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Simulation Anxiety and Learning Styles

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SIMULATION ANXIETY AND LEARNING STYLES

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ABSTRACT

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This study explored the amount and sources of nursing student anxiety associated with simulation learning activities and the effect of learning style preferences on perceived anxiety. The Westside Simulation Anxiety Survey, Felder-Soloman Index of Learning Styles and Elements of Simulation Tool were used to describe the levels and causes of anxiety for the study population. Findings of this study reveal that simulation produces a high normal level of anxiety for learners, the level of anxiety did not change from first and final semesters in the nursing program, learning style affected the amount of anxiety experienced, and certain factors of simulation cause increased anxiety for certain learning style preferences. Extremely high levels of anxiety were associated with being assigned the primary nurse role. Recommendations presented to address anxiety during simulation include student preparation techniques, the need for clear role expectations, and opportunities for self-reflection on performance. Faculty behaviors to impact anxiety levels include training, giving meaningful feedback, and building on the strengths of diverse learning preferences.

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CHAPTER I

SIMULATION ANXIETY AND LEARNING STYLES

Limited resources and increasing complexity of care amidst health reform are but a few factors that impact current nursing practice (Jarzemsky, 2012). A transformation in nursing education is needed in order to prepare the professionals needed to provide care in an ever-changing health care environment. The Institutes of Medicine (IOM), Quality and Safety Education for Nurses, and research done within the field of nursing education all declare that new alternatives in nursing education must be implemented to meet current professional practice needs (Benner, Sutphen, Leonard & Day, 2010; Institute of Medicine, 1999; Quality and Safety Education in Nursing, 2007).

Because knowledge and clinical decision-making skills are recognized as essential professional competencies for nurses, it is critical that nurse educators design educational experiences to help novice professionals learn these skills (Fullerton & Thompson, 2005; Kala, Isaramalai, & Pohthong, 2010). Simulation is one type of learning modality that can help develop professional competencies. Simulation, as used in a protected nursing education setting, is an artificial educational experience in which elements of the real world are integrated to achieve learning without the risk of real-life consequences to real-life persons (Bastable, 2008; Gaba, 2004). Eighty-seven percent of respondents to a study by the National Council of State Boards of Nursing initiated in 2010 reported using high-or medium- fidelity simulation in their nursing programs. Typically, a group of students performs tasks or provides care in simulation experiences,

which can include role-playing, actors, or static body models. Simulation often includes a prebrief period, a scenario with a mannequin (either medium or high fidelity) programmed to exhibit various symptoms as a "patient," and a debrief period.

Evidence from the literature shows that there are many positive outcomes from simulation. Simulation has been shown to positively impact cognitive skills (Elfrink, Kirkpatrick, Nininger, & Schubert, 2010), critical thinking (Kaddoura, 2010), self-confidence (Blum, Borglund, & Parcells, 2010), skill performance (Anderson & Warren, 2011; Meyer, Connors, Hou, & Gajewski, 2011), and communication (Kuehster & Hall, 2010). Due to the interactive learning involved in simulation, simulation can act as a bridge between theory and clinical practice. While this bridge to practice may be seen as a positive outcome, the experience of simulation can also cause anxiety among students (Cordeau, 2010; Lasater, 2007; Walton, Chute, & Ball, 2011) which may lead to decreased performance or learning.

Background

Simulation and Anxiety

Simulation is an educational strategy that is becoming more widespread in nursing education as a learning modality. A typical simulation experience uses prebrief preparation, scenario completion and debriefing segments to replicate real world clinical situations. Hayden (2010) reports that 77% of the 1,060 nursing programs surveyed nationally use simulations to substitute for traditional clinical time and 87% of respondents to a study by the National Council of State Boards of Nursing reported using high-or medium- fidelity simulation in their nursing programs. Schools are using

simulation activities, and research is now emerging that attempts to determine the efficacy this learning method has on improved learning outcomes.

Many studies have identified that student satisfaction and confidence is positively impacted by simulation (Bearnson & Wiker, 2005; Bremner, Aduddell, Bennett, & VanGeest, 2006; Childs & Sepples, 2006; Dillard et al., 2009; Feingold, Calaluce, & Kallen, 2004; Larew, Lessans, Spunt, Foster, & Covington, 2007; Lasater, 2007; Rhodes & Curran, 2005). Additional research focuses on scenario preparation by faculty and reflection that occurs in debriefing (Dreifuerst & Decker, 2012). To be most effective, simulation needs to allow an experience that mimics accurate nursing assessment, clinical reasoning, communication, and skilled interventions (Jeffries, 2007). As the fidelity or realism of the simulation increases, students have opportunities for problem solving similar to what may occur in actual practice.

Stress and anxiety are related. Stress, a normal part of daily thoughts and situations that produce sensations of anger or frustration, can motivate a person to take action. Anxiety is a psychophysiologic response to an excess of stress that produces feelings of apprehension or fear (Beck, Emery & Greenberg, 1985). In the academic setting students may be physically safe, but still face risks such as failure, embarrassment, and negative judgment from peers and faculty (Ganley & Linnard-Palmer, 2012). Beck, Emery & Greenberg (1985) and Greene (1985) long ago described that anxiety arises from a vulnerability that allows a learner to exaggerate the degree of threat in a situation which simultaneously negatively impacts problem-solving abilities. In simulation experiences students must be able to demonstrate knowledge while performing in front of others and thinking through uncertain nursing situations.

Additionally, faculty critique of performance is an integral part of the simulation experience. Evaluation anxiety is inversely related to cognitive functions such as problem solving (Coy, O'Brien, Tabaczynski, Northern & Carels, 2011) and impacts student performance.

Lasater (2007) reports that student anxiety in simulation increases with the anticipation of an unexpected event. Adult learners value success, and appreciate the opportunity to make mistakes in private, learn from their mistakes, and be protected from the anxiety that occurs from making mistakes in front of others (Blazeck & Zewe, 2013). While simulation is a valuable learning modality, it often is accompanied by making errors in front of others during the simulation scenario. Due to the debrief experience associated with simulation, errors are often discussed in a group setting, and reviewed with video evidence of errors. This dual trigger may accentuate the anxiety associated with the simulation experience. Conversely, it may be possible that anxiety associated with these events may decrease as students become more familiar and trusting of each other over time through progression in a nursing program.

In curriculums where simulation is used to demonstrate the achievement of course outcomes it becomes even more important that faculty address student anxiety. If a student's anxiety impairs the ability to meet outcomes, faculty may need to spend additional, individual time with the student to verify completion of course requirements. If simulation is used as a portion of required clinical hours, a make-up experience may need to be developed for individuals not able to demonstrate desired scenario performance. In summative simulation experiences, an inability to safely complete a scenario due to anxiety may prevent progression in the nursing program. Understanding

if the causes of anxiety are the same, or if anxiety triggers change with progression through a curricular course of study may assist in best use of simulation as a learning strategy.

While it is recognized that educational experiences should lead learners towards positive learning, it is also recognized that experiences that cause anxiety can lead to decreased learning (Rhodes & Curran, 2005). Frequently, simulation involves a group of students who demonstrate patient care activities while being observed by faculty and peers, which may provoke anxiety. The widespread implementation of simulation experiences in nursing education raises concern when reports of increased student anxiety are also being reported. An elevated level of anxiety induced by simulation may be viewed as positive if the learning environment is perceived as "healthy" (Ganley & Linnard-Palmer, 2012). More commonly, increased anxiety has been linked to decreased performance, focus and learning (Cheung & Au, 2011; Harvey, Bandiera, Nathens & LeBlanc, 2012). Walton, Chute and Ball (2011) report students experienced high levels of anxiety with all simulations, although this anxiety decreased with ongoing practice with the learning strategy.

Learning Styles and Simulation

Since the 1970s, countless students have had their learning styles assessed using a variety of instruments (Felder, 2010). Benefits to understanding of learning styles have been reported as necessary for students to understand their learning and for instructors to plan teaching strategies (Felder). Learning styles determine how an individual interacts in learning situations (Armstrong, Peterson, & Rayner, 2012; Cassidy, 2004). Andreou, Papastavrou, and Merkouris (2014) report that learning style is a permanent capacity

that forms mental capacities, and that there is a diversity of learning styles among nursing students. This diversity may reflect how students react while in the simulation environment.

Learning styles have been examined in relation to simulation activities. Ravert (2004) reported that critical thinking scores were not predicted by learning style while Andreou, Papastavrou and Merkouris (2014) reported that there may be a relationship between learning styles and critical thinking. Robison (2012) reported that learning style may also influence clinical judgment. In another study, Shinn (2013) reported that learning style did not influence the effectiveness of the overall simulation instructional method. When simulation is broken down into components, however, Cordeau (2010) reports that 1) various levels of anxiety are experienced at different times during simulation, 2) students individually reported various levels of anxiety related to simulation, and 3) a perceived unsuccessful intervention negatively interfered with performance for the rest of the scenario. A perception of performance that interferes with these conclusions introduces the opportunity to examine the impact learning styles may have on anxiety triggers at various points in the simulation experience.

Intuitively, educators may recognize that anxiety in a learning situation may be helpful if the level of anxiety is controlled, but may be harmful if the anxiety interferes with a student's ability to focus and demonstrate understanding. An understanding of the role, if any, that learning preferences play in predisposing students to anxiety in a simulation setting may inform the use of the individual components of simulation (prebrief, scenario, debrief) in the educational setting. Ultimately, if the desired learning

outcomes associated with simulation are not being met it becomes difficult to justify allocating the student, faculty, and physical resources to this learning method.

Problem Statement

Stress to a certain level may assist in learning and retention of information, but faculty need to consciously recognize where likely stressors in a learning experience originate in order to maximize positive learning. Simulation is increasingly being used in nursing education and is known to generate stress and anxiety in many students that can decrease learning (Cordeau, 2010; Elfrink, Nininger, Rohig & Lee, 2009; Ganley & Linnard-Palmer, 2010; Levine, 2008; Muller, et al., 2009; Sappington, 1984; Sogunro, 1998). Studies are beginning to emerge that identify what specific aspects of the simulation experience cause the anxiety. In order to maximize the overall learning experience of simulation nurse educators need to understand how student learning styles and anxiety interact with simulation across the curriculum. A lack of understanding of the student perceptions of anxiety and learning style factors at differing points of the educational experience may present limitations on the effective use of simulation as a learning strategy, effective use of faculty time, and effective use of program resources.

Purpose Statement

While there are studies providing evidence that students experience anxiety in simulation activities there is limited information on student identification of anxiety triggers at differing points of the educational program. This study built on the knowledge base regarding simulation education by asking students to reflect on various components of the simulation experience as related to their level of anxiety at different points of the educational process and compared these triggers to student learning styles.

Specifically, the purpose of this study was to explore student interpretations of potentially anxiety-provoking aspects of simulation in the first and final semesters of a nursing program and compared these identified anxiety factors with self-identified learning style preferences.

Research Questions

This study will address the following questions:

Q1 Is there a difference between levels of perceived anxiety related to simulation for students in the first and final semester of a nursing program as measured by a revised Westside [Simulation] Anxiety Scale?

Q2 For students in first and final nursing program semesters, is there a difference in identified causes of anxiety related to simulation experiences as measured by the Elements of Simulation Survey Tool?

Q3 Does the overall level of anxiety related to simulation, measured by the Westside Simulation Anxiety Scale, vary by learning style preference, measured by the Felder - Soloman learning Style Index?

Q4 Does the source of anxiety as identified by the Elements of Simulation tool vary by learning style preference, measured by the Felder-Soloman Learning Style Index?

Q5 What are sources of anxiety during simulation for first and final semester students?

Significance to Nursing

Major healthcare and accrediting bodies are calling for reform and innovation in nursing education. Implementation of new or popular strategies should not ignore that some methodologies may generate a level of anxiety in individual students that hinder learning and attainment of course outcomes. The National Council of State Boards of Nursing listed innovations in education such as clinical simulation as a research priority for 2009-2012. This study presents a response to the call for action by nursing and

health care organizations to further develop the science of nursing education in the field of simulation learning.

Theoretical and Operational Definitions

Anxiety. Psychologically, anxiety arises from student perceived potential for failure, negative judgment by faculty and peers, or embarrassment (Ganley & Linnard-Palmer, 2012). Anxiety typically includes an element of fear. Lazarus and Folkman (1984), pioneers in stress theory research, defined anxiety as an uncomfortable feeling made worse from prolonged stress and the presence of multiple stressors. In comparison, stress can be defined as a relationship between the person and the environment that is perceived as a danger to their well-being (Lazarus & Folkman) and elicits a feeling of anger, frustration or nervousness. The Westside Test Anxiety Scale (Driscoll, 2007), revised to The Westside Simulation Anxiety Scale, will be used to measure student-perceived anxiety related to simulation activities.

Cognitive Interference Theory. Developed by Sarason, Pierce, and Sarason (1996), the Cognitive Interference Theory explains the association between anxieties related to evaluation and reduced cognitive performance. The theory proposes that when faced with evaluation or possible failure, individuals worry or become anxious, which results in negative self-statements that consume mental resources and result in decreased performance (Northern, 2010).

Evaluation Anxiety. Evaluation anxiety is a specific form of anxiety that occurs during situations where an individual's performance is being evaluated in social, academic or work settings (Northern, 2010). A relationship between increased anxiety

and decreased cognitive performance has been shown using a variety of measures (Northern).

Learning Style. Learning styles have classically been defined as cognitive, affective, and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment (Keefe, 1979). A particular learning style is not better than another, but merely has different strengths and weaknesses from other styles (Felder & Brent, 2005). The Felder-Solomon's Index of Learning Styles to be used in this study identifies four opposing learning preferences: visual/verbal, active/reflective, sensing/intuitive, and sequential/global (Felder & Soloman, 1988).

Simulation. An artificial educational experience in which elements of the real world are integrated to achieve learning or evaluative goals without the risk of real-life consequences (Bastable, 2008; Gaba, 2004), simulation occurs in a protected educational environment.

Summary

Several national organizations have called for the innovative reform of nursing education methods. Some interactive, performance-based methods being implemented may cause an increase in anxiety when compared to more traditional classroom methods. Simulation activities in particular may generate a level of anxiety in students that inhibits learning, especially if there is a disparity in preferred learning style and the learning components present in simulation. The time and resources needed for simulation activities can be significant, making it imperative that faculty understand the processes that can both positively and negatively impact learning with this modality.

Healthcare agencies need nurses who are prepared to recognize critical clinical situations and make accurate clinical decisions to implement care that safeguard patients. Simulation activities can only help achieve this goal when student learning is not overshadowed by anxiety that slows or even prevents preparation to fulfill this expectation.

CHAPTER II

REVIEW OF LITERATURE

Because knowledge and clinical decision-making skills are recognized as essential professional competencies for nurses, it is critical that nurse educators design educational experiences to help novice professionals learn these skills (Fullerton & Thompson, 2005; Kala, Isaramalai, & Pohthong, 2010). While it is recognized that educational experiences lead learners towards program outcomes, it is also recognized that anxiety can lead to decreased learning (Rhodes & Curran, 2005). Faculty may assume that students are nervous, tense, stressed, or anxious in various learning environments such as exams, clinical, or simulation without understanding the source of the emotions. Identifying specific sources of student anxiety presents opportunities for faculty to develop strategies to mediate anxiety in order to maximize learning. This study explored sources of simulation anxiety as identified by student populations and reference these perceptions to preferred learning styles of students participating in simulation.

In the traditional model of nursing education, students learn and practice the knowledge and skills needed to practice within the profession in a class and campus laboratory setting. The assumption is that students transfer these skills to a clinical agency and actual patients. The focus within this model is on the completion of psychomotor tasks, with little opportunity for reflection on behaviors, outcomes, or

learning beyond task performance (Herm, Scott, & Copley, 2007). The need to change this traditional nursing education model was highlighted when the Institute of Medicine (IOM) published the now classic report "To Err is Human" (Institute of Medicine, 1999). This report emphasized medical errors made in our current healthcare system and also called for change in nursing education. Advocacy and accreditation groups such as the Joint Commission and the National Patient Safety Foundation support educational measures that increase patient safety through increased knowledge or clinical reasoning development (National Patient Safety Foundation, 2013; The Joint Commission, 2012).

Nursing educators recognize that preparation of students to provide care includes more than presenting various tasks to be performed. Employers desire nurses who have a strong knowledge foundation, communication skills, and clinical reasoning abilities. Nursing programs attempt to measure outcomes such as these while still meeting expectations from state boards of nursing, accrediting bodies such as the Accreditation Commission for Education in Nursing (formerly the National League of Nursing Accrediting Commission) and university degree requirements. The Essentials of Baccalaureate Education for Professional Nursing Practice states that the strategies implemented for educating nurses must include the use of powerful, active, and collaborative instructional methods (American Association of Colleges of Nursing, 2008). There are, however, various factors that can impact a students' ability to acquire the desired professional traits that simulation is designed to develop. These factors include anxiety, learning style and cognitive interference. These factors will be reviewed within the context of the simulation setting.

Anxiety

Psychologically, anxiety in simulation arises from student perceived potential for failure, negative judgment by faculty and peers, or embarrassment (Ganley & Linnard-Palmer, 2012). Anxiety typically includes an element of fear. Lazarus and Folkman (1984), pioneers in stress theory research, defined anxiety as an uncomfortable feeling made worse from prolonged stress and the presence of multiple stressors. In comparison, stress can be defined as a relationship between the person and the environment that is perceived as a danger to their well-being (Lazarus & Folkman) and elicits a feeling of anger, frustration or nervousness.

While stress may enhance learning, too much anxiety contributes to decreased concentration, problem-solving and academic performance (Beddoe & Murphy, 2004; Rhodes & Curran, 2005). Evaluation anxiety in adult learners has been described as an elusive, bothersome quality that impairs learning (Palethorpe & Wilson, 2011). Further, not all learners respond the same to anxiety-provoking situations. Tanaka, Takehara, and Yamauchi (2006) identified that there is a strong correlation between emotional anxiety and performance-avoidance which is demonstrated as poor performance. A person may demonstrate a focus on the task at hand and demonstrate some ability, but still have poor performance overall due to their anxiety level. Foronda, Liu, and Bauman (2013) describe this discrepancy between cognitive gain and behavioral demonstration as the difference between ‘knowing’ and the ability to use knowledge in a relevant manner, with a recommendation that more research be done to identify the relationship between anxiety level and effect on learning. The discrepancy between knowing and performance

may be explained by the amount of anxiety generated by specific aspects of the simulation environment in conjunction with internal learning preferences.

Simulation

Simulation as an educational strategy is not a new concept, nor is it unique to health care. Various simulation techniques have been used throughout history and into the present. Chess represents war games; jousting allowed knights to practice skills; the aviation industry has developed high-fidelity flight simulations; and the nuclear power industry uses simulation to prepare for potential worst-case scenarios of nuclear incidents (Bradley, 2006).

