem solving, clinical abilities, and working with others.

V.   Compensation

You will receive $5 in cash after you finish the third set of questions. This will occur at the end of the simulation exercise.

VI.   Voluntary Participation and Withdrawal

Participation in research is voluntary. You do not have to be in this study. If you want to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop participating at any time. Whatever you choose, it will not affect your course grade or academic progression.

VII.   Confidentiality

We keep your records private to the extent allowed by law. Teresa Bates, the Principal Investigator will have access to the information you provide. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board, the Office for Human Research Protection (OHRP). Your individual responses will be confidential and will not be released in any individually identifiable form without your prior consent. Your name will not be connected to your data. On this consent form, you will find an identification number. This will be your identifier to record on any questionnaire that you complete. After you sign this consent form with the identification number, Ms. Bates will place it in an envelope and seal it. The sealed envelopes will be stored in a locked file cabinet in her office and only accessed by Ms. Bates if you forget your identification number. Information from the questionnaires will be entered into a computer that will be password protected. No identifying information will be stored in the computer. All paper questionnaires and information in the computer will be destroyed three years from study completion. Your course instructors and clinical instructors will not know whether or not you participate in the study and no individually identifiable information will be shared with them. Your name and other facts that might point to you will not appear when we present this study or publish its results. The findings will be summarized and reported in group form. You will not be identified personally.

Appendix A (Cont'd).

VIII.   Costs

There are no known costs to you for taking part in this study except your time.

IX.   Contact Persons

If you have questions, concerns, or complaints about this study, contact Teresa Bates, RN, MSN, the Principal Investigator, at 770-883-7636 or by email at tbates@gsu.edu. You can also call if you think you have been harmed by the study. Call Susan Vogtner in the Georgia State University Office of Research Integrity at 404-413-3513 or svogtner1@gsu.edu if you want to talk to someone who is not part of the study team. You can talk about questions, concerns, offer input, obtain information, or suggestions about the study. You can also call Susan Vogtner if you have questions or concerns about your rights in this study.

X.   Copy of Consent Form to Participant:

You will be given a copy of this consent form to keep.

If you are willing to volunteer for this research, please sign below.

_____   _____
Participant   Date

_____   _____
Principal Investigator   Date

Appendix B

Date: ___/___/____   Participant ID #_____

Demographic Survey
High-Fidelity Simulation Study

Please complete the following information about yourself.

1. Gender (Circle one)
   1. Female
   2. Male

2. Age in years _____

3. Program track (Circle one)
   1. Traditional
   2. Accelerated

4. Which of the following courses are you enrolled in? (Circle one)
   1. NURS 2160 Basic Health Assessment and Nursing Skills
   2. NURS 3510 Caring for Adult Populations

5. Race/Ethnicity (Please Circle)
   1. African American
   2. American Indian
   3. Asian
   4. Caucasian Non-Hispanic
   5. East Indian
   6. Hispanic
   7. Other _____

6. Is English your native language? (Circle one)

   1. Yes
   2. No

7. How many months experience do you have working in healthcare with direct patient care?
For example: 1 ½ years = 18 months or no work experience = 0 months.
_____

8. Do you have an anxiety disorder? (Circle one)
   1. Yes
   2. No

Appendix B (Cont'd).

9. Are you currently being treated for an anxiety disorder with (Circle all that apply):
    1. Not applicable
    2. Medication
    3. Psychotherapy
    4. Other

10. Are you currently granted any of the following accommodations at Georgia State (Circle all that apply).
    1. None
    2. Extended time
    3. Private test room
    4. Schedule breaks
    5. Proctor reading exam aloud
    6. Note taking assistant
    7. Audio recorder

11. Have you ever failed a nursing course?
    1. Yes
    2. No

12. What is your current nursing GPA? _____

Appendix C

Subscales for the Simulation Learning Effectiveness Inventory

Subscale	Description	Number of items	Cronbach's alpha
Course	Appropriateness of course to match student's needs	3	.85
Resource	Availability of resources, especially equipment which facilitates learning	4	.82
Clinical ability	Improving student's ability to care for patients	5	.89
Debriefing	Degree of benefit from debriefing	4	.91
Problem-solving	Engaging in problem-solving activities	7	.83
Confidence	Confidence in clinical practice	5	.88
Collaboration	Collaboration and communication	4	.82

Note. Adapted from Chen, S., Huang, T., Liao, I., & Liu, C. (2015). Development and validation of the Simulation Learning Effectiveness Inventory. *Journal of Advanced Nursing, 71*(10), 2444-2453. doi:10.1111/jan.12707