Case studies, role-play, computer-based scenarios, and standardized patients all represent the use of simulation in health care (Abersold, 2011). Asmund Laerdal worked with anesthetists to develop the "Resusci-Anne" task trainer in 1960, and manikins have become increasingly complex to now include simulators that replicate sophisticated physiologic responses based on what is done to the manikin (Bradley, 2006). Since the late 1990s a special focus on the use of clinical simulation has been encouraged by organizations such as the National League for Nursing, with the assumption that simulation can enhance the transfer of knowledge, skill development, and application of skills and knowledge (Abersold; Cantrell, 2008). Advantages of using simulation as a learning strategy include the ability to demonstrate clinical judgment, communication, and psychomotor skills in a safe learning environment (Bastable, 2008). Simulation formats also appeal to technology-savvy students while providing more engagement than traditional methods of lecture and linear thinking (Aldrich, 2005; Pardue, Tagliareni, Valigo, Davidson-Price, & Orehowsky, 2005).

Simulation research is providing evidence on the themes of confidence and self-efficacy, satisfaction, anxiety and stress, skills and knowledge, and interdisciplinary experiences (Foronda, Liu, & Bauman, 2013). The need for additional study is indicated by the occurrence of seemingly contradictory results. Confidence and self-efficacy, for example, is reportedly increased related to participation in simulation (Mould, White & Gallagher, 2011), decreased in senior-level students (Schlairet, 2011) and unable to be accurately self-identified in students (Cardoza & Hood, 2012). Two systematic reviews on confidence and simulation report conflicting results, with Cant and Cooper (2010) supporting the common report of an increase in students' confidence but Yuan, Williams, and Fang (2012) reporting insufficient evidence to support a correlation between student confidence and simulation. It is noted that while a few randomized subject studies report increased confidence (Bremner, Aduddell, & Amason, 2008; Parker, et al., 2011), many study methodologies were quasi-experimental with convenience sample participants (Bambini, Washburn, & Perkins, 2009; Blum, Borglund, & Parcells, 2010; Brannan, White, & Bezanson, 2008; Kaplan & Ura, 2010; Lewis & Ciak, 2011; Schlairet, 2011; Thomas & Mackey, 2012).

While positive learning outcomes from simulation must be demonstrated to meet criteria for American Association of Colleges of Nursing (AACN) accreditation (Davis & Kimble, 2011), research demonstrating effects of simulation on educational outcomes remains inconclusive (Bloomfield, Fordham-Clarke, Pegram, & Cunningham, 2010; Jeffries, Clochesy, & Hovancsek, 2009). Evaluation of learning outcomes from simulation has been identified as a critical component for research (Diekelman &

Ironside, 2002). The role anxiety may play in these inconclusive results remains largely unexplored.

Anxiety and Simulation

While simulation has been identified as a learning opportunity that improves confidence and satisfaction, it has also been identified as stressful and anxiety producing (Baxter, Akhtar-Danesh, Valaitis, Stanyon, & Sproul, 2009). Levine (2008) describes that anxiety may explain student feelings of helplessness following perceived failure and that a person's response to failure has "enormous implications" for a person's ability to learn new material (p. 63). Levine further explains that a challenge of learning is in mastering unfamiliar material, and when a person experiences failure it creates anxiety which then prevents the person from being successful in learning. In simulation, this anxiety may be seen when a student spends a great deal of time reviewing a patient chart, diagnostic results or a monitor reading while the patient condition is obviously deteriorating and immediate intervention is needed. Levine's work supports the need to examine how anxiety in simulation affects the learner. Reports of the anxiety produced in simulation environments have even raised a concern that benefits may not outweigh the cost for some students (Valler-Jones, Meechan, & Jones, 2011).

In a relatively early study of anxiety and simulation, Henrichs, Rule, Grady, and Ellis (2002) explored the anxiety levels of nurse anesthetist students. In this qualitative, phenomenologic study of 12 students it is reported that all students exhibited various behavioral symptoms of anxiety. The results included variations of low anxiety at an initial simulation activity to a higher level of anxiety with progression through the course. The increase in anxiety was associated with an expectation that something

unexpected was probably going to happen during the simulation that would require problem-solving that may exceed the preparation for the scenario. The contrast in student responses is clear as half of the students became more comfortable with simulation over time, while the other half of participants reported an increase in simulation anxiety over time due to feelings of being judged, out of control, and losing focus of the problem. Female participants in particular sought peer support for an avoidance of "failure" in the simulation experience.

Palethorpe and Wilson (2011) used a qualitative research strategy to explore student responses that occurred when students felt they were operating in a 'panic zone' during learning situations. Anxious behaviors reported by participants in the state of panic included "melting into the background in group work," "becomes upset or needs constant approval," and complaining about the course overall (p. 432). Gore, Hunt, Parker and Raines (2011) studied the impact of a simulation experience on reducing anxiety for a clinical placement and report that anxiety was lower for students who participated in a four hour simulation activity prior to their first clinical activity. This study confirmed the value of managing anxiety in order to reduce a barrier to learning, but did not explore the anxiety initiated by the simulation activity itself. Additional studies confirm that simulation can reduce the anxiety associated with clinical placements in pediatric and mental health units, but again did not explore any anxiety during the simulation (Megel, et al., 2012; Szepak & Kameg, 2011).

In a qualitative study exploring the experiences of 47 first-term students, of which 8 nontraditional students volunteered to be in a focus group, Lasater (2007) reported that the main theme in the focus group was anxiety. While learning in the

debriefing period of simulation was reported to occur, it was noted by several participants in this study that more learning occurred when the student was not functioning in the primary nurse role, and that students did not like performing as the primary nurse. Performance or evaluation anxiety was not directly addressed in the reported results.

Cordeau (2010) used a hermeneutic phenomenology study design that utilized a line-by-line analysis of students' written descriptions of simulation experiences. Nineteen of 48 students who consented to participate submitted completed descriptions that identified five subthemes of perceived anxiety related to clinical simulation: (a) pre-simulation related to the unknowns of clinical simulation, (b) beginning anxiety, consisting of the high level of anxiety experienced at the onset of the simulation, (c) intermittent anxiety experienced at various times depending on learner understanding, (d) continuous anxiety that pervades the entire experience, and (e) debriefing anxiety that occurs after the simulation during debriefing. The anxiety experienced in this study may have been increased as student simulation was a formal summative evaluation of their performance. Students experienced various levels of anxiety during all phases of simulation, and although there was no correlation to placement in the nursing program or of preferred learning style, the author recommends that student perception of simulation be used to better meet student needs.

A student's reality of a simulation experience includes emotions and self-awareness; if a student feels singled out or anxious the entire experience is affected (Elfrink, et al., 2009). Shepherd, McCunnis, Brown and Hair (2010) completed a quantitative, quasi-experimental longitudinal study of participants in their final year of a

three-year nursing program to evaluate performance of measuring vital signs in simulation. In this study, students completed self-assessments of confidence and anxiety, with results reported that students who were anxious before the simulation remained anxious after the experience and those who were least anxious before the simulation had the biggest increase in anxiety after the simulation. In a descriptive study, Ganley and Linnard-Palmer (2012) explored student perspectives of a safe learning environment. Students (n = 64) reported that they felt safe when they were not ridiculed or embarrassed by any mistakes, where they could function without debilitating anxiety, and were not compared with classmates. Within the simulation environment, all of these factors may be breached depending on the interpretation by the student of what occurs in the various components of simulation.

Clapper (2010) specifically identifies that feelings of fear and intimidation have a negative effect on learning. Bong, Lightdale, Fredette, & Weinstock (2010) conducted four pediatric simulations with physicians, nurses, and technicians and found that simulation-based learning activities result in increased stress that can become overwhelming. Cato (2013) reports students experience feelings of anxiety during simulation at 3 times the rate of experiencing feelings of confidence. This raises a question, "What happens within a person during simulation experiences that generates anxiety and what learning characteristics of a person contribute to anxiety?"

Learning Styles

There are several definitions of learning style based on different approaches. In the context of this study, learning style is described as a person's habitual and affective behaviors that determine how the individual interacts in learning situations (Armstrong,

Peterson & Rayner, 2012). Kolb (1984) contends that some learn best by observing and reading while others learn best by experimenting; some people enjoy learning in a group and others prefer to study alone. Simulation typically forces the student to perform in a social group, which may cause anxiety if this does not comply with how they prefer to learn. For example, in a non-experimental descriptive study exploring critical thinking and simulation, Wu, Tham, St. Lydia, Tan-Toh, & Tan (2010) reported that most students in their study were passive learners who did not like the patient simulation learning method.

An interesting dynamic of simulation as a learning strategy is that separate components of the activity and the role a student is assigned for the scenario may either match or conflict with a preferred learning style, making it difficult to match a specific learning style preference to a specific, single simulation event. So while a person's preferred learning style may be a moderating factor in a student's ability to prepare and perform in an interactive simulation experience (Hartman, 1995), this study endeavors to explore learning style, anxiety, and the components of simulation in a more global sense.

A variety of assessment measures are available to explore students' learning styles. Coffield, Moseley, Hall and Ecclestone (2004) report that 71 instruments were available at the time of their learning style instrument review. The Felder-Soloman's Index of Learning Style (ILS) is one of the most commonly used instruments used in nursing literature (Andreou, Papastavrou & Merkouris, 2014). The ILS, developed by Richard Felder and Barbara Soloman, consists of 44 dichotomous items on four scales that assess sensing or intuitive tendencies, visual or verbal tendencies, active or

reflective tendencies, and sequential or global thinking processes (Felder & Spurlin, 2005).

A sensory learner tends to be concrete and oriented towards facts and hands-on procedures while intuitive learners are more comfortable with theories and looking for meaning of an experience. Learners with a visual preference prefer pictures and demonstrations while a verbal learner prefers written and spoken explanations. An active learner processes information through physical activity and enjoys working in groups while a reflective learner seeks learning by analysis and introspection. For understanding of information, a sequential learner seeks steps and a logical progression while a global learner prefers a large picture view first and then details. (Felder & Brent, 2005).

In reviewing the internal consistency, temporal stability and factor structure of the ILS, Hosford and Siders (2010) concluded that it is appropriate to assess the learning style preference of undergraduate medical students by using the ILS. Felder and Spurlin (2005) reported that learning style preferences may explain why students may select certain professions and that students who select a field described as "practical," which includes nursing, would be expected to display predominant sensing tendencies. This expectation was not validated by a study done by Mahmoud (2012), who found in a descriptive correlational study with baccalaureate nursing students that the majority preferred visual/verbal learning. Bremner, Aduddel and Amason (2008) did not find a correlation between anxiety and a learning style preference of visual learning, while Beischel (2013) found a positive correlation between anxiety, verbal learning style and learning outcomes. In a study by Paskins and Peile (2010), medical students became more anxious as they got closer to assuming their upcoming role of physician and when

performing in front of peers. These same factors may impact the amount and type of anxiety in nursing students in their final semester of school.

If one ascribes to the theory that learning style is not fixed, but impacted by educational experiences, it may be that learning style preferences may become more balanced with progression through an educational program. If this is true, then anxiety in simulation will not show a distinct correlation to learning preference, but instead be linked to components of the simulation experience.

Theoretical Frameworks

Adult Learning Theory and Cognitive Interference Theory form a framework for understanding the impact simulation may have in the development of anxiety in nursing students. The theories describe the learning environment learner's desire and how the internal environment can impact learning.

Adult Learner Theory

Characteristics of the adult learner identified by Malcolm Knowles include being self-directed, using past learning as a resource for future learning, having a desire to apply learning to problems, and a need to understand the relevance of what they are learning (Clapper, 2010). Learning activities for these learners need to be "designed to engage students in listening to and interacting with others, observing, thinking, and doing in a way that highlights the knowledge, skills, attitudes, competencies, and skills to be acquired" (Scheckel, 2009, p. 154).

Simulation is a learning strategy that engages the student through participation with content knowledge to stimulate higher cognitive processes (Schell, 2006; Wolf, Bender, Beitz, Weiland, & Vito, 2004). Other activities that address the cognitive

domain of learning (knowledge, comprehension, application, analysis, synthesis and evaluation) include case studies, lecture, concept-mapping, questioning and self-reflection activities (Scheckel, 2009; Ming Su, Osisek, & Starnee, 2004). Simulation typically is based on a specific clinical case study story that requires a learner to use past experience, new knowledge, specific skills and problem-solving to successfully complete the scenario. All of this must occur in real time while being observed and evaluated and while opening the student to the self-perception of failure and embarrassment. This perception may lead to anxiety, and anxiety may interfere with not only learning, but also with performance.

Cognitive Interference Theory

Sarason, Pierce, and Sarason (1996) developed the Cognitive Interference Theory to explain the association between evaluative anxiety and reduced cognitive performance. In this theory, cognitive interference is negative self-talk that interferes with performance by distracting an individual from completing an expected task. Based on the "Working Memory" work of Baddeley (1992), the theory proposes that a central executive function of memory acts as an attention-controlling system that processes demanding tasks. Further, the theory proposes that when faced with evaluation or possible failure, a person may become anxious with accompanying negative self-statements (Northern, 2010). The negative self-statements result in fewer mental resources to complete the task at hand, depletes working memory (temporary data storage of information), and can cause a decline in performance (Northern). In addition, Sarason et al. (1996) propose that when in a stressful situation, an individual recognizes that something needs to be done to change the situation, which leads to thoughts that are

either relevant or irrelevant to the situation. This may also cause a decline in performance as the central executive function must allocate resources to dealing with the thoughts. Therefore, there is less thought processing available to deal with the simulation tasks that are expected to be completed.

Cognitive Interference Theory can easily be applied to the simulation experience and may explain decreased performance by students. A student may arrive at the designated simulation activity already worried about the potential for being observed while performing timed tasks. This alone may cause negative self-statements, which the central executive function must process. Add an additional stressor of being assigned to the primary nurse role, and the student may become even more anxious. This in turn causes more mental distraction from irrelevant thoughts that arise from a role assignment that assures the need to complete imposed tasks in front of observers. This may result in less working memory available to use during the simulation and the student may perform poorly in the scenario or debriefing even though performance without the associated anxiety may have been adequate to complete the tasks (such as in practice sessions). This decreased performance has been shown to be evident when additional stressors were added to a clinical site orientation (Cheung & Au, 2011) and to trauma simulations (Harvey, Bandiera, Nathens & LeBlanc, 2012).

Cognitive interference may also occur in peers observing simulation activities when a skill is performed incorrectly. When incorrect data is presented (written or visual), the observer's working memory must decide between the correct information they brought to the experience and the incorrect information they are observing, and distracting self-talk may begin for the observer. Dealing with the self-talk again takes

resources away from the central executive function, causing a loss of understanding of what is being seen. In early research by Lewis, McAllister, and Adam (1951), learners worked with simulated airplane controllers and were intentionally exposed to seeing and doing tasks the wrong way. Conclusions from this study emphasize the importance of viewing and practicing correct skills because seeing or practicing the wrong procedure requires the learner to cognitively sort through both proper and improper methods in addition to all other information they are being exposed to during the simulation.

When faced with incorrect information or a focus on less important information in a simulation a learner may leave the simulation remembering only the wrong procedure, or things not meant to be emphasized (Clapper, 2010). For example, Elfrink, et al. (2010) describe that during a simulation intended to highlight assessing oxygenation as a priority assessment for heart failure, cues that emphasized correct placement of electrocardiogram leads may have resulted in several incorrect responses in the post-simulation examination. In a study that required psychology students to read books that coincided with a movie that had conflicting information from the book, all students (n = 54) were more likely to recall the inaccurate information seen visually in the movie (Butler, Zaromb, Lyle & Rodieger, 2009; Herbert, 2010). It is therefore a challenge to all learners to deal with the processing of information in a way that creates the least amount of challenge to the central executive functioning of the memory process and the associated anxiety.

Gaps in the Literature

Several studies have explored aspects of simulation and learning styles. Learning style in simulation settings and confidence (Heston, 2010), satisfaction (Fountain &

Alfred, 2009; Gurpinar, Alimoglu, Mamakli & Aktekin, 2010), clinical judgment (Robison, 2012), and critical thinking (Andreou, Papastavrou, & Merkouris, 2014) have been previously explored. A relationship between learning style and anxiety associated with simulation has not been explored to date. While learning styles may correlate with a preference for simulation as a learning method, the cognitive interference that may occur as a result of anxiety during simulation may inhibit learning and increase any associated anxiety. Identifying the anxiety level associated with various components of simulation may give an opportunity to remove barriers to the hoped for learning from this increasingly common learning method.

Summary

Early reports on simulation from the 1990's to approximately 2005 are primarily focused on equipment and techniques. More recently, the literature is based on learning theories, student perspectives and research to develop best practices. It is also recognized that anxiety has an impact on student learning. Understanding triggers of anxiety from simulation at various points of program learning and correlating to a students' preferred learning style gives an opportunity to review all three of these latest research concerns. Adult learners appreciate relevance of learning, but do not like to experience feelings of failure in front of others. When confronted with an anxiety-producing event, learners may demonstrate decreased performance as mental resources are shunted to dealing with the thoughts associated with the anxiety-provoking event, leaving fewer mental reserves to complete the required tasks. Within the framework of Adult Learning Theory and Cognitive Interference Theory, the intent of this study was to explore student interpretations of potentially anxiety-provoking aspects of simulation

in the first semester of a nursing program and the final semester of a nursing program and compare these identified anxiety factors with self-identified learning style preferences.

CHAPTER III

METHODOLOGY

The purpose of this study was to explore the amount and causes of student anxiety in the simulation setting with any associated correlation with student learning style preference. Simulation is a learning strategy used in nursing education that provides a safe environment for students to practice the knowledge, skills and attitudes needed for professional practice. While research has shown that simulation may positively impact student self-confidence and satisfaction (Fountain & Alfred, 2009; Gurpinar, et al., 2010; Mould, et al., 2011), it is also recognized that simulation can cause anxiety that can impair performance and learning through cognitive interference (Baxter, et al., 2009; Levine, 2008).

Causes of anxiety in the simulation setting may include the potential for failing to complete expected tasks, performing in front of others, mismatch to preferred style of learning, interacting with a mannequin, or student placement in the program (Cato, 2013). While a certain amount of stress may increase learning, anxiety that interferes with a student's thought processes is likely to prevent learning and the development of desired clinical judgment skills from this learning strategy. The data obtained from this study will add to the understanding of how student characteristics and perceptions impact their ability to learn in the simulation environment.

Research Perspective

This study used an exploratory, sequential, mixed-methods design to explore perceived anxiety in nursing students from the simulation experience, if causes of anxiety in simulation remain the same across the curriculum, and if learning style preferences affect perceived stress for nursing students. For this study, the phenomenon of anxiety associated with simulation was first explored and then the phenomenon was measured. In the first phase of this study, qualitative data were collected and analyzed through focus groups. In the second phase, quantitative data, which were dependent on the results of the qualitative phase, were collected and analyzed to test the initial qualitative findings (Creswell & Clark, 2011).

Qualitative methods with focus groups were used to help identify causes of anxiety for first and final semester students who have completed simulation experiences. Survey tools were then used to quantify student anxiety levels and causes along with their self-determined learning style preference. Figure 1 illustrates the process followed in this exploratory, sequential, mixed method design.

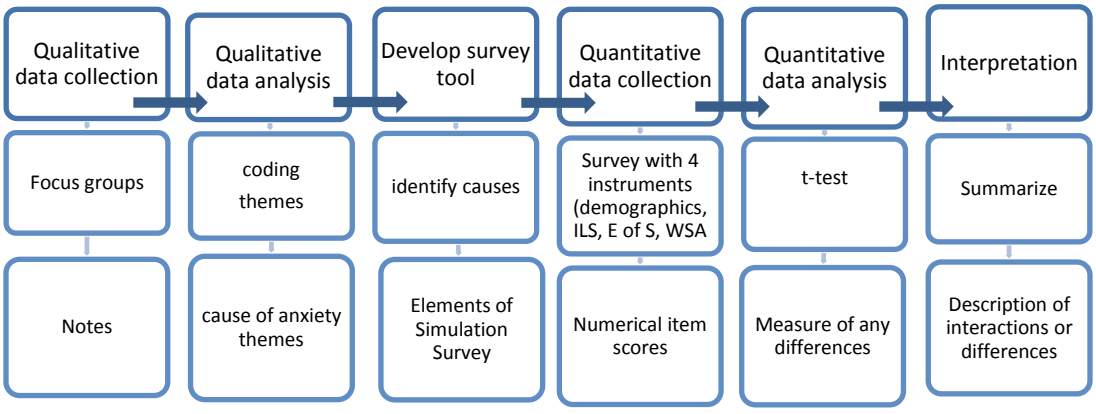

Figure 1. Diagram for study design. ILS = Index of Learning Styles; E of S = Elements of Simulation Tool; WSA =Westside Simulation Anxiety Scale.

The use of focus groups is a commonly used method of data collection in education research (Johnson & Christensen, 2012). The purpose of a focus group is to provide in-depth information about participants concerning their perspectives and subjective meanings related to the topic of interest (Johnson & Christensen). In this study, focus groups were used to verify if causes of anxiety previously identified in research is relevant to this group of students. It was hoped that in a small group setting students would be open about causes of simulation anxiety once others began discussing any associated anxiety. The focus group also allowed students to explain or disagree, and give further explanations of comments. In this study, focus groups were used to elicit information regarding students' affective response to the experience rather than their cognitive experience.

Following verification of potential causes of anxiety in the student population through focus groups for the present study, survey tools were administered to first and final semester nursing students. Quantitative data from the surveys were used to identify if causes of anxiety remain constant over the educational course of students, if the level of anxiety remains constant, and if learning style preference affected the perception of anxiety in simulation.

Setting

This study was conducted within a traditional baccalaureate nursing department of a university in the Midwestern region of the United States. Invited participants were previously accepted into the nursing program with successful completion of associated required courses. Students may enter the program in either the fall or spring semester. Simulation is implemented in the same way for all semesters of the nursing program.

Simulation templates organize the course simulations, and select faculty from each site have received some training at faculty meetings on preparing, facilitating, and debriefing simulation activities. Groups of approximately eight students (reflecting clinical group sizes) attend simulation activities. Each simulation occurs in a 2 hour block in each course. Typically in each simulation, a team of two students perform the case scenario (acting as primary and secondary nurses) while the remaining students act as observers, family members, or other supplemental roles as needed.

Simulation activities are required in all courses of the target baccalaureate nursing program. Simulation as a learning strategy occurs on average eight times in a course with the goal of reinforcing concepts taught in theory and clinical assignments. The two hour blocks that comprise a simulation activity are scheduled in conjunction with theory content and completed prior to the unit exams. Students attend simulation in small groups, often in their assigned clinical groups, as the allotted time is part of their clinical course credit hours. The experiences are a formative learning method, but students may earn a clinical failure for poor performance or preparation, which then requires a make-up activity. Clinical credits are part of the overall course: course credits are split between theory and clinical hours. In addition to a required make-up activity, if three cumulative clinical failures are achieved during clinicals in agencies or in simulation, a student is not allowed to progress to the next course regardless of the theory grade earned. So while no grade is assigned to simulation activities, students do need to meet course outcomes associated with performance during simulation experiences as part of their overall course expectations.

The focus groups were held in the classroom associated with the current simulation lab which serves as a gathering place for students both before and after simulation activities. This classroom environment allowed appropriate lighting, temperature control, internet access and tables that are used as needed during the group process. Due to the online access for the pilot and main study surveys, these tools were accessed by participants in a setting of their choice, which should have maximized comfort for the respondents.

Participant Selection

Potential participants were a convenience sample of nursing students enrolled in the first and final semesters of a baccalaureate nursing program located in the Midwestern region of the United States. All students meeting these criteria were invited to participate. There were students on five separate campus sites for the program, including one on the home campus site for the university and four additional cohorts at outreach campuses across the state. It is noted that each of the courses are administered in as similar a fashion as possible; the same course syllabi, requirements, simulation, clinical hours and exams are used on each campus site.

All participants had completed simulation experiences as designated by course curricula and with any normally occurring preparation and debriefing activities. Medium fidelity mannequins were used in each course, with students in the final semester also utilizing a high fidelity mannequin for select scenarios that are more complex. Students in the first semester are not as likely to have used the high fidelity mannequin due to scheduling needs in the simulation lab. As students progress through the program the simulations become increasingly complex, culminating in a management simulation in

the final semester requiring students to coordinate and prioritize care for three simulated patients rather than the single patient focus in previous semesters. Standardized patients are used in second semester courses for mental health scenarios, but this cohort of students were not included in the study as potential participants.

The researcher for this study is not a faculty member in either of the courses targeted for the study. Some first semester students have interacted with the researcher in a required pre-admission pathophysiology course delivered on one of the program's five campuses. This interaction may have occurred in the semester just prior to admission to the program or up to four semesters prior to admission depending on individual plans of study. The final semester students on one campus may have interacted with the student researcher during the second and third semesters of the program. Although the researcher may be known to students on one of the five campuses, the researcher was not currently assigned to theory, clinical, simulation, or any other duties in the first or final semesters on any campus in the program.

Due to the descriptive nature of the study tool, randomization of subjects was not done. There was minimal attrition of study subjects as participating in the focus group was not needed for participation in completing the survey tool, and completion of the survey tool was a one-time event that was not dependent on participation in the focus group.

Effect Analysis

Effect size is a reflection of the strength of the relationship between the independent variable, learning style preferences, and the dependent variables of anxiety (Polit & Beck, 2008). Effect size can be estimated by reviewing literature reporting

similar variables (Tappen, 2011). Limited studies have reviewed learning styles and anxiety, however Lenahan (1994) found a moderate effect (Cohen's d = .63) between knowledge of learning preference and test anxiety. Based on the limited information in the literature, a medium large effect is desired (d = 0.7).

Power Analysis

Statistical power is used to determine the number of subjects required to detect differences between groups. The goal of calculating power *a priori,* or during the design stage of a study, is to determine how large a sample is needed to enable statistical judgments that are accurate and reliable and how likely your statistical test will be able to detect a given effect size in a particular situation. A power analysis for this study was conducted to determine the number of participants needed for this study. For this study, a comparison of means will examine if the overall cause and level of anxiety for simulation varies by learning style preference. The *a* for analysis was set at .05. To achieve power of .80 and a medium effect size, a sample size of 90 participants was required (Faul, Erdfelder, Buchner, & Lang, 2009). The total potential population size available was approximately 100 first semester students and 175 final semester students who were invited to participate in an attempt to reach the target sample size.

Instrumentation

Over the course of phase one and phase two, five separate instruments were used in this study. Each will be described separately.

A demographic survey. Items on the demographic instrument included age, gender, ethnic background and previous health care experience. These variables were chosen to obtain information about the sample population to ascertain if the participating

student populations were similar to each other in general group characteristics as well as being representative of nursing student groups within this geographical region. See Appendix A for the demographic tool. Nonparametric statistics were conducted on the categorical and nominal data and parametric statistics were conducted on the interval data to explore statistical difference between the two participant cohorts. This data is reported in chapter four.

The focus group survey questions. The researcher-developed items for the focus groups allowed participants to identify sources of anxiety related to simulation activities. Participants were invited to respond to the broad questions, "What was a memorable simulation experience you have had and why?" and "What causes anxiety for you related to simulation?" The intent of the questions was to keep the focus on causes rather than responses to anxiety. Responses were reviewed for common themes of anxiety sources identified by this population of student participants, and were also compared to possible sources previously identified in literature. These themes were used to help establish that the items on the Elements of Simulation survey were relevant and reflect student issues for the intended population group.

The Westside Simulation Anxiety Scale. Developed by Richard Driscoll (2007), the Westside Test Anxiety Scale is a ten item scale that focuses on performance and cognition impairment related to anxiety rather than somatic symptoms. The online scale is a public access tool available from AMTAA.ORG, and can be downloaded and used with no charge in an academic setting. Correlations between anxiety-reduction as measured by the scale and improvements in test performance were used as validation criteria for the Westside scale. College-age and elementary-age subjects were evaluated

in validation studies with an average correlation of r = .44 (Driscoll, 2007). This validation coefficient combined with replication in two diverse student population indicates the Westside scale has demonstrated reliability and validity in previous work measuring test-anxiety impairment (Driscoll, 2007). Evans, Ramsey, & Driscoll (2010) used this anxiety scale to measure pre-intervention anxiety in nursing students and found that half of the 84 students screened reported high or moderately-high anxiety prior to an evaluation activity.

Initially developed for cognitive exams, permission to modify the scale to reflect reactions to simulation by substituting the word "test" with "simulation" was granted by Dr. Driscoll, developer of the scale (Appendix B). Anxiety rankings on this scale were used to identify baseline amounts of anxiety related to the simulation environment as perceived by student participants. Students ranked their feelings associated with simulation on a 5-item Likert scale ranging from "5 - extremely always true" to "1 -not at all never true." The ranked score from each item was summed and averaged to reflect an overall anxiety score. A score of 1.0- 1.9 indicates comfortably low simulation anxiety, 2.00 – 2.5 indicates normal or average simulation anxiety, 2.5 -2.9 indicates high normal simulation anxiety, 3.0-3.4 indicates moderately-high anxiety, 3.5- 3.9 indicates high anxiety, and 4.0-5.0 indicates extremely high simulation anxiety.

Sample items on the Westside Test Anxiety scale include statements such as, "When I study for my simulation, I worry that I will not remember the material for the simulation", "I find that my mind sometimes wanders when I am completing simulation," and "After simulation, I worry about whether I did well enough". See Appendix C for the Westside Simulation Anxiety Scale.

The Felder-Soloman's Index of Learning Styles (ILS). The ILS is an online questionnaire designed by Richard Felder and Linda Silverman (n.d.) to assess preferences on four dimension of learning. The ILS may be freely used by educators who wish to use it for teaching, advising, or research (Felder & Soloman, n.d.). The instrument consists of four scales, each with 11 items: Sensing-intuitive, visual-verbal, active reflective, and sequential- global. To complete the scale, students must complete a statement by selecting one of two choices given. Scores for the dimension are achieved by summing the responses; scores ranking 1 -3 indicate a student has a fair preference, 5 -7 moderate and 9 -11 a strong learning preference for that dimension (Andreou, Papastavrou & Merkouris, 2014). The Sensing-Intuitive scale and Visual-Verbal sale report Crohnbach's alpha of greater than .7; The Active-Reflective and Sequential-Global scales report Crohnbach's alpha coefficients of .61 and .55 respectively (Litzinger, Lee, Wise, & Felder, 2007). Construct validity of the scale has been established through correlation with the Myers-Briggs Type Indicator and with student perceptions of their learning style (Litzinger, et al.).

Sample items from the ILS include: "I understand something better after I a) try it out or b) think it through;" "When someone is showing me data, I prefer a) charts or graphs or b) text summarizing the results;" and "When I start a homework problem, I am more likely to a) start working on the solution immediately or b) try to fully understand the problem first." See Appendix D for the online version of the Felder-Solomon Index of Learning Style.

The Elements of Simulation Survey Tool. This researcher developed survey consisted of single item measures based on the focus group responses and current

research identified items linked to anxiety in simulation. This descriptive tool consisted of 24 items asking students to rank the amount of anxiety associated with each item. Students will select from "1 – not at all anxious" to "5- extremely anxious" for factors such as "cameras or being recorded," " being observed by faculty," "performing skills," and "possibility of making a mistake." The scale used was finalized after data from the focus groups were analyzed. See Appendix E for the Elements of Simulation Tool. Table 1 presents a summary of the instruments to be used in the study.

Table 1

Summary of Study Instruments

Instrument	Number of Items	α	Tabulation of Score
Westside Test Anxiety Scale	10	Unreported	Mean of 10 items
Feldman-Solomon Index of Leaning Style Scale	11 for each subscale		Mean of 11 items each scale
a. Active-Reflective		a. $\alpha = 0.61$	
b. Sensing-Intuitive		b. $\alpha = 0.77$	
c. Visual-Verbal		c. $\alpha = 0.76$	
d. Sequential-Global		d. $\alpha = 0.55$	
Elements of Simulation Survey	24	Not applicable (single item measures)	Individual item score

Note. α = Cronbach's Index of internal consistency. Cronbach's data reported from "Westside Test Anxiety Scale Validation*,"* by R. Driscoll, 2007, ERIC Document No. ED495968, p.3. Copyright 2994 by Richard Driscoll, PhD and "A psychometric study of the Index of Learning Styles," by T.A. Litzinger, S.A. Lee, J.C. Wise, and R.M. Felder, 2007, *Journal of Engineering Education, 96*, p. 314. Copyright 2007 by the Journal of Engineering Education.

Procedure

For the focus groups in phase one, students in the first and final semesters of their respective programs were recruited by an email invitation (Appendix F) sent by the program office staff. Contact information for the assistant researcher was included to

allow scheduling for the group meeting. A consent form (Appendix G) was signed by students participating in the focus group to acknowledge their understanding of voluntary participation. Snacks were provided for the participants to invite a more relaxed atmosphere for this phase, and participants could elect to be in a drawing for one of five, ten dollar gas cards.

Data for the focus group aspect of the study was collected in the first and final semesters of the nursing students' course of study, after they had participated in at least one simulation activity. Two focus groups of four to six students each (Krueger & Casey, 2009) for each semester (first and final) were sought for participation, with nine students participating from the first semester and fourteen participating from the final semester. The groups were convened on the home campus of the nursing program in a regular academic setting of the simulation lab. Students signed the consent form at the beginning of this session. A scripted introduction to the focus groups was presented by the research assistant (Appendix H). The script included a general welcome, overview of the topic, ground rules, and opening question followed by the research question.

The focus group discussion was facilitated by a research assistant, with sessions lasting approximately one hour each. No participant identifying information was included in the notes, which included name of the study, date and time, semester and number of participants, notes, and key points of the discussion. The written notes from the focus groups were reviewed for content and themes. Sources of anxiety from the draft Elements of Simulation tool was noted if they were brought up by participants. Semi-structured questions related to the previously identified sources from the literature were used to assess relevance to the focus group. An example question was, "How does

feedback during simulation affect your anxiety?" Questions for clarification included, "When you say ____, what does that mean?" Although results of this analysis were available to the participants if they desired, none requested the information. The Elements of Simulation tool was finalized based on this data, with no additions or corrections needed on the tool.

Once phase one was completed, the quantitative data phase began. A questionnaire or survey must be pilot tested before being used in a research study to determine that it operates properly (Johnson and Christensen, 2012). To test the survey tool in the online platform Qualtrics, a small group of eight students completed a pilot survey to verify participants understood the meaning of the items and the administration process. The pilot group was recruited by the program office staff via email (Appendix I) to complete phase two of the study in Qualtrics. Second semester students were invited to pilot the study as they were not part of the proposed study population. The pilot consisted of the demographic survey, Index of Learning Styles, Westside Simulation Anxiety Scale and the Elements of Simulation survey to explore for any corrections needed, unclear instructions, or administration problems. An opportunity to register for one of five $10 gas cards was offered to the pilot group participants as an incentive for participation.

After the pilot validated that the main survey functioned properly, an invitation was sent to the potential participants in the first and final semester students of the program inviting them to complete the major part of the second phase of the study which consisted of the same surveys completed by the pilot group. The email invitation (Appendix I) was sent out through the program office manager, who has access to all

student class lists and emails, to confirm that all potential participants were included in the participation invitation across the multiple campuses. Participants were advised of the upcoming opportunity to participate in the study. Awareness of the study was announced by the course coordinators, known to the potential participants from each course. The announcement by the course coordinators was only that an email would be arriving from the program office staff with the invitation to participate, as emails from office staff would be names unfamiliar to potential participants. No other course faculty involvement was utilized.

Students who accepted the email invitation to participate in the study accessed an internet link to the Qualtrics survey page. On the Qualtrics page students completed the demographic information, the Westside Simulation Anxiety Scale (10 items), the Felder-Soloman's Index of Learning Styles (44 items) and the Elements of Simulation Survey Tool (24 items). At the end of the study, participants had an opportunity to register by a separate link for one of five, ten dollar gift cards from a local gas station chain as a thank you for participating. This registration was not required.

Although there are several total items, most participants completed the survey in approximately 20 minutes. The survey was submitted online. After two weeks a reminder email was sent, again from the program office staff. After an additional three week period the results were downloaded into MS Excel and SPSS version 22 programs for analysis.

Considerations and Protection of Human Subjects

Institutional Review Board (IRB) approval was obtained from the University of Northern Colorado IRB (Appendix K) and the University of South Dakota IRB

(Appendix L) before beginning the study. Participation in both phases of the study was voluntary, and participants were assured that they are able to withdraw at any time.

The focus groups met in an academic setting familiar to the students. A consent form (Appendix F) was used for participation in the focus groups. After potential participants had a chance to read the consent and have any concerns addressed they were asked to sign two copies of the consent. Participants kept one copy for any future reference, and the second copy will be kept for three years at the research advisors office. The consent for the focus group included a statement that confidentiality and anonymity can't be guaranteed in a focus group setting as the researcher cannot control what information may be discussed by group participants after the group is done, although efforts were made to encourage participants to respect their peers' privacy by not discussing any information outside of the focus group setting.

The general survey was administered online, and was therefore completed in a setting of the students' choice. Risks to the participants included possible stress from a perceived "testing" experience, or possibly a re-emergence of feelings of anxiety associated with the simulation experience. Although the researcher has no ability to affect grades for the participants, there may still have been a perceived faculty/student power differential (Orb, Eisanhauer, & Wynaden, 2000). Student participants were reassured that participation is truly voluntary, the researcher will not be able to affect their course grade, and that the results will only be used to maximize future student learning in simulation settings. Gains for the participants included the opportunity to better understand their preferred learning preference which may assist them in future course work and a better understanding of emotions associated with simulation.