Appendix D

High-Fidelity Simulation Objectives

NURS 2160 & NURS 3510

Spring 2017 Semester

1. Identifies the primary nursing diagnosis.

2. Identifies relevant patient history information.

3. Identifies appropriate assessment to perform based on patient history.

4. Prioritizes nursing interventions.

5. Recognizes the 5 rights of safe medication administration.

6. Determines relevant patient teaching.

7. Demonstrates direct and accurate communication with team members.

8. Demonstrates effective teamwork.

9. Utilizes problem solving in observer or nurse role.

Appendix E

NURS 3510 High-Fidelity Simulation Clinical Experience

Time Schedule

0720   Sign-in

0730   **Prebriefing begins**

Purpose of HFS experience and research study

0740   Promotion of safe environment

Encourage to view as a real hospital experience

0745   Review objectives

Provide overview of day

0755   Review **Informed Consent Form**

0810   PI leaves room and students desiring to participate sign Informed Consent Form

0820   Explain **Demographic Survey and STAI Y-2 (T-Anxiety Subscale)**

0830   PI leaves room and students complete questionnaires

0840   Break

0850   Patient report

0910   Review patient packet

Discuss results of pre-simulation preparation assignment

What is something that you learned from the assigned reading that would help a nurse provide safe and quality care for a patient with acute pancreatitis?

Discuss patient's care plan

0940   Draw roles and explain role responsibilities

0955   Explain **STAI Y-1 (S-Anxiety Subscale)**

1000   PI leaves room and students complete questionnaires

1010   Break

1025   Orientation to room and manikin

Practice assessing patient, taking vital signs, opening Pyxis and operating IV pump.

Practice medication calculation and withdrawing IV med from vial.

Meet charge nurse

1055   Take active and observer role students to their corresponding locations
        Students collaborate in their active and observer groups regarding accomplishment of
        objectives during scenario

1110   **Prebriefing ends**

1115   **Simulation scenario begins**

1135   **Simulation scenario ends**

1140   **Debriefing begins**

1215   **Debriefing ends**

        Explain last 3 questionnaires: **STAI Y-1 (S-Anxiety Subscale), SCLS, and SLEI**

1220   PI leaves room and students complete questionnaires

Appendix F

High-Fidelity Simulation Roles

Description of Responsibilities

I. Active Roles

    A. Primary nurse

        1. Performs focused, initial assessment and

        2. Delegates tasks to documentation nurse and medication nurses as needed.

    B. Medication nurse #1 – administers scheduled IV medications.

    C. Medication nurse #2

        1. Administers prn medications.

        2. Manages IV fluids.

    D. Documentation nurse

        1. Obtains and documents vital signs

        2. Documents the initial assessment, nursing interventions, and patient responses to the interventions.

II. Observer Role

    A. Watch the streamed video of the HFS from a nearby classroom.

    B. Complete the observation sheet while observing the HFS experience.

    C. Discuss the observations with the other observer role students during and after the HFS experience.

    D. Share and discuss your observations during debriefing.

Appendix G

Observer Nurse Role Observation Form

Instructions: Please answer Yes or No for each objective below. Add any comments that you would like to share during debriefing.

Did the students you were observing:	Comments
Determine: **Primary nursing diagnosis** Yes____ No____	
Obtain: **Relevant patient history** Yes____ No____	
Perform: **Focused assessment** Yes____ No____	
Prioritize: **Nursing interventions** Yes____ No____	
Administer: **Medication safely** Yes____ No____	
Perform: **Appropriate patient teaching** Yes____ No____	
Demonstrate: **Effective teamwork** Yes____ No____	
Demonstrate: **Effective communication skills** Yes____ No____	
Demonstrate: Problem solving skills Yes____ No____	

Appendix H

Reflective Debriefing Questions

Below is a list of questions that the facilitator used during debriefing to encourage reflective thinking and discussion. Students in both active and observer roles were encouraged to answer all of the questions except question 4. This question was constructed specifically for the observer role students.

1. How did you feel during the simulation scenario?

2. Which objectives were you able to accomplish?

3. a. Which objectives were you unable to accomplish?

   b. Why do you think you were unable to accomplish those objectives?

4. Observer nurses:

   a. What would you like to share from your observation worksheet with the active

      role nurses?

   b. What did you learn from the active role nurses that you observed?

5. a. What did the observer group do well?

   b. What did the active nursing role group do well?

6. If you were able to repeat this simulation scenario, what do you think that you would do

   differently?

7. What is one "take-away" that you learned from the simulation experience today that you

   will try to apply in the clinical setting during your next clinical day?

8. Is there anything else that you would like to discuss or share with the group?