Recognition of these emotions may help with developing coping mechanisms to decrease the effect of anxiety for the student. Participation did not affect any course grade or clinical outcome.

The notes associated with the focus group will be kept in a locked file in a locked office on the researcher's campus. The print record of electronic results of the online data survey will be protected in a locked file cabinet in the nursing department of the researcher for a minimum of three years. All consent forms will be kept on the University of Northern Colorado campus in the research advisor's office in a locked filing cabinet.

Data Analysis

Data analysis was performed for both qualitative and quantitative data. The purpose of this study was to analyze the amount and causes of perceived anxiety of simulation activities along with the possible correlation to learning style for nursing students in their first or final semester of nursing school. The following methods were used to analyze the data related to the research questions.

Demographic variables

Information on participants was gathered to assess general characteristics. Participants had the opportunity to identify their semester in the program (first or final), gender, age range, race preference and any health care experience. General descriptive data were gathered, such as male to female percentages, mean age, and type of health care background in percentages within the population. These data were also used to assess if the participants are typical of an undergraduate nursing population and to compare the two groups within the study.

Survey Scoring and Reliability Analysis

Scoring on the Westside Simulation Anxiety Scale was the mean of summed responses for ten items. A Cronbach's alpha was completed to assess reliability of the Felder-Soloman Index of Learning Style tool. Scoring on each of the Elements of Simulation Tool was ranked on a scale ranging from "1 not at all anxious" to "5 extremely anxious." Reliability was not assessed on the Elements of Simulation Tool as these items are independent from each other.

Research Question Analysis

Question one: Is there a difference between levels of perceived anxiety related to simulation for students in the first and final semester of a nursing program as measured by a revised Westside Simulation Anxiety Scale? Research question one has the independent variable of semester in the nursing program (first versus final) and one dependent variable of anxiety, as measured by the Westside Simulation Scale. Responses on the instrument are on a Likert scale which were then averaged across the ten items, giving continuous data within a range of possible scores of 1 to 5. An independent t-test compared the means of the two groups to establish if anxiety is different or the same at these two time points for the participants.

Question two: For students in first and final nursing program semesters, is there a difference in identified causes of anxiety related to simulation experiences as measured by the Elements of Simulation Survey Tool? Research question two addresses potential causes or sources of anxiety in simulation as perceived by participants. The independent variable remained the semester in the nursing program.

The sources of anxiety were examined through completion of the Elements of Simulation tool as an individual rank for each potential cause. Scores for each source of anxiety were measured on a Likert scale from 1 to 5, where 1 is "not at all anxious" and 5 is "extremely anxious." Independent t-tests compared the means for statistical significance (a priori $p < .05$) to examine if specific sources of anxiety were different or the same at these two semester time points in the nursing program.

Question three: Does the overall level of anxiety related to simulation, measured by the Westside Test Anxiety Scale, vary by learning style preference, measured by the Felder-Soloman Learning Style Index? Research question three looked for a relationship between the independent variable of learning preference as identified by the Felder-Solomon Index of Learning Style and the dependent variable, level of anxiety, as measured by the Westside Simulation Anxiety Scale. On the instrument, participants are presented with 11 questions for each learning style preference of Active/Reflective, Sensing/Intuitive, Visual/Verbal and Sequential/Global. Learning style scores are calculated by counting the total number of times a subject chooses one learning style over the other across 11 questions. Respondents were then classified into categories based on which style they prefer most often. A *t* test analysis then allowed examination of the learning styles effect on overall anxiety.

Question four: Does the source of anxiety as identified by the Elements of Simulation tool vary by learning style preference, measured by the Felder-Soloman Learning Style Index? Participants had the opportunity to score their amount of anxiety for each potential source of anxiety on a Likert scale. A *t* test measured the significance in means between the simulation elements and learning styles.

Question five: What are sources of anxiety during simulation for first and final semester students? Research question five was addressed through conventional content analysis of data obtained from focus groups. Conventional content analysis is used to describe a phenomenon (Hsieh & Shannon, 2005), in this case sources of anxiety that arise in simulation experiences. Data from open-ended questions answered in the focus groups were reviewed for key thoughts or concepts. Based on literature review and focus group data, exemplars for the potential causes of anxiety were included on the Elements of Simulation Tool. The overall frequency of each source of anxiety, as well as the frequency for each item for each semester will be described in chapter four.

Summary

Clinical judgment is a desired skill for novice nurses. Simulation is an increasingly common learning modality being implemented in educational programs to help nursing students develop this skill. While some stress may enhance attention, focus, and therefore learning, extreme stress in the form of anxiety has been shown to inhibit learning. This chapter explained the purpose and methodology for this study, which was to explore the amount and cause of simulation anxiety and the association of anxiety in the simulation setting to learning style preferences for first and final semester nursing students when in the simulation environment. Criteria for inclusion, recruitment, ethical considerations and the study process were explained. The use of both a focus group and general participant group was outlined, along with the completed statistical analysis.

The results of this study help inform the understanding of the anxiety students perceive associated with simulation learning activities. Sources of anxiety were ranked, and the impact of learning style on simulation anxiety were explored. Understanding the

effect learning style preferences has on anxiety during simulation adds to the body of knowledge that informs simulation development, performance, and debriefing. Understanding the associated anxiety sources can also lead to interventions to help students manage their anxiety. If the impact of anxiety on both cognitive and psychomotor performance can be decreased, measurement of learning outcomes from simulation can more accurately reflect the precise effect of simulation on the development of knowledge, skills and attitudes needed in the professional setting.

CHAPTER IV

RESULTS

An exploratory, sequential, mixed-methods study was designed to explore perceived anxiety in nursing students as they participate in simulation experiences, if the causes of anxiety in simulation remain the same across the curriculum, and if learning style preferences affect perceived stress for nursing students. Focus groups and a pilot study group participated in the tool development phase. Two cohort groups participated in the primary aspect of the study.

In the main aspect of the study, participants completed surveys to assess overall simulation anxiety, learning style preference, and the amount of anxiety associated with specific elements of simulation that may cause anxiety. The two cohorts in the main study came from students enrolled in either the first or final semester of a Baccalaureate nursing program. To achieve power of .80 and a medium effect size, a sample size of 90 participants was required (Faul, Erdfelder, Buchner, & Lang, 2009). A total of 96 surveys were eligible for analysis of data, meeting the power analysis requirement.

Initial focus groups described causes of anxiety they had experienced during simulation activities. Responses and themes were used to validate that the items on the Elements of Simulation tool reflected potential sources of simulation anxiety. A pilot group was recruited to test online functionality and item clarity of the main study. In the main study phase, further analyses were conducted to investigate if there were

differences between the cohorts in levels of perceived anxiety related to simulation, if there is a difference in identified causes of anxiety, and if any sources of anxiety vary by learning style preference. Demographic data were also collected to ascertain participant characteristics. This chapter presents a description of the demographic characteristics of the sample followed by the focus group results and results of the analyses explored in the main survey related to the research study questions.

Characteristics of the Sample

The sample population for this study included a convenience sample of first and final semester students in a Midwest generic Baccalaureate nursing program. Participants in the focus groups, pilot study and main study came from the same student populations but did not participate in more than one part of the study. Data was gathered between September 2014 and December 2014. From a total population of 236 students, a total of 23 students participated in the two focus groups and eight students participated in the pilot study to assess functionality and clarity of the main survey tool. For the main study phase, 112 participants started the survey. Sixteen participants provided incomplete information and were deleted from the study, leaving 96 surveys that were used in the analyses.

Focus Group

The purpose of the focus groups was to identify any sources of anxiety not discovered during the literature review. Potential causes of anxiety that were incorporated into the survey included dealing with the unknown (Cordeau, 2010), not knowing what to do and being videoed (Elfrink, et al., 2009), a desire for feedback and dislike for assuming the primary nurse role (Lasater, 2007). Ganley & Linnard-palmer

(2010) noted that preparation for simulation and being ready to perform skills is needed for students to feel "safe" during simulation. Cato (2013) identified additional components that may cause anxiety such as factors related to observation, distinguishing what is real, administering medications and the possibility of making a mistake. After an initial list of potential sources of anxiety for students related to the simulation experience was developed, focus groups were held to determine if any other causes needed to be included on the survey.

Participants

Two focus groups were held to validate the potential sources of anxiety to include on the survey; one with first semester students, and a second group with students in their final semester of the program. Participants responded to an email invitation to participate in the focus group for their respective semester and each cohort met separately. All invited participants had participated recently in simulation activities. A total of twenty three students participated in the focus groups; nine females from the first semester cohort and fourteen from the final semester cohort (six male and eight female participants). There were two primary discussion topics for each focus group. The first topic was an invitation to each participant to individually share a simulation that was memorable for them and why it was memorable. The second topic was an invitation to share anything that causes feelings of anxiety for them individually related to simulation.

Memorable Simulations

While a variety of specific simulation experiences were acknowledged as being memorable, common themes for why a simulation was memorable were identified. Only

one theme, fidelity and equipment, was not related to anxiety. Memories surrounding fidelity included the need to "pretend" for a medication and the challenge of using a mannequin instead of a "real patient." Equipment memories included when "the mannequin blinked it freaked me out-I didn't know it would do that and I lost my focus," "I didn't know what I could and couldn't do with the mannequins," "Having a microphone in the observer room is creepy-it freaks me out," and "I hate my voice on the recording—is that what I sound like?" Fidelity is addressed on the Elements of Simulation survey with the item "determining what is real and what is simulated."

Participants readily shared examples of anxiety-causing events related to simulation. The anxiety-related themes that made a simulation experience memorable included being observed, performance expectations, assigned role during simulation, and knowing what to do for the simulation experience. Participants described anxiety related to having the instructor in the room, being watched, and feeling like they were being judged. Not knowing what was expected, not knowing what to do and uncertainty about how to prepare were common sources of anxiety related to performance during simulation. Being assigned to a primary nurse role and not feeling adequately prepared caused feelings of anxiety in both groups. Table 2 identifies causes of anxiety grouped by theme.

Similar anxiety themes occur in both student groups, suggesting that continued exposure to simulation experiences does not lessen some anxiety-producing components. Items on the Elements of Simulation survey that address these themes include "being observed by faculty," "being observed by peers," "role in simulation," performing in front of others," "preparing for simulation," and "knowing what to do."

Table 2

Causes of Anxiety Related to Simulation

Anxiety Theme	Examples given by focus group participants	Semester of Participant	
		First	Final
Being observed	"Especially having the instructor in the same room was stressful"	X	
	"Everybody was watching"	X	
	"I like not having the teacher in the room"		X
	"I feel like everyone is judging me"		X
	"Having [observers] in the room was stressful"		X
Performance expectations	"I didn't know what to do"	X	
	"The first group was just 'thrown under the bus'- the second group felt like they knew what was coming."	X	
	"I hadn't had this experience before, it was brand new so there was a fear of the unknown"	X	
	"I know how to study for a test, but for simulation, what do I do?"	X	
	"We don't know how to prioritize as a first year student."		X
	"It was "overwhelming." I wanted to have a box of Xanax waiting for us in the first semester."		X
	"I am worried that if you make a mistake you will get a bad grade."		X
	"More complex cases are stressful-you keep thinking maybe he will crash."		X
Knowing what to do	"I need to know better how to execute simulation"	X	
	"We had learned how to take VS, assess pain and assess tissue integrity but not how to put it all together"	X	
	"We only had a 1 minute orientation to the lab this time and that was very stressful"		X
	"We need to have a lot of prep this year because there is higher stakes with the order of things."		X

Table 2, continued

Anxiety Theme	Examples given by focus group participants	Semester of Participant	
		First	Final
Student role	When we draw sticks for a role we have to be more prepared but it also creates more anxiety."	X	
	"We rotated roles so I couldn't relax until I knew what was coming."	X	
	"Drawing sticks for a role is still stressful."		X
	"The titles are really stressful having a 'primary nurse' and 'secondary nurse' is hard. When you are the primary nurse you feel like …as you are all alone, and you feel like you have to do everything."		X

Final semester students spontaneously identified some mediators to their anxiety. Comments such as "I am more comfortable now with the other students and instructors" and "we are way more familiar now with what is going on so there is less stress" show that time and exposure can decrease the cause of some anxiety, but overall anxiety may not decrease, as final semester students identified that higher performance expectations heighten anxiety. The higher performance expectations identified by statements such as "more complex cases are stressful—you keep thinking maybe he will crash" and "we need to have a lot of prep this year because there is higher stakes with the order of things" are reflected in the survey items of "ability to recognize changes in patient conditions" and "prioritizing nursing actions."

No additional items were identified from the focus groups to add to the survey. A survey needs to be pilot tested before use in a research study to determine that it operates

properly (Johnson & Christensen, 2012). Therefore, the survey was then administered to a pilot group to assess functionality and clarity.

Pilot Survey

After confirming that no alterations were needed to the survey tool an invitation was sent out by the program office asking for participants to test the total online survey as a pilot group. This gave the opportunity to assess functionality of the online program through which the survey was administered and to give the opportunity for students to identify any items that were difficult to understand. Eight students in the second semester of the program completed the pilot survey and submitted anonymous written feedback on a small card to the research assistant. There were no problems with the functionality of the program (Qualtrics) and no difficulties understanding the survey items (clarity) were reported. The study then progressed to the final phase where the full survey was made available to the target population of first and final students who had not previously participated in the first two phases.

Main Survey Data Analysis

The survey instrument used in the study was comprised of four sections: a demographic questionnaire, the Westside Simulation Anxiety Scale (Driscoll, 2007), the Index of Learning Styles (Felder & Soloman, n.d.), and the Elements of Simulation Tool developed in the first phases of the study.

Demographic Data

The demographic data from this study included the nominal variables of semester in nursing program, race, gender, amount of health care experience and type of health care experience. Participants were asked to report their actual age in years.

Analysis of demographic data found no significant differences between the two participant cohort groups.

Participants. For the main study phase, surveys were analyzed for 96 participants from two participant cohorts: 58 from the first semester cohort and 38 from the final semester cohort.

Age. Participant age ranged from 20 years to 51 years with a mean of 24.3 years (S*D* = 7.22 years). The age range of the first semester participants was 20-51 years with mean age of 23.2 years (*SD* =7.34 years) and final semester cohort age range was 21-41 years with a mean age of 26 years (*SD* = 6.7 years). An independent t-test analysis did not show a significant difference in age for the two participant groups *(t* = -1.8; p =.07*).*

Race. Participants predominantly identified their race as "White" (97.9 %; *n* = 94). The only additional race identified was "African/African American (2.1 %; *n = 2).*

Gender. All participants identified being female gender in the main survey.

Healthcare-related work/experience. Participants were asked to identify their amount of healthcare-related work/experience prior to starting the program. Overall, seventy six participants (79.2 %) reported some amount of healthcare experience. Forty-four first semester participants and thirty-two final semester participants reported healthcare experience. The majority of participants with experience (39.6%) reported 1-3 years of experience (*n* = 38). The most common type of work experience reported, 58.3 %, was as an unlicensed care provider (Certified Nurse Assistant, Nurse Assistant).

Psychometrics

A Cronbach's alpha was run on The Westside Simulation Anxiety scale completed by participants in the study to measure reliability of the scale. The

Cronbach's alpha test should indicate if each of the items on a survey with more than two response options measures the same construct (Adamson & Prion, 2013). The construct being measured is "simulation anxiety" and there are five response options offered for each item on the scale. Cronbach's alpha for this survey tool was .907 in this study. A value of .7 to .9 is considered acceptable when comparing groups (Adamson & Prion), therefore the survey was considered reliable. The instrument tools were analyzed as they related to each research question and will be discussed.

Research Question 1

Q1 Is there a difference between levels of perceived anxiety related to simulation for students in the first and final semester of a nursing program as measured by a revised Westside Simulation Anxiety Scale?

The amount of anxiety perceived by first and final semester students was explored using the WSAS. The scale consists of 10 items. Participants were asked to rank the amount of anxiety associated with each item. Possible responses were: 5 = Extremely- Always true, 4 = Highly- Usually true, 3 = Moderately- Sometimes true, 2 = Slightly- Seldom true, and 1 = Not at all- never true. The response numbers were summed and divided by 10 to obtain an overall simulation anxiety score.

Overall scores show the following levels of anxiety (Driscoll, 2007):

1.0-1.9	Comfortably low simulation anxiety
2.00-2.5	Normal or average simulation anxiety
2.5-2.9	High normal simulation anxiety
3.0-3.4	Moderately high simulation anxiety
3.5-3.9	High simulation anxiety
4.0-5.0	Extremely high simulation anxiety.

The scale is designed to pick up anxiety features of performance impairment, intrusive thoughts, and physiological distress. The mean score on the WSAS in this study was 2.98 (n = 96; SD = 0.81) which correlates to a high normal overall level of anxiety associated with simulation. Comparison of the two cohorts did not show significance in the overall level of simulation anxiety. The mean score for first semester students was 2.99 and the mean anxiety score for final semester students was 2.91. A *t*-test comparing the WSAS scores between first and final semester students showed a non-significant p-value of .655, indicating that overall anxiety levels for simulation are the same for the two cohorts.

A question item separate from the WSAS gave participants an opportunity to indicate an overall indication of simulation anxiety by moving a sliding bar marker to any point along a 0-10 point scale where 0 indicates no anxiety and 10 indicating high anxiety. Results of this item showed no significance (p = .168) in the mean anxiety reported by cohort, with first semester mean = 6.39 (n = 58; SD = 2.15) and final semester mean = 5.76 (n = 38; SD = 1.9). These general rankings for anxiety reinforce the results of the WSAS. Table 3 summarizes the results for the WSAS.

Table 3

Anxiety Levels Measured on the Westside Simulation Anxiety Scale

Cohort	n	*M*	*SD*	*t*	*p*
First semester	58	2.99	0.86	.449	.655
Final semester	38	2.91	0.71		

Note. n = Number of cases. *M* = Sample mean. *SD* = Standard deviation. *t* = *t* distribution. *p* = Level of statistical significance.

Research Question 2

Q 2 For students in first and final nursing program semesters, is there a difference in identified causes of anxiety related to simulation experiences as measured by the Elements of Simulation Survey Tool?

Based on previous research noted above, the twenty-four items of the Elements of Simulation Tool identify actions that can potentially cause anxiety for students during simulation experiences. Participants ranked the level of anxiety for each item on a scale from 1 = no anxiety to 5 = extreme anxiety. The lower the measured mean score the lower the level of anxiety generated by each item. An overall mean of anxiety was not computed for this scale as each factor stands alone as a potential cause of anxiety. Table 4 summarizes the mean amount of anxiety each item on the scale generated for each cohort of first and final semester participants. Note that a negative *t* score indicates that the group mean for first semester participants was higher, indicating a higher level of anxiety. A positive *t* = score indicates a higher group mean for final semester participants, indicating that this item was more anxiety-producing for the final semester cohort.

Five items, presence of cameras ($p = .024$), observer role ($p = .001$), performing skills during scenario ($p = .001$), possibility of making a mistake ($p = .012$), and observing other students ($p = .002$) showed significant difference between the two cohorts, generating more anxiety for first semester participants than final semester participants.

Table 4

Mean Amount of Anxiety by Participant Cohort for Elements of Simulation

Simulation Element	Cohort Semester	*n*	*M*	*SD*	*t*	*p*
Unfamiliar clinical situation	First	56	3.68	0.94	-1.78	.079
	Final	34	3.29	1.09		
Cameras present or being recorded	First	56	3.79	1.12	-2.29	.024*
	Final	34	3.24	1.08		
Being observed by faculty	First	56	3.64	0.98	-.53	.598
	Final	34	3.53	0.99		
Being observed by peers	First	56	3.50	0.94	.13	.895
	Final	34	3.53	1.11		
Receiving feedback from faculty in front of peers	First	56	3.21	1.16	-.36	.722
	Final	34	3.12	1.39		
Receiving feedback from peers in front of others	First	56	3.29	1.37	-.98	.332
	Final	34	3.00	1.30		
Role in simulation: primary nurse	First	56	3.93	0.76	1.1	.275
	Final	34	4.12	0.84		
Role in simulation: secondary nurse	First	56	3.18	1.05	-.01	.993
	Final	34	3.18	1.00		
Role in simulation: observer	First	56	1.46	0.79	-3.44	.001*
	Final	34	1.00	.000		
Performing skills during scenario	First	56	3.18	0.94	-.31	.001*
	Final	34	3.12	0.84		
Ability to recognize changes in patient condition	First	56	2.96	0.95	1.38	.172
	Final	34	3.24	0.82		
Recognizing significance of diagnostic/lab results	First	56	2.93	0.85	1.19	.237
	Final	34	3.18	1.11		

Table 4, continued

Simulation Element	Cohort Semester	*n*	*M*	*SD*	*t*	*p*
Administering medications in timely manner	First	56	2.82	0.97	-.26	.793
	Final	34	2.76	1.02		
Prioritizing nursing actions	First	56	3.18	0.81	-.34	.735
	Final	34	3.12	0.84		
Assigned title of Primary nurse	First	56	4.04	0.87	.12	.904
	Final	34	4.06	0.89		
Simulation debriefing session	First	56	2.21	1.02	-.85	.396
	Final	34	2.00	1.35		
Performing in front of others	First	56	3.59	1.11	-.71	.481
	Final	34	3.41	1.26		
Being timed during simulation	First	56	3.50	1.22	-1.96	.054
	Final	34	2.94	1.46		
Possibility of making a mistake	First	56	4.11	0.91	-2.57	.012*
	Final	34	3.53	1.21		
Determining what is real and what is simulated	First	56	2.75	1.16	-.61	.543
	Final	34	2.59	1.31		
Preparing for simulation	First	56	2.52	1.11	-1.92	.059
	Final	34	2.06	1.07		
Observing other students' performances	First	56	1.86	1.07	-3.14	.002*
	Final	34	1.24	0.55		
Knowledge level of simulation focus	First	56	2.89	1.02	-.88	.382
	Final	34	2.71	0.91		
Knowing what to do	First	56	3.50	0.99	.41	.683
	Final	34	3.59	0.99		

Note. n = number of cases. *M* = Sample mean. *SD* = Standard deviation. *t* = *t* distribution. *p* = Level of statistical significance. *Significance level at *p* = < .05

Research Question 3

Q 3 Does the overall level of anxiety related to simulation, measured by the Westside Simulation Anxiety Scale, vary by learning style preference, measured by the Felder-Soloman Learning Style Index?

The Felder- Soloman Learning Style Index ILS is a 44-item survey consisting of four dimensions of preferred learning styles: Active versus Reflective; Sensing versus Intuitive; Visual versus Verbal; and Sequential versus Global. Active learners process information through physical activity while Reflective learners seek introspection. Sensing learners tend to be concrete and oriented towards facts and hands-on procedures while Intuitive learners are more comfortable with theories and meanings. Learners with a Visual preference prefer pictures and demonstrations while a Verbal learner prefers written and spoken explanations. Sequential learner prefers steps and a logical progression while a global learner prefers a 'large picture' view. (Felder & Brent, 2005).

When exploring the major dimensions of the learning preference scale, 54 participants displayed an active learning preference and 42 displayed a reflective learning preference (N = 96). For the sensing/intuitive dimension, 88 participants displayed a sensing preference and 8 had a more intuitive learning preference. Sixty-eight participants preferred the visual dimension versus 28 participants with a verbal preference. On the last dimension, 80 participants displayed a sequential preference and 16 had a global preference (Table 5).

Table 5

Students' Learning Style Preferences

Learning Style Preference	*n*	%
Active	54	56.25
Reflective	42	43.75

Table 5, continued

Learning Style Preference	*n*	%
Sensing	88	91.67
Intuitive	8	8.3
Visual	68	70.83
Verbal	28	29.16
Sequential	80	83.33
Global	16	16.67

Note. n = number of cases. % = percent.

Data were analyzed as categorical data. An independent sample t-test was conducted to assess the possibility of differences in learning styles between the cohorts (Table 6). Across the four dimensions there were no significant differences between the two participant cohorts.

Table 6

Comparison of Learning Styles by Cohort

Learning Style	Semester in program	*N*	*M*	*SD*	*t*	*p*
Active/ Reflective	First semester	58	1.5	0.15	.95	.344
	Final semester	36	1.47	0.15		
Sensing/ Intuitive	First semester	58	1.24	0.19	1.01	.316
	Final semester	36	1.29	0.24		
Visual/ Verbal	First semester	58	1.36	0.18	.34	.736
	Final semester	36	1.35	0.21		
Sequential/ Global	First semester	58	1.34	0.15	1.05	.297
	Final semester	36	1.38	0.21		

Note. N = Total number of cases. *M* = Sample mean. *SD* = Standard deviation. *t* = *t* distribution. *p* = Level of statistical significance.

A *t* test analysis was done to see if preferred learning style had an impact on the WSAS scores (Table 7). A significant difference for learning style preferences and

anxiety was noted for the Sensing/Intuitive scale (p = .002), Visual/Verbal scale (p = .015), and Sequential/Global scale (p = 0.10). Analysis shows that participants with a Sensing preference (M = 3.06) were more anxious than Intuitive learners (M = 2.15), Verbal learners (M = 3.29) experienced more anxiety than Visual learners (M = 2.85), and Sequential learners (M = 3.08) are more anxious than Global learners (M = 2.51).

Table 7

Learning Style Preference on Westside Simulation Anxiety Scale

	M	*SD*	*t*	*p*
Active	2.91	0.85	-1.02	.309
Reflective	3.08	0.76		
Sensing	3.06	0.79	3.17	.002*
Intuitive	2.15	0.52		
Visual	2.85	0.83	-2.49	.015*
Verbal	3.29	0.67		
Sequential	3.08	0.83	2.64	.010*
Global	2.51	0.52		

Note. M = Sample mean. SD = Standard deviation. t = t distribution. p = Level of statistical significance. *Significance level at p = < .05.

Participants also had an opportunity to place a free sliding marker on a 0 no anxiety to 10 extreme anxiety scale. Pearson correlation indicated that scores on this question correlated strongly with the scores on the WSAS (r = 0.69, p = .001), and t test analysis on sliding marker also supported the results found on the WSAS scale (Table 8).

Table 8

Learning Style Preference on Sliding Range Anxiety Scale

	M	*SD*	*t*	*p*
Active	5.96	2.24	-1.05	.297
Reflective	6.42	1.78		
Sensing	6.40	1.95	4.12	<.001*
Intuitive	3.50	1.20		
Visual	5.88	1.97	-2.15	.034*
Verbal	6.92	2.19		
Sequential	6.53	1.98	4.11	<.001*
Global	4.38	1.45		

Note. M = Sample mean. SD = Standard deviation. t = t distribution. p = Level of statistical significance. *Significance level at p = < .05

Research Question 4

Q 4 Does the source of anxiety as identified by the Elements of Simulation Tool vary by learning style preference, measured by the Felder-Soloman Learning Style Index?

A *t* test analysis was used to examine potential relationships between each item on the Elements of Simulation Tool and the Learning Style Index dimensions. Levene's test score indicated an unequal variance on some items, most likely related to the small number of participants identified with this learning preference dimension. Nineteen anxiety elements showed significance with some type of preferred learning style (Table 9). Reflective learners feel more anxiety from being observed by peers (p = <.001), receiving feedback from peers in front of others (p = .009), being assigned to be

secondary nurse (p = .016), and related to their knowledge level for the focus of the simulation (p = .015). No significance was shown for Active learners.

Table 9

Active/Reflective Learning Style and Sources of Anxiety

	Active		Reflective			
Variable	*M*	*SD*	*M*	*SD*	*t*	*p*
Unfamiliar clinical situation	3.59	1.04	3.47	0.95	0.56	.577
Cameras present or being recorded	3.59	1.14	3.58	1.11	0.06	.955
Being observed by faculty	3.52	1.04	3.74	0.86	-1.06	.291
Being observed by peers	3.22	1.00	4.00	0.78	-3.85	<.001*
Receiving feedback from faculty in front of peers	3.07	1.34	3.37	1.05	-1.13	.262
Receiving feedback from peers in front of others$_a$	2.89	1.46	3.58	1.01	-2.68	.009*
Role in simulation: primary nurse	4.00	.727	4.05	0.89	-0.31	.757
Role in simulation: secondary nurse	2.96	.971	3.47	1.01	-2.49	.016*
Role in Simulation: observer	1.30	.717	1.26	.554	0.24	.812
Performing skills during scenario	3.11	.925	3.26	.860	-0.80	.426
Ability to recognize changes in patient condition$_a$	3.11	1.00	3.05	.769	0.32	.753
Recognizing significance of diagnostic/lab results	3.15	1.02	2.89	.863	1.25	.214
Administering medications in timely manner	2.89	1.00	2.74	.978	0.72	.471
Prioritizing nursing actions	3.07	.821	3.32	.809	-1.40	.165
Assigned title of primary nurse	4.00	.869	4.11	.863	-0.57	.568
Simulation debriefing session$_a$	1.96	1.01	2.42	1.29	-1.83	.071
Performing in front of others	3.35	1.19	3.79	1.07	-1.82	.071
Being timed during simulation	3.22	1.33	3.42	1.33	-0.71	.481
Possibility of making a mistake$_a$	3.74	1.16	4.11	.798	-1.76	.081
Determining what is simulated$_a$	2.56	1.33	2.95	1.01	-1.61	.112
Preparing for simulation$_a$	2.35	1.28	2.37	.819	-0.10	.920
Observing other students' performances$_a$	1.74	1.09	1.53	.762	1.14	.268
Knowledge level of simulation focus$_a$	2.63	1.03	3.11	.798	-2.49	.015*
Knowing what to do	3.44	1.04	3.68	.873	-1.16	.249

Note. M = Sample mean. SD = Standard deviation. t = t distribution. p = Level of statistical significance. *Significance level at p = < .05. a = Equal variances not assumed (Levene's test < .05).

Sensing learners feel anxiety related to being observed by faculty (p = <.001) and peers (p = <.001), receiving feedback from faculty (p = .001) and peers (p = <.001) in front of others, and being assigned to the observer role (p = <.001). Performing skills during the scenario (p = <.001), performing in front of others (p = .008) and knowing what to do (p = .001) also caused anxiety for Sensors. No significant factors were present for Intuitive learners (Table 10).

Table 10

Sensing/Intuitive Learning Style and Sources of Anxiety

	Sensing		Intuitive			
Variable	*M*	*SD*	*M*	*SD*	*t*	*p*
Unfamiliar clinical situation$_a$	3.60	1.01	3.00	0.76	2.06	.068
Cameras present or being recorded$_a$	3.62	1.16	3.25	0.46	1.78	.092
Being observed by faculty$_a$	3.67	1.00	3.00	0.00	6.12	<.001*
Being observed by peers	3.65	0.92	2.25	0.89	4.14	<.001*
Receiving feedback from faculty in front of peers$_a$	3.31	1.21	2.00	0.76	4.39	.001*
Receiving feedback from peers in front of others$_a$	3.33	1.27	1.50	0.54	7.82	<.001*
Role in simulation: primary nurse	4.07	0.80	3.50	0.54	1.97	.052
Role in simulation: secondary nurse	3.21	1.02	2.75	0.89	1.24	.217
Role in Simulation: observer$_a$	1.31	0.68	1.00	0.00	4.20	<.001*
Performing skills during scenario$_a$	3.26	0.88	2.25	0.46	5.33	<.001*
Ability to recognize changes in patient condition	3.10	0.93	3.00	0.76	0.28	.779
Recognizing significance of diagnostic/lab results	3.02	0.99	3.25	0.46	-0.64	.527
Administering medications in timely manner$_a$	2.81	1.04	3.00	0.00	-1.69	.095
Prioritizing nursing actions$_a$	3.19	0.86	3.00	0.00	2.04	.045
Assigned title of primary nurse	4.10	0.85	3.50	0.93	1.89	.062
Simulation debriefing session	2.14	1.17	2.25	0.89	-0.25	.802
Performing in front of others	3.62	1.14	2.33	0.52	2.73	.008*
Being timed during simulation	3.36	1.33	2.75	1.17	1.24	.217
Possibility of making a mistake$_a$	3.95	1.01	3.25	1.39	1.40	.202
Determining what is simulated	2.71	1.19	2.75	1.58	-0.08	.937

Table 10, continued

Variable	Sensing		Intuitive		*t*	*p*
	M	*SD*	*M*	*SD*		
Observing other students' performances	1.69	0.99	1.25	0.46	1.24	.220
Knowledge level of simulation focus	2.88	0.99	2.25	0.46	1.78	.078
Knowing what to do	3.64	0.95	2.50	0.54	3.33	.001*

Note. *M* = Sample mean. *SD* = Standard deviation. *t* = *t* distribution. *p* = Level of statistical significance. *Significance level at *p* = < .05.

No significant factors were identified for the Visual Verbal learning dimensions (Table 11), although Verbal leaners are more anxious overall during simulation (*p* = 0.15, Table 7).

Table 11

Visual/Verbal Learning Style and Sources of Anxiety

Variable	Visual		Verbal		*t*	*p*
	M	*SD*	*M*	*SD*		
Unfamiliar clinical situation	3.53	0.99	3.58	1.06	-0.23	.822
Cameras present or being recorded	3.50	1.04	3.83	1.31	-1.26	.212
Being observed by faculty	3.56	0.98	3.75	0.94	-0.83	.410
Being observed by peers	3.53	0.91	3.50	1.22	0.13	.896
Receiving feedback from faculty in front of peers	3.09	1.18	3.50	1.35	-1.41	.161
Receiving feedback from peers in front of others	3.03	1.28	3.58	1.41	-1.77	.080
Role in simulation: primary nurse	3.97	0.83	4.17	0.70	-1.04	.303
Role in simulation: secondary nurse	3.18	0.96	3.17	1.66	0.04	.968
Role in Simulation: observer**	1.24	0.55	1.42	0.88	-0.95	.352
Performing skills during scenario	3.21	0.94	3.08	0.78	0.57 3	.568
Ability to recognize changes in patient condition	3.15	0.92	2.92	0.88	1.07	.289
Administering medications in timely manner	2.76	0.98	3.00	1.02	-1.00	.320

Table 11, continued

Variable	Visual		Verbal			
	M	*SD*	*M*	*SD*	*t*	*p*
Prioritizing nursing actions	3.15	0.82	3.25	0.85	-0.53	.600
Assigned title of primary nurse	4.06	0.88	4.00	0.83	0.29	.776
Simulation debriefing session	2.15	1.09	2.17	1.31	-0.07	.943
Performing in front of others	3.45	1.19	3.75	1.03	-1.08	.285
Being timed during simulation	3.26	1.39	3.42	1.14	-0.48	.631
Possibility of making a mistake	3.76	1.09	4.25	0.85	-1.97	.052
Determining what is simulated	2.65	1.17	2.92	1.35	-0.93	.353
Preparing for simulation	2.45	1.11	2.08	1.06	1.42	.161
Observing other students' performances	1.68	0.91	1.58	1.14	0.40	.687
Knowledge level of simulation focus	2.91	0.89	2.58	1.14	1.44	.154
Knowing what to do	3.50	0.99	3.67	0.96	-0.72	.475

Note. M = Sample mean. *SD* = Standard deviation. *t* = *t* distribution. *p* = Level of statistical significance.

Sequential learners feel more anxious for seven simulation factors (Table 12). Unfamiliar clinical situation (p = .001), the observer role (p = <.001), performing skills during scenario (p = .016), and their ability to recognize changes in patient condition (p = .004) cause anxiety. Prioritizing nursing actions (p = <.001), concern about the possibility of making a mistake (p = <.001), and in knowing what to do (p = .014) also cause more anxiety for Sequential learners. No factors showed significance for Global learners.

Table 12

Sequential/Global Learning Style and Sources of Anxiety

Variable	Sequential		Global			
	M	*SD*	*M*	*SD*	*t*	*p*
Unfamiliar clinical situation$_a$	3.66	1.04	3.00	0.52	3.74	.001*
Cameras present or being recorded$_a$	3.66	1.16	3.25	0.86	1.62	.117
Being observed by faculty	3.68	0.98	3.25	0.86	1.64	.105
Being observed by peers	3.61	0.99	3.13	0.96	1.79	.077

Table 12, continued

Variable	Sequential *M*	Sequential *SD*	Global *M*	Global *SD*	*t*	*p*
Receiving feedback from faculty in front of peers	3.24	1.17	3.00	1.55	0.70	.488
Receiving feedback from peers in front of others	3.24	1.32	2.88	1.41	0.99	.326
Role in simulation: primary nurse$_a$	4.05	0.76	3.88	0.96	0.70	.494
Role in simulation: secondary nurse	3.24	0.99	2.88	1.09	1.31	.195
Role in Simulation: observer$_a$	1.34	0.70	1.00	0.00	4.24	<.001*
Performing skills during scenario$_a$	3.26	0.92	2.75	0.68	2.56	.016*
Ability to recognize changes in patient condition	3.21	0.93	2.50	0.52	2.96	.004*
Recognizing significance of diagnostic/lab results	3.13	0.98	2.63	0.72	1.95	.055
Administering medications in timely manner	2.89	1.03	2.50	0.73	1.46	.148
Prioritizing nursing actions$_a$	3.29	0.83	2.63	0.50	4.23	<.001*
Assigned title of primary nurse	4.08	0.85	3.88	0.98	0.86	.393
Simulation debriefing session	2.08	1.09	2.50	1.37	-1.34	.184
Performing in front of others	3.55	1.15	3.43	1.22	0.37	.714
Being timed during simulation	3.26	1.30	3.50	1.46	-0.65	.518
Possibility of making a mistake	4.08	0.94	3.00	1.16	4.02	<.001*
Determining what is simulated	2.76	1.25	2.50	1.03	0.79	.435
Preparing for simulation	2.46	1.38	1.88	0.81	1.95	.055
Observing other students' performances	1.71	1.00	1.38	0.72	1.27	.208
Knowledge level of simulation focus$_a$	2.87	1.04	2.63	0.50	1.41	.165
Knowing what to do	3.66	0.93	3.00	1.03	2.52	.014*

Note. *M* = Sample mean. *SD* = Standard deviation. *t* = *t* distribution. *p* = Level of statistical significance. *Significance level at *p* = < .05. a =Equal variances not assumed (Levene's test < .05).

The sources of anxiety associated with learning preference reflect the tension felt when participants are asked to utilize strategies that contradict a comfortable learning or performance strategy. A description of the learning dimension and factors that cause more anxiety are summarized in Table 13.

Table 13

Sources of Anxiety Associated with Learning Preference

Learning Preference	Simulation Items Causing More Anxiety
Reflective	Being observed by peers Receiving feedback from peers in front of others Role in simulation: Secondary nurse Knowledge level of simulation
Sensing	Being observed by peers Being observed by faculty Receiving feedback from faculty in front of peers Receiving feedback from peers in front of others Role in simulation: observer Performing skills during scenario Performing in front of others Knowing what to do
Sequential	Unfamiliar clinical situation Role in simulation: observer Performing skills during scenario Ability to recognize changes in patient condition Prioritizing nursing actions Possibility of making a mistake Knowing what to do

Research Question 5

Q5 What are sources of anxiety during simulation for first and final semester students?

Conventional content analysis of the two focus groups was done as the first part of the study and is described previously under "Focus Group." Items related to the themes of anxiety identified by the two focus groups were included in the Elements of Simulation Tool, where items were scored by participants in the main survey group. The items were subsequently ranked highest anxiety item to lowest by total group mean and

then by cohort group mean. Being the primary nurse (by title or actual role) ranked as the highest anxiety items overall, followed by the possibility of making a mistake.

Being observed in any manner, knowing what to do, the use of cameras and actual performance ranked as the next grouping of anxiety elements. Items that ranked the lowest overall as causes for anxiety included debriefing, observing other students' performances and being an observer during simulation. Table 14 summarizes overall causes of anxiety and causes of anxiety by cohort during simulation.

Table 14

Rank Order of Anxiety Sources by Cohort

Sources of Anxiety	Overall rank (N = 96)	*M*	1st year rank (n = 58)	2nd year rank (n = 38)
Assigned title of Primary nurse	1	4.05	2	2
Role in simulation: primary nurse	2	4.02	3	1
Possibility of making a mistake	3	3.82	1	4 (tied)
Being observed by faculty	4	3.58	6	4 (tied)
Knowing what to do	5	3.54	8 (tied)	3
Cameras present or being recorded	6 (tied)	3.51	4	9 (tied)
Being observed by peers	6 (tied)	3.51	8 (tied)	4 (tied)
Performing in front of others	8	3.50	7	7
Unfamiliar clinical situation	9	3.48	5	8
Being timed during simulation	10	3.22	8 (tied)	17
Role in simulation: Secondary nurse	11	3.18	13 (tied)	11 (tied)
Receiving feedback from faculty in front of peers	12	3.16	12	13 (tied)
Performing skills during scenario	13 (tied)	3.15	13 (tied)	13 (tied)
Prioritizing nursing actions	13 (tied)	3.15	13 (tied)	13 (tied)
Ability to recognize changes in patient condition	16	3.10	16	9 (tied)
Knowledge level of simulation focus	18	2.80	18	19
Administering medications in timely manner	19	2.79	19	18

Table 14, continued

Sources of Anxiety	Overall rank (*N* = 96)	*M*	1st year rank (*n* = 58)	2nd year rank (*n* = 38)
Determining what is real and what is simulated	20	2.67	20	20
Preparing for simulation	21	2.29	21	21
Simulation debriefing	22	2.10	22	22
Observing other students' performances	23	1.55	23	23
Role in simulation: observer	24	1.29	24	24

Note. N = Total number of cases. *M* = Sample mean. n = Number of cases.

Open Comments

After completing the Elements of Simulation Tool, participants had the opportunity to answer four additional questions. When asked to designate the amount of anxiety respondents felt related to simulation activities on a sliding bar range of 0 to 10, with 0 being no anxiety, first semester participants reported a mean level of 6.39 (*SD* = 2.14) and final semester participants reported a mean level of 5.76 (*SD* = 1.95) for an overall mean of 6.16 (*SD* = 2.06, *p* = .168). When given the opportunity to identify how helpful simulation is to learning preparation to become a professional nurse on the same type of slider bar with 0 being not at all helpful and 10 being very helpful, the mean value for the two cohorts was 7.98 (*SD* = 2.05, *p* = .19), suggesting that the learning strategy is perceived as helpful despite any anxiety generated by the process. First semester participants rated simulation helpfulness slightly more helpful then final semester participants (*M* = 8.17, *SD* = 1.83 versus *M* = 7.59, *SD* = 2.39).

Two final free text survey items gave an opportunity to add any additional comments about other sources of anxiety during simulation and any comments about simulation in general. There were seven comments added for simulation anxiety and six comments for simulation in general. Comments on the last two items of the main survey mirrored both the focus group comments and items on the Elements of Simulation Tool. The free text comments for sources of anxiety included not being sure of what to do next ("When you are not sure of the next step, but you know you should"), interactions with fellow students ("…If they start to make things more difficult for me during simulation when they are supposed to be helping i [sic] dont [sic] really know how to respond"), making a mistake ("I get upset with myself if I make a mistake and I catch it in the middle of the simulation"), feeling expectations had not been explained well enough ("…I felt that not everything had been explained to me well enough and I thought it [sic] was going to do terrible…"), forgetting something ("…just making sure i [sic] dont [sic] forget something that would cause harm to patient…"), wondering if the equipment is real or fake ("Wondering if the IV pump/oxygen flow/computer works because sometimes it is fake and sometimes they actually work"), and actions of the observers ("observers talking and laughing").

Comments on simulation in general reflected thoughts about the overall learning strategy, and included concerns about not having the opportunity to use clinical judgment ("Obviously I know my patient will have pneumonia. I would have liked it more if I didn't know what the patiet's [sic] diagnosis was."), confusion when students feel fidelity is low ("i [sic] think that when the patients are not very realistic it makes simulation harder because you might not apply things how you actually would and it

makes students confused"), interactions from fellow peers ("…The only thing I dnt [sic] like is sometimes my peers can be to [sic] critical."), and recognizing the value of the learning modality despite the associated anxiety ("Even though they make me nervous, I think they are a valuable opportunity for learning).

Summary of the Findings

This chapter presented data about the study sample and their perceptions of anxiety related to simulation experiences. Two cohort groups, first semester nursing students and final semester nursing students, were compared in the study. Anxiety themes from focus groups and the use of a pilot group were described. Demographic variables, overall simulation anxiety, learning styles, and individual factors that can cause anxiety in simulation were described for the main study participants and compared for the first and final semester cohorts. Statistical analysis did not show a significant difference in the overall level of simulation anxiety.

Conventional content analysis of the two focus groups was done as the first part of the overall study. The anxiety-related themes that made a simulation experience memorable included being observed, performance expectations, assigned role during simulation, and preparation for the simulation experience. Participants in the focus groups described anxiety related to having the instructor in the room, being watched and feeling like they were being judged. Not knowing what was expected, not knowing what to do and uncertainty about how to prepare were common sources of anxiety related to performance during simulation.

The results of this study reveal that participants experience moderately high levels of anxiety when participating in simulation activities and the overall simulation

level does not change between first and final semesters in their course of study. The role of primary nurse causes a high level of anxiety, as does concern over making a mistake. Other sources of anxiety show a shift from first to final semester participants, with first semester participants focused on performance events and final semester participants focused on clinical judgment. While the preferred learning styles of nursing students were similar between the first and final semester participants, certain components of simulation, such as being observed or assigned role, do illicit an increase in anxiety for certain learning styles. Despite the anxiety associated with simulation, participants feel the learning strategy is helpful for their preparation to be a professional nurse.

CHAPTER V

DISCUSSION AND CONCLUSIONS

Knowledge and clinical decision-making skills are essential competencies for nurses. Educational programs focus on providing learning experiences that prepare students to demonstrate these competencies when in nursing practice. Because of the pressures and expectations of the academic setting to gain these competencies, students may face perceived anxiety from the fear of failure, embarrassment, and negative judgment from peers and faculty. This anxiety can produce cognitive interference that may then negatively impact learning and problem-solving abilities. Simulation is one type of learning modality that can help develop these competencies in the educational setting but can also generate anxiety. Built around a patient scenario, the purpose of this learning strategy is to replicate as closely as possible a specific clinical event that typically requires a student nurse to recognize the medical event, make clinical judgments, intervene to positively impact patient outcomes and evaluate the patient outcomes. The setting for the scenario includes as much realism for equipment, supplies, dress and décor as possible when recreating the clinical situation.

There are several factors within the simulation environment that can generate feelings of anxiety in students. The purpose of this study was to explore student interpretations of potentially anxiety-provoking aspects of simulation in the first and

final semesters of a nursing program, and examine any relationship between these anxiety factors and learning style preferences. In the following analysis, focus group and survey results will be discussed in terms of themes and overall anxiety levels. Causes of anxiety as perceived by participants are described and examined in conjunction with learning style preference. Suggestions for decreasing student anxiety in simulation activities and areas for further research are identified.

Discussion

Overall Simulation Anxiety Level

The first question in the study addressed the overall amount of anxiety that occurs from the stress of participating in simulation while in the student role. Stress and anxiety are interrelated. Stress is a normal part of everyday life that can increase focus and motivation. Anxiety is a psychophysiologic response to excess stress that produces feelings of apprehension or fear (Beck, Emery & Greenberg, 1985). Anxiety can lead to feeling vulnerable, which in turn can cause a person to exaggerate the level of threat present and negatively impact problem-solving abilities (Beck, Emery & Greenberg; Greene, 1985). In simulation, students must demonstrate performance and clinical reasoning while being observed and critiqued by peers and faculty. The anxiety related to being evaluated is inversely related to problem-solving functions (Coy, et al., 2011).

The presence of stress and anxiety among undergraduate nursing students in clinical learning environments has been identified in studies dating back to the 1970s (Moscaritolo, 2009). The simulation environment that strives to replicate the practice setting also can elicit similar anxiety associated with the practice setting. Whether occurring in the actual practice setting or the simulated environment, anxiety can impact

performance. Research shows that physicians, nurses and technicians in the workplace who participate in training simulations experience stress that can be perceived as overwhelming (Bong, et al., 2010). It should not be unexpected that novice nursing students also experience anxiety when placed in situations where performance and clinical judgment are expected.

Participants in this study completed the Westside Simulation Anxiety Scale (WSAS) to measure overall levels of anxiety generated from simulation activities. The mean score on the WSAS was 2.98 (N = 96, SD = 0.81), which correlates to a high normal overall level of anxiety associated with simulation. Too much anxiety contributes to decreased concentration, problem-solving and academic performance (Beddoe & Murphy, 2004; Rhodes & Curran, 2005). Tanaka, Takehara, and Yamauchi (2006) identified that learners may have adequate ability but poor performance overall due to their anxiety level. This adds complexity to using simulation as an evaluative tool in academic settings as poor performance can be caused by inadequate knowledge, poor preparation, or performance impacted by anxiety. Various authors have reported that research demonstrating effects of simulation on educational outcomes remains inconclusive (Bloomfield, Fordham-Clarke, Pegram, & Cunningham, 2010; Jeffries, Clochesy, & Hovancsek, 2009). The anxiety associated with simulation may be part of why it is difficult to measure educational outcomes with this learning strategy.

Cohort Anxiety Levels

Results from the WSAS scale showed there was no significant difference in the level of perceived anxiety between participants in the first and final semester of their nursing program (p = .655). These results were corroborated with a main survey item

that allowed participants to place a free sliding marker at any point along a scale 0 to 10 with 0 being no anxiety felt from simulation and 10 being extreme anxiety in simulation. The overall mean from this scale was 6.39 (*SD* = 2.14) for the first semester cohort and 5.76 (*SD* = 1.95) for final semester participants. There was no significant difference in the mean score on this survey item for participant groups ($p = .168$). Together these findings contradict the results in the grounded theory study by Walton, Chute, and Ball (2011) that anxiety decreased as students gained experience with simulation.

The current study found that there were similar levels of anxiety felt during simulation between the two cohorts of first and final semester participants, suggesting that the level of anxiety did not change with ongoing exposure to simulation. Simply increasing the amount of simulation exposure over time did not decrease perceived anxiety for participants in the current study. It is noteworthy that despite the anxiety experienced during simulation, participants also ranked simulation activities as being helpful for their preparation to be a professional nurse ($M = 7.98$, $SD = 2.05$).

Although the overall level of anxiety remained constant for the participants, additional study questions attempted to determine if the specific causes of anxiety are different, if the causes of anxiety changed over the course of the educational process, and if anxiety was impacted by learning style preferences. Identifying specific sources of anxiety at varying levels of the educational process can impact curriculum development when needs of the learners are considered.

Anxiety Item Rankings

Highest Anxiety Items

The highest overall causes of anxiety were “assigned title of primary nurse,” “role in simulation: primary nurse” and “possibility of making a mistake.” Both focus

groups identified high anxiety associated with role assignment. Not knowing what role they may be assigned was a particular concern for at least one first semester participant: "We rotated roles and I couldn't relax until I knew what was coming." Despite having other students assigned to assist in simulation, final semester students identified feelings of "being thrown under the bus as you are all alone," and "you feel like you have to do everything." Note that just being assigned the *title* of primary nurse was ranked as the number one cause of anxiety overall (M = 4.05 with a score of 1 indicating not very anxious and 5 indicating extremely anxious, SD = 0.86). Not surprisingly, having the role of primary nurse ranked as the second highest item for causing anxiety (M = 4.02, SD = 0.8). The items of title or role of primary nurse both rank at the extremely high anxiety level on the Elements of Simulation tool. Feelings of anxiety drop markedly for the other roles assessed, with the role of secondary nurse ranked at number eleven (M = 3.18, SD = 1.01) and role of observer ranked at number twenty four (M = 1.29, SD = 0.65) overall for all participants.

Role designation and the possibility of making a mistake demonstrate an anticipatory component to the anxiety experienced in simulation. This anticipatory component sets the stage for cognitive interference to negatively impact performance. If the assignment of observer or secondary nurse is made, anxiety may markedly decrease, while being assigned the title or role of primary nurse may increase anxiety even more than the anticipation of performance. The high anxiety experienced in the role of primary nurse validates the results reported by Lasater (2007), where participants noted that while learning in the debriefing period of simulation does occur, more learning occurred when the student was not functioning in the primary nurse role, and that

students did not like performing as the primary nurse. Likewise, Ullom, Hayes, Fluharty, and Hacker (2014) reported that students were reluctant to play the role of the nurse, and that poor performance was attributed to performance anxiety rather than a lack of understanding for the scenario concepts.

Primary nurse role. When considering the effect of cognitive interference on simulation learning, the cognitive effect of the assigned title or role of primary nurse played a greater part in overall anxiety than actual performance in the scenario. This aligns with the proposal by Sarason, et al. (1996) that in a stressful situation (being asked to be the primary nurse), an individual recognizes that something needs to be done to change the situation (recognize the need for patient interventions), which causes the central executive function to allocate resources to deal with the thoughts, which leaves less thought processing available to deal with the simulation tasks. A student in the primary nurse role may not be able to process actions needed or perform as desired due to the cognitive interference in learning that is occurring. This highlights the need for expert debriefing to help those in the primary nurse role to gain an accurate perspective of the tasks that were done while allowing time to regain their equilibrium after the stressful scenario event has been completed.

Secondary nurses do not feel the same level of anxiety associated with their assigned role (M = 3.18, SD = 1.01). Instead, participants are more concerned with performing in front of others (M = 3.50, SD = 1.15). This validates adult learning theory, which has the premise that adult learners value success, and appreciate the opportunity to make mistakes in private, learn from their mistakes, and be protected from the anxiety that occurs from making mistakes in front of others (Blazeck & Zewe, 2013).

Steps to mediate the anxiety associated with role assignment need to be considered to allow students the greatest opportunity to perform at their best under learning conditions that continue to be anxiety-provoking throughout their course of study. Harder, Ross & Paul (2013) examined the student perspective of role assignment and suggest several recommendations related to feelings of pressures associated with roles. These recommendations include: Roles should be based on the objectives of the simulation, students need to have a clear understanding of what the various roles are, along with the role faculty will play (if any); limiting the number of students assigned to the observer role as it is seen as passive, and not assigning roles outside of the students' abilities (such as physician).

Additional suggestions to address role anxiety include addressing the anticipatory nature of the anxiety by facilitating a practice simulation to demonstrate each of the usual roles. Having some scenarios that team beginning and advanced students offers an opportunity for practice in delegation, seeing roles in action, and exposure to clinical reasoning. Faculty can explore the use of terminology associated with roles. By clearly defining the simulation roles, it may be more accurate to use terminology such as charge nurse or team nurse, although this may simply shift the stress to this alternate title if students still feel increased anxiety in any situation where they are expected to take a lead role.

Making a mistake. The possibility of making a mistake ranked third as a source of anxiety (M = 3.82, SD = 1.05). Adult learners do not like making mistakes in front of others (Blazeck & Zewe, 2013). While simulation is a valuable learning modality, it often is accompanied by making errors in front of others during the scenario. Due to the

debrief experience associated with simulation, errors are often discussed in a group setting, and reviewed with video evidence of errors. This dual trigger may exacerbate the anxiety associated with the simulation experience.

Dealing with the emotions generated by making a mistake and giving negative evaluation feedback in a group environment can be a learned skill for faculty teaching in simulation. In a complex health care system, there will be many opportunities to make an error. Should an error occur in simulation, faculty have an opportunity to guide discussion on how the error occurred and ways to prevent similar errors in the future. Training in debriefing methods that include how to give feedback and reviewing mistakes without blame or judgment strengthens the feeling of academic safety for students (Ganley & Linnard-Palmer, 2012). As students progress in the program, an error could even be used to illustrate how factors interact in a complex system and include some type of "incident report" process to mimic what would happen in actual practice. This allows accountability for the error while giving a mechanism to process the error from a leadership or systems stance.

There is a significant difference in the number three ranked item of "possibility of making a mistake" and the fourth ranked item of "being observed by faculty" (p = .002). This result suggests a clear separation between the top three sources of anxiety and the remaining items. The top three ranked items of assigned title, assigned role, and concern over making a mistake appear to account for a significant portion of the overall anxiety identified by the participants.

Mid-range Anxiety Items

Items that ranked in the mid-level of causing anxiety had mean scores of 3.58-3.05 and included "being observed by faculty," "knowing what to do," "cameras present

or being recorded," "unfamiliar clinical situation," "being timed during simulation," "receiving feedback from faculty/peers," "performing skills/prioritizing nursing actions," "ability to recognize changes in patient condition," and "recognizing significance of diagnostic/lab results." Some of these items are now grouped by underlying themes for discussion.

Being observed/cameras. Being observed was a major theme in the focus groups. Having the instructor in near proximity was mentioned as anxiety-provoking by both groups. First semester focus group participants specifically mentioned the feelings related to everybody watching. Having observers in the simulation room with the student performing the scenario and feeling judged were singled out by final semester focus group participants as producing anxiety.

Parker and Myrick (2012) report the anxiety engendered by being recorded and observed comes from the fear and stage fright of "performing in a fishbowl" (p. 368). Especially when being videoed, gaps in knowledge or performance are apparent to any observer. Due to this factor, there may not be a reduction in level of anxiety in simulation even when students understand that simulation is not directly linked to a specific grade (Beischel, 2013). It shouldn't be surprising that being filmed or observed while performing a multifaceted task that you do not yet feel proficient in should cause anxiety.

Students may fear a loss of respect from peers and faculty if they do not perform to the expected level. The reality of entering practice soon may increase the feeling of needing to show readiness to enter the profession. It is not uncommon in health care practice areas to not only have your work scrutinized and tracked by supervisors and

coworkers but to also have your work reviewed for how the delivered care relates to quality improvement, patient satisfaction, and patient outcomes. Strengthening emotional and cognitive skills to help deal with anxiety produced by being observed may help new nurses cope with the realities of a stressful work environment. Learning to deal with the anxiety that comes from being observed may also prove helpful for times when a nurse is transferred unexpectedly to an unfamiliar unit, is caring for a patient who experiences a sudden change in health status, or is transitioning to a new area of practice requiring the mastery of new skills.

Few people do not experience anxiety when being observed, when they feel unprepared, or when in unfamiliar situations. Careful thought needs to be given when designing the complexity and placement in the curriculum of simulation activities. Consideration needs to be given for practice and review opportunities of potential skills needed for the simulation experience. Feeling competent in psychomotor skills allows learners to build towards higher level performance behaviors such as prioritizing tasks or exhibiting the complex clinical judgment needed for a patient with several comorbid illnesses. Gaining experience in dealing with the anxiety that comes from the uncertainties of a clinical setting while still in the protected environment of simulation may help mediate the stress response that can occur once the learner is a practicing nurse.

Unfamiliar clinical situation. While an unfamiliar setting in general can cause anxiety, an unfamiliar situation where one is expected to intervene to help someone can increase the amount of perceived anxiety. Unlike an academic exam where content remains stable across the length of the exam, the real time environment and real

consequences of actions during clinical situations makes preparation and adapting more difficult. Adapting can be especially challenging if the situation turns out to be something in which one has limited experience. As students progress through a program, they attend clinical activities in a variety of settings which necessitates dealing with unfamiliar agencies, clinical units, types of patients, and even where to park. Despite this ongoing exposure to unfamiliar situations in clinical settings, facing an unfamiliar situation in simulation still ranks in the top ten sources of anxiety (M = 3.48, SD = 1.0).

From a curricular view, simulation activities can be leveled for complexity and varying amounts of student preparation. Matching the simulation environment to the student clinical settings can help both learning environments feel more familiar. This clinical setting replication can be created to either prepare students for experiences at actual clinical agency sites, recreate a current clinical site with similar equipment and patient types, or to create a patient care area that not all students have exposure to, such as an emergency room with gurneys. Having static placement of supplies and equipment in the simulation area can help manage concern with where supplies are gathered. An orientation activity at the beginning of each academic semester or quarter can reinforce supply placement and highlight any changes that have occurred. Knowing where the syringes are always located, for example, minimizes anxiety from trying to find where the appropriate supplies are during a simulation experience.

Being more specific about skills needed for a scenario, developing faculty guidelines for prompting students during simulation or even allowing students to review an upcoming simulation scenario in the first semester can offset the anxiety that arises from the unfamiliar. Linking simulation to classroom theory which is reinforced in a

clinical preparation assignment can help students recognize the clinical situation to be presented in simulation. The amount of prompting and information given prior to a scenario can decrease as students gain more experience. This does not mean a detailed preparation is needed, merely one that guides towards the focal outcome desired for the simulation activity.

Actions during simulation. Performance during the actual clinical scenario phase of simulation provides several opportunities for students to feel anxious. This section encompasses "knowing what to do," "being timed during simulation," "performing skills/prioritizing nursing actions," "ability to recognize changes in patient condition," and "recognizing significance of diagnostic/lab results."

Several comments from the focus groups addressed the theme of "knowing what to do" during simulation. Comments such as needing to know how to "execute the simulation," "…how to put it all together," and "It would reduce anxiety if we knew what we have to do" all portray a sense of uncertainty when it comes to completing a simulation experience. A comment from the survey item to identify other sources of anxiety describes this uncertainty directly with the statement, "When you are not sure of the next step, but you know that you should." Concern related to knowing what to do aligns with the high percentage of participants who were identified as having a Sequential learning preference (83%). Not knowing the "correct" steps needed in the somewhat unpredictable setting of simulation adds to a feeling of anxiety. Students feel vulnerable when dealing with the unknown, and in simulation activities students are asked to step into the unknown in front of an audience. The feeling that the patient will "crash" at some point in the simulation increases the feeling that the student may not

know what to do for an unexpected event. Students may also have an awareness of how multiple factors can impact patient care. The importance of not missing the significance of any key factor is exemplified by the comment, "just making sure i [sic] dont [sic] forget something that would cause harm to patient and fail simulation."

Providing a short video of a simulation experience along with guided orientation activities prior to simulation can help alleviate anxiety generated both from preparing for simulation as well as knowing what to do during a simulation event. This may be especially helpful for first semester students. Students meeting the minimum expectation for skill practice may still not be adequately prepared for the performance in a timely manner of those skills. Allowing unlimited time for skill demonstration in a skill validation experience hinders a student's perception of expected time limits in actual clinical areas and simulation. Giving a target amount of time for completion of skills can help students know what is expected. Faculty can have clear objectives for the simulation experience with an appropriate amount of time allotted for the completion of the tasks needed to meet the objectives. If a simulation is too complex or there are too many components to address it becomes difficult for a student to meet all of the outcomes within a limited time.

The "thinking" abilities of students can be stretched with the use of case studies, exposure to multiple patients through clinical post-conference activities such as concept map development and use of a "grand rounds" approach of having students present their patients to other group members in conjunction with clinical. Asking students to describe various "what if" scenarios for clinical patients and then identify critical assessments that would indicate patient changes, nursing interventions and desired

outcomes for the "what ifs" can also broaden experience of working with potential unexpected patient events.

Receiving feedback from faculty/peers. Receiving feedback from faculty, even in front of others, ranked in the bottom half of item rankings (M = 3.16, SD = 1.23). Although receiving feedback is a source of anxiety, Lasater (2007) reports that students want feedback on performance. The skill of faculty in giving feedback is critical in how much anxiety students may feel and remember. The feedback given in debriefing affords an excellent opportunity for faculty to role-model how to give professional feedback and provides an opportunity for students to practice the skills of both giving and receiving feedback. Although there may be a level of anxiety associated with receiving feedback, the positive gain from having outside input to help define meaning in the experience seems to offset the negative aspects associated with receiving the input. This is an interesting juxtaposition in light of the high anxiety associated with the possibility of making an error. But as Lasater (2007) points out, students want an honest appraisal of the potential patient outcomes of their actions. While participants in this study did not show a decrease in overall level of anxiety with experience, their ability to support others may reflect the lower level of anxiety associated with receiving feedback responses. Being open to giving and sharing feedback adds significantly to collaborative learning and the ability to construct new knowledge from the experiences of others.

Comfort in receiving feedback may reflect an environment where participants generally feel safe, but not all fellow student behavior is seen as supportive. In the open-ended question portion of the survey, two participants noted, "if other students start to make things more difficult for me during simulation when they are supposed to be

helping i [sic] dont [sic] really know how to respond" and "observers talking and laughing" as other sources of anxiety. Another participant reported, "The only thing I dnt [sic] like is sometimes my peers can be to [sic] critical." These comments indicate that feedback from peers can have a direct effect on the perception of the anxiety associated with the simulation experience. Having faculty role-model and give "feedback on feedback" during simulation is a valuable opportunity to help learners develop the professional skill of evaluating others.

Lower Range Anxiety Items

Items ranked as causing lower amounts of anxiety included "knowledge level of simulation focus,' "administering medications in a timely manner," "determining what is real and what is simulated," "preparing for simulation," "simulation debriefing," and the previously noted aspects of observation. Given that the "possibility of making a mistake" ranked as the third highest item overall, it was somewhat surprising that a knowledge level of the simulation focus ranked 18 overall (M = 2.8, SD = 0.97) and preparing for simulation ranked as item 21 (M = 2.29, SD = 1.11). It could be that completion of a preparation activity helps students feel prepared but does not address the possibility of being unable to prevent mistakes in the fluid environment of simulation. Being assigned to the role of observer ranked at item 24 (M = 1.29, SD = 0.65) as a source of anxiety, indicating that participants do not consider being an observer a stressor.

Preparing for simulation/knowledge level. As a component of simulation, the participants in this study were expected to complete a simulation preparation assignment related to the clinical situation as part of their regular coursework. This assignment is

completed prior to simulation and reviewed during the prebrief portion of the experience. The assignment reinforces theory content and acts as a guide to prepare for participating in the simulation. Consisting of questions related to the possible clinical situation and medications, the intent is to enhance students' feelings of readiness to address the clinical situation. Students do not know what role they will have prior to the simulation, so it is advantageous to expend a fair amount of effort on this preparation assignment. The availability of the preparation assignment may have increased the feeling of being prepared for simulation and therefore decreased the anxiety level associated with preparation. By completing the preparation the focus of the upcoming simulation scenario may become clear as well. Having a preparation assignment does not appear to alleviate the anxiety associated with feeling prepared for an unexpected event or the need to actually perform as these items ranked higher in producing anxiety.

Having orientation activities in the simulation setting to prepare for simulation activities can increase comfort with the environmental factors related to simulation. Potential activities could be a "treasure hunt" which includes a specific list of supplies and equipment commonly used in the upcoming simulation scenarios that students locate, practice signing in or out of the simulation setting, and basics such as operating electric bed controls and blood pressure equipment. Practice with the medication administration system (med drawers, locked cabinet, electronic system, etc.) can help decrease stress for a task that is likely to be encountered in numerous scenarios. Students should have practice opportunities using mannequins of similar fidelity that will be used in the upcoming simulation scenario.

The amount of time and work to complete preparatory activities must be weighed against the student perceived benefit. Preparation activities that are perceived as too difficult or time-consuming can increase the amount of associated anxiety. Having preparation activities that are clearly relevant to the simulation can increase the value of the activity from a student's viewpoint, increase the feeling of being ready, and can help with the feeling of knowing what to do. Preparation activities should take into account the desired outcomes of simulation. Later in the curriculum it may be desired that prior preparation is limited in order to evaluate clinical judgment. Limited preparation for more advanced students allows a more realistic transition to practice for patient care as well as practice with clinical judgment skills.

Medication administration. It is intriguing to note that administering medications in a timely manner is the only performance task that did not fall in the mid-range rankings of anxiety levels. Administering medications is a crucial nursing action related to safety and yet it was ranked as item nineteen by participants ($M = 2.79$, $SD = 0.99$). This is puzzling when the complexity of this skill is considered. Administering medications is a multi-faceted skill and nursing students are taught safety measures that must always be observed when administering medication. The complexity of medication administration increases when factors of dosage calculation, administration through an intravenous or saline lock access, or programming of an electronic pump are factored into performance. All of the expected aspects of administering medications need to be completed within the time frame of the scenario and in addition to any other tasks such as assessment that are expected as part of the scenario.

Several factors may influence why participants rank medication administration as a lower anxiety item. Perhaps students have a greater amount of experience in administering medications as this skill frequently occurs in clinical settings. Students may recognize the importance of safely giving medications and therefore focus more heavily on this skill. Perhaps other participants in simulation take a more active role in assuring that medications are given safely. Faculty may give cues for medications that ensure safety. The set-up for simulation scenarios may include only the medications needed, eliminating some of the ambiguity that may exist in practice. Factors related to medication administration may remain in place from the previous group of students who completed the scenario, such as the rate on the intravenous pump. Students may be allowed to verbalize steps of administration rather than actually completing the steps. Examples of verbalization might be, "I would give this over 2 minutes," or "I would check the heart rate before giving this." Participants who are employed in health care may administer medications as part of work duties.

Other potential explanations include factors that may be of more concern to faculty. In the midst of the multitude of tasks and skills that student nurses are attempting to master, the singular importance of safe medication administration may not be recognized. There may be no consequence for errors related to medications beyond verbal feedback in debriefing that is missed in the post-performance anxiety of the student administering the medication. Feedback may be given in a manner that does not emphasize the seriousness of medication administration. Students may be overly confident in their ability to give medications safely since this task is monitored extraordinarily closely in clinical settings with immediate intervention to prevent an

error in this aspect of patient care. Due to time taken in completing other tasks in the simulation students may not get far enough into the scenario to administer medications, or they may miss the assessment or diagnostic data indicating the need for medication as an intervention.

Safety features of medication administration should be emphasized and reinforced in simulation. Fidelity to clinical practice should be observed as much as possible to establish safe patterns of administration. Having participants complete some type of incident report can help emphasize the consequences of medication errors. To lessen the negative impact of completing an incident report, all students in the scenario group could fill out the form as an example of what happens in practice when an error is made. Initiating administration protocols based on professional standards, such as the National Patient Safety Goals can give clear parameters of desired performance. Allowing an opportunity to repeat medication administration to correct any lapse can reinforce desired techniques. While medication administration is considered a foundational skill, it is important to ascertain if the lower level of anxiety related to this item comes from adequate student preparation or from less than diligent input from faculty.

Determining what is real. While simulation fidelity was identified by focus group participants as a theme it ranked at item twenty (M = 2.67, SD = 1.22) of the twenty four survey items. Determining what is real in the simulation setting did not add undue anxiety when compared to other factors, although it still needs to be considered in planning. When asked on the survey for other sources of anxiety, one respondent wrote, “Wondering if the IV pump/oxygen flow/computer works because sometimes it is fake

and sometimes they actually work." Under the survey item that allowed an opportunity for general simulation comments another participant responded, "i [sic] think that when the patients are not very realistic it makes simulation harder because you might not apply things how you actually would and it makes students confused." These comments reflect the challenge of working with the constraints of a simulated environment.

While a mannequin can simulate some physiologic processes very well (heart sounds, lung sounds), it is difficult to truly imitate a real person even when high fidelity mannequins with faculty voice over capabilities through a microphone are used. In particular, a mannequin does not move the same as a real person (such as flinching during a procedure), cannot display nonverbal feedback (lack of eye contact, tense muscles), and is limited in affective responses (despair at illness process). Mannequins cannot actually swallow a medication or jerk when receiving an intramuscular injection. Unless expert moulage or make-up is used or actors have the actual disease process, even a real person playing the role of a patient still may not display true physiologic signs and symptoms of illness processes.

Despite these limitations, students are expected to simulate what the desired actions and responses would be to the mannequin or actor. It does present a challenge for learners to attempt to give an oral med to a mannequin and then pretend the medication was swallowed as they somehow discard the imitation medication, or the need to wait for a prompt to report the temperature reading on an inanimate object. To address fidelity issues, both faculty and students need to agree that simulation can be accepted as real without total reality present. Dieckmann, Gaba, and Rall (2007) recommend that simulation should be viewed as a social practice that includes a

contextual event in which people interact with each other, technical artifacts, and the environment (the mannequin and other devices) towards a goal. To achieve this, faculty can focus on having students affectively connect to the case presented, giving enough background information that the "patient" has a story to share. Differences in reality can be part of the learning discussion while still maintaining a focus on relevance of the experience. A discussion of the limitations related to reality while maintaining the integrity of the simulation experience can be included in orientation activities.

Debriefing. Learning to receive and give feedback is an important asset in a profession that works with many members of a team. This factor may vary based on the debriefing skill of faculty. Faculty with strong debriefing skills may be able to help offset anxiety that comes from being observed or filmed through expert delivery of feedback. While a lapse in safe patient care or technique needs to be addressed, doing so in a way that preserves the dignity and strengths of the student can create a more open climate for critique. Students may be their own worst critic, and emphasizing successful skills as well as areas for improvement can help students recognize the positive aspects of performance rather than just the negative areas.

Having a student watch their video of simulation performance in privacy and complete a self-critique may allow self-reflection without feeling defensive around others, and also allow private individualized feedback from faculty. In the beginning learning phases a checklist could be provided to give expected performance criteria for a self-critique. As students progress in the program they could be allowed to critique their performance based on broader course outcomes, such as attention to safety or communication. Studies by Cordeau (2010) and Clapper (2010) both conclude that

debriefing gives an opportunity to discuss emotions and allow reflection on learning. Debriefing anxiety ranked lower (number 22, *M* = 2.10, *SD* = 1.15) than receiving feedback from faculty in front of peers (number 12, *M* = 3.16, *SD* = 1.23) or receiving feedback from peers (number 15, *M* = 3.14, *SD* = 1.33). Since a major component of debriefing is to evaluate events and outcomes of the simulation scenario with feedback, it is puzzling that these two items are not ranked closer together. Students may not appreciate feedback when directed at them, but appreciate the opportunity to recap simulation activities in debriefing.

Role of observer. In any ranking list of items there will be one item that ranks the lowest. In this case, it is noteworthy that being assigned the role of observer was not only the lowest ranking item, but that the item stimulates virtually no anxiety among the participants. This should not be seen as a positive, as it represents a type of missed learning opportunity. Jeffries and Rizzolo (2006) report that the various role assignments, including observer roles, do not affect simulation outcomes of knowledge gain, confidence and satisfaction. However, if participants experience no stress at all, if they do not take the role seriously, or if there is no motivation to actively participate in the role, then learning opportunities are diminished (Cato, 2013). It is more desirable that enough stress is present in a learning opportunity that learners are motivated towards optimal performance. Several suggestions can enhance the respect students may have for the observer role.

Making random role assignments may encourage all participants to prepare for simulation, but having defined expectations of each role can increase student understanding and participation in each role. A reminder of the importance of observers

along with a review of the purpose and desired outcomes for observers can be included during the prebrief segment of scenario. The use of a guided observer worksheet with predetermined topics to observe for, training in using peer review to give constructive guidance, and expecting observers to consider concepts such as the effect of teamwork and communication on patient outcomes are ways to more actively engage the observers (Boehm & Bonnel, 2010; Hober & Bonnel, 2014, Schaar, Ostendorf, & Kinner, 2013). Having observers receive a handoff report from the acting primary nurse to take over the care of the patient at a time determined by faculty facilitating simulation may also increase their engagement of the unfolding scenario.

Anxiety Causes by Cohort

Analysis of The Elements of Simulation Tool also attempted to identify if there are different causes of anxiety related to simulation experiences between the first and final semester cohorts. Each participant had the opportunity to rate the amount of anxiety they felt for each item during simulation experiences. Chapter four delineates the specific statistical analysis for the twenty-four items. Differences in identified causes of anxiety will be discussed here for the two cohorts. Suggestions for mediating anxiety during simulation will also be presented as various factors are reviewed.

While overall anxiety levels between cohorts were similar, five items showed significant difference between first and final semester participants. Significant difference was found for "possibility of making a mistake" ($p = .012$), "cameras being present or being recorded" ($p = .024$), "observing other students' performance" ($p = .002$), performing skills during scenario ($p = .001$) and "role in simulation: observer" ($p = .001$). On each of these items first semester students found the items to produce more

anxiety. This indicates that exposure to simulation, clinical experiences, or other unidentified factors may help reduce anxiety in some areas as a student progresses through a program of study.

Possibility of Making a Mistake

The "possibility of making a mistake" ranked as the number one cause of anxiety for first semester participants and fourth for final semester participants. The item "cameras being present being recorded" ranked as fourth and ninth respectively. Both of these items speak to performance concerns in front of an audience and the fear of failure. The desire to make mistakes in private and avoiding the anxiety that accompanies making mistakes in front of others are both characteristic of adult learners (Blazeck & Zewe, 2013). Concern with the use of cameras reinforces that the learners do not want to have mistakes recorded for possible review with others. Being in the novice role of being a nurse likely contributes to anxiety generated from these items. The concern over making a mistake may be compounded by knowing that others are watching and performance is being evaluated.

First semester students may feel uncertain about performing skills. This can add to anticipatory anxiety associated with potentially making a mistake. Final semester participants have had more time to gain a level of comfort in performing tasks frequently encountered in simulation. Prolonged exposure to simulation for students closer to graduation may mediate some of the anxiety of making a mistake performing skills as students have had the opportunity to observe and make mistakes by this point in their educational process. Experiencing supportive feedback in previous simulations may help reduce the amount of anxiety in this population. Even with an anxiety level lower than

first semester participants, making a mistake still ranks as fourth highest cause of anxiety for participants in their final semester. Errors of judgment in front of others are a likely reason why concern with mistakes remains a high source of anxiety through the final semester.

Use of Cameras

The use of cameras generates less anxiety in final semester participants. It is unknown why comfort with the use of cameras increases with length in the program. It may be possible that students are more comfortable with the cameras due to more exposure to the learning strategy. There may not be consistent use of recordings by faculty in later courses. Not being recorded or watching recordings would then lessen any associated anxiety. Students may have learned to "tune out" watching themselves. Support from other students while watching may also ease discomfort.

Observation

The other two items that showed a significant difference were "observing other students' performance and "role in simulation: observer." While first semester participants ranked these items higher in anxiety than final semester participants, these items ranked as the bottom two items overall for level of anxiety so less faculty resources may be needed to address these items. When considering the aspect of observing, it may be that the anxiety that is generated from observing others may arise from discomfort in watching other students who may make a mistake or struggle to complete expected tasks. Having a clear understanding of what is expected when assigned to the observer role and learning how to give feedback may mediate anxiety for this item.

Being Timed

First semester participants ranked this item at number eight while final semester participants ranked it at seventeen. Opportunities to practice and perform tasks across the course of study may increase the ability to perform tasks in a timely manner. This comfort in performing psychomotor skills may also open up a wider window of time for the "thinking" needed for the clinical judgment that determines what interventions are needed since less time is needed to perform tasks.

Preparation

Despite a higher level of preparation anxiety reported from first semester participants, it was in the focus group for final semester participants where preparation expectations were specifically identified. That group acknowledged the feeling that they need more preparation at this point of their education as "there is higher stakes with the order of things." Overall, however, preparation related to simulation was ranked at 21 indicating it is not a major factor of anxiety for participants.

Four items of the twenty four items assessed showed a significant difference between the first and final semester cohorts. Since a small percentage of items reveal a significant difference it becomes apparent that most items that caused anxiety in the beginning student still caused anxiety in students closer to graduating. Experience with simulation format may help mediate the amount of anxiety for specific items, but experience did not remove the overall amount of anxiety associated with simulation.

Learning Style Preference and Anxiety

In this study, learning style was examined in the context of possible relationships to anxiety experienced during simulation learning activities. Due to the interactive, social and performance based components of simulation it is reasonable to expect that

features of simulation may conflict with a preferred way to learn. Research questions in this study explored if the overall level of anxiety and if specific sources of anxiety vary by preferred learning style. Wu et al. (2010), for example, reported that most students in their study were passive learners who did not like the patient simulation learning method. Exploring links between learning preference and anxiety can impact simulation set-up and implementation.

Learning Style Preferences and Overall Anxiety

Across the four dimensions of the Learning Style Index scale, there were no significant differences between the two participant cohorts in this study, indicating that the cohort groups are homogenous in types of learning preferences. The variables of age and years of experience were not significant for learning style preference. Analysis did show that three learning styles showed significance for the amount of anxiety experienced during simulation. Sensing, Verbal, and Sequential learners all report more anxiety than their counterparts of Intuitive, Visual and Global learners. The high percentage of participants identified as Sensing and Sequential learners may help account for the ongoing anxiety associated with simulation. The anxiety may not decrease since the basic components that make up the simulation experience do not change over the educational process, nor do the learning preferences become more balanced while still in school. The combination of psychomotor and cognitive/reflective skills needed during simulation allow all preferences to be used during the experience. Learners may also use a mixture of different styles dependent on the situation (Loo, 2004), but when learners have a strong preference it is more difficult to adapt a style to

meet the needs of a situation. The presence of anxiety may also decrease the ability for learners to adapt their problem-solving approach.

Durham, Cato, & Lasater (2014) explain that simulation is similar to clinical experiences, where all of the learner senses are engaged and a variety of levels of learning are utilized. Therefore, educators can feel comfortable using simulation as a learning method to reach diverse learning preferences (Shinnick & Woo, 2015) and should not need to be concerned that simulation activities negatively impacts one style of learning preference over another when planning simulation activities. Varying learning style preferences may perceive anxiety differently in simulation, and specific perceived sources of anxiety are also impacted by preferred style.

Learning Style Preference and Sources of Anxiety

Learning style preferences help describe how learners gather, interpret, organize and keep information for further use (Chick, n.d.). Active learners process information through physical activity. Reflective learners seek introspection as part of learning. Sensing learners are more comfortable when faced with concrete facts and hands-on procedures. Intuitive learners are theory and meaning oriented. Learners with a visual preference prefer pictures and demonstrations while the Verbal learners prefer written and spoken explanations. Learners with a sequential preference want a logical progression of steps in the learning process, while learners with a global preference can start to put information together in unique ways once they see connections. (Felder & Soloman, n.d.).

When considering learning style preferences, it may be expected that a learner who prefers sensory, visual, active and sequential learning processes would be more

comfortable with the simulation scenario itself while learners with a preference for intuitive, verbal, reflective and global learning modalities may be more comfortable with the pre-simulation preparation and debriefing portions of simulation. McCrow, Yevchak, and Lewis (2014) examined the preferred learning style of acute care nurses and found that participants in their study exhibited a Sensing and Visual preference with a balanced preference between Active-Reflective and Sequential-Global dimensions.

The learning style profile for the group of participants in this study show some similarity and some differences to the McCrow, et al. (2014) findings. The number of Active preference learners (56%) and Reflective preference learners (44%) was more balanced than the other dimensions. The high number of Sensing (92%) and Visual (71%) preference learners matches what McCrow, et al. found for nurses in practice. The high number of learners with a Sequential preference (83%) in this study contradicts McCrow et al.'s findings of a balanced Sequential-Global preference and may reflect being in the active stage of learning with a heavy reliance of following exact steps to gain competence in skills.

Nineteen items on the Elements of Simulation Tool showed significance with some type of preferred learning style (Tables 9-12). When reviewing the characteristics of the various learning dimensions presented by Felder & Brent (2005) it becomes apparent why the items of simulation that cause anxiety clash with desired learning styles.

Reflective learners show more anxiety from being observed by peers ($p = <.001$), receiving feedback from peers in front of others ($p = .009$), being the secondary nurse ($p = .016$), and knowledge level of simulation ($p = .012$). Reflective learners seek

introspection as part of learning, so being watched and receiving feedback in a public forum contradicts the need for private processing of experiences. Reflectors prefer working alone, making group work of any kind and being the secondary nurse more challenging. A desire to think through information prior to implementing actions accounts for some of the anxiety for knowledge level of the simulation focus that arises for Reflectors.

Sensing learners are more comfortable when faced with concrete facts, are good at memorizing, and dislike surprises (Felder & Soloman, n.d.). Anxiety for Sensors was reported when being observed by faculty (p = <.001) and peers (*p* = <.001), receiving feedback from faculty and peers (*p* = .001 and *p* = <.001), performing skills and performing in front of others (*p* = <.001 and *p* = .008), and knowing what to do (*p* = .001). Sensors are also anxious when in the observer role (*p* = <.001). In the somewhat unpredictable environment of simulation, not knowing what to do while being watched by others adds pressure to the Sensing learner. Sensors resent being "tested" on materials not explicitly covered in class (Felder & Soloman) which may account for the anxiety performance inherent in simulation activities. For a learner who is comfortable with memorizing facts and predicting what happens, being watched while trying to perform in a flexible environment with several potential outcomes is challenging. A lack of clarity for the role of observer again creates an unpredictable situation that is difficult to prepare for, causing anxiety.

No simulation factors showed significance for either Visual or Verbal learners. The diverse activities associated with simulation supports both of these preferences,

starting with the written preparation activities, followed by watching the active scenario phase, and concluding with discussion in the debrief phase.

Learners with a sequential preference desire a logical progression of steps in the learning process. Sequential learners feel anxious regarding unfamiliar clinical situations (p = .001), performing skills (p = .016), ability to recognize changes in patient condition (p = .004), prioritizing nursing actions (p = <.001), the possibility of making a mistake (p = <.001), and knowing what to do (p = .014). They are also uncomfortable being an observer (p = <.001). Sequential learners tend to gain understanding in a linear fashion, with each new piece of information building logically from previous pieces (Felder, 1990). An unfamiliar setting or unexpected patient event may not follow a logical sequence, making it more difficult to process. Being asked to prioritize what steps to take and then needing to perform a skill correctly requires the Sequential learner to access a broad knowledge base that is still being developed. As clinical judgment matures in practice there may be a shift towards more of a balance between sequential and global preference. The observer often has no specific task or assignment to complete, leaving no logical steps to perform.

Participants in this study were provided the opportunity to identify any correlation between preferred learning style and specific factors that cause anxiety. Examining the specific factors that lead to anxiety for learners with different preferences is beneficial to assist faculty in helping learners understand the origin of their feelings of anxiety. Simulation techniques may also be implemented to offset the cognitive interference experienced between a preferred style and the task being asked of the learner.

Recommendations for Nursing Education

It is recognized that educational experiences should lead learners towards positive learning experiences, and that experiences that cause anxiety can lead to decreased learning (Rhodes & Curran, 2005). The purpose of this study was to explore the amount and causes of student anxiety in the simulation setting with any associated correlation with student learning style preference. Findings show that participants in this study experience a high normal level of anxiety as evidenced by a mean of 2.98 (*SD* = 0.81) on a 1 to 5 scale with 1 being "Not at all- never true" and 5 being "Extremely-Always true." The level of anxiety associated with simulation did not show a significant change from first semester to final semester in the program ($p = .655$). Specific sources of anxiety were found to be significant, however, and several causes of anxiety showed significance for specific learning style preferences. The use of simulation is widespread in nursing education programs (Hayden, 2010), yet the experience creates anxiety in learners. This anxiety can lead to cognitive interference that can then interfere with learning. Several recommendations follow that can be considered when planning simulation activities to lessen the anxiety from these factors and support learning style preferences.

Preparation

Orientation to the simulation area should be mandatory for all participants. Students should have time to locate where equipment and supplies are located throughout the educational program. Supplies should be in the same place for each simulation, even if various supply carts are brought in for use. For example, once students have located the linen and hygiene supply area, the supplies need to always be

arranged in the same place. If supplies are on a rolling cart that is brought in only for specific scenarios, students should familiarize themselves with what supplies are on the cart and where they are on the cart prior to the simulation. Finding items on a checklist of common supplies can serve as a guide to students for what to look for in the simulation area. Included on the checklist can be items such as raising and lowering side rails and the head of the patient bed, operating the vital sign equipment with the mannequin or an actual person, accessing medication supplies, and where sharp containers, gloves, and trash cans are located. Time to practice with equipment that may be unfamiliar to students should also be provided. Any documentation formats should be consistent across all scenarios.

The best type of patient resource for the type of scenario should be identified and included in resource planning. Mannequins may not be optimal when assessing affective scenario situations, such as a patient experiencing an acute manic episode, or the reaction to a procedure such as intramuscular injection. Standardized patients may need to be hired to allow learning objectives to be met. A scenario may be able to be completed with a low or medium fidelity mannequin rather than the more expensive high fidelity mannequins. The use of outdated materials and supplies donated from agencies, while generous and appreciated, should be reviewed for safety and relevance to current practice. All syringes used in learning environments should conform to current needle safety requirements, for example. Obsolete equipment no longer seen in any practice setting should not be integrated into the learning environment.

Roles

Having the title of "primary nurse" or being assigned the role of "primary nurse" generated a high level of anxiety in participants. Being called "primary nurse" creates an expectation that students may feel ill-equipped to fulfill. Learners at the novice level of practice have limited experience in performing tasks and also delegating responsibility, which then leads to anxiety (Benner, Tanner, & Chesla, 1996).

The assignment of roles should be carefully aligned with the simulation objectives. A clear understanding of the expectations for each role decreases the ambiguity that results in not knowing what is expected for each participant in a scenario. Assigning supplemental roles not needed for the scenario dilutes fidelity of the overall environment. Roles that are assigned should reflect actual practice models. For example, rarely in actual clinical practice do two nurses enter a patient room together only to have one stand at the bedside just waiting for a delegated task. When assigning a student to support the primary nurse, the initial discussion and planning should take place outside of the simulation room. In general, task assignments from the assigned leader of the scenario can take place before entering the room so all participants can mentally make an initial plan of action before entering the "patient" area. Depending on the simulation objectives, which may include management components, any additional help needed to complete the scenario may be available upon request but not until specifically needed or requested.

The prebrief period offers a chance to review the responsibilities of the scenario roles, including what role the faculty are playing for this specific instance. Having the fewest students possible assigned to a passive observer role encourages engagement.

Observers can have specific responsibilities and guided worksheets to increase their engagement and accountability for scenario objectives. For example, one observer can be responsible for tracking if skill performance is in accordance with standard of care criteria. A second observer can be especially attentive to communication factors that occur in the scenario. Another can attend to safety components such as hand hygiene, side rail use, and call light access. Observer engagement will likely remain high if it is understood that at some point in the scenario a nurse in the scenario will give a hand-off report to one of the observers who is then expected to take over care of the “”patient” from that point forward.

Altering the common primary nurse title to another more general title, such as “nurse” or “team lead” may relieve some of the anxiety students feel. Anxiety may simply transfer to this new title, however. It would be preferable that potential anxiety from titles and roles be dealt with proactively through adequate preparation activities, an understanding of what the roles are for the scenario and what help is available once the scenario starts. Not assigning roles outside of student abilities (such as physician or pharmacist) can help alleviate anxiety associated with role assignment. Practice simulations, or a sample simulation that has been video-taped can allow students to practice various roles associated with simulation.

Performance

Developing select simulations that team junior and more senior students together allows opportunities for demonstration of management principles (delegation and supervision) and exposure to clinical judgment by the junior partner not seen in scenarios focused only on skill completion. The use of case studies in theory class or

clinical post-conference settings that ask students to identify decision points, prioritization and information needed to perform care can give practice in developing clinical judgment. Case studies could also be used as introductions to the simulation activity yet to come for novice students, allowing an opportunity to think through possible interventions.

While exploring academic safety during simulation, Ganley & Linnard-Palmer (2012) identified several recommendations that could decrease the anxiety associated with making mistakes. Their suggestions include practicing scenario-related skills before gathering to perform the scenario, giving faculty prompts reminding students of what needs to be done in any scenario, introducing the case before the simulation, allowing students to ask for help, and giving constructive feedback. An additional suggestion identified by Cato (2013) includes eliminating critical comments by observers as the scenario is occurring. Setting guidelines for appropriate behaviors by observers can be part of the scenario protocols. For example, scenario performance can be designated a "no talking" time period to decrease concerns of possible comments being made before those actively performing in simulation have a chance to give their feedback on the experience.

Concern with making a mistake can be compounded when concurrently being video recorded. Recordings can be used to show less than desirable events during simulation and highlight examples of excellence as well. Critiquing performance on a recording in private is an option, but does not allow processing by other students. To the extent that the physical facility resources allow, the simulation setting could be arranged to address anxiety that comes from being observed. This would include having faculty

and observers away from the scenario room if possible, even though there would be observation from cameras occurring. Allowing the students who were recorded to select a section of the recording to critique before a general review can restore a measure of control into a stressful situation. Allowing students from the recording to address any changes that would be recommended in the scenario before other observers comment gives an opportunity to explain the thought processes they followed. Incorporating time constraints on academic activities such as skill validation leading up to simulation not only gives experience in being accountable to time limits in simulation, but also reflects expectations of the clinical agencies.

Students as well as faculty must realize that correct performance of a specific skill once does not mean competence for that skill has been attained. Repetition of previously learned skills in a new context helps the student to continue to construct a knowledge foundation. Repetition also promotes the development of performance patterns. For example, having students actually wash hands at all appropriate points in a simulation rather than merely verbalize the actions can help embed the action until it becomes almost second nature to the learner. Once hand hygiene, or checking a patient identifier, or other critical behaviors become automatic it can leave thinking resources available to process more complex tasks.

Feedback

While feedback needs to be given without blame or judgment, it is also important that feedback include accurate assessment of behaviors. Adult learners in simulation settings want intentional feedback reflecting the reality of their actions (Lasater, 2007). Comments that may seem supportive or innocuous such as, “You did a good job” create

cognitive dissonance when a student has already recognized that a major error occurred. Expert training can help prepare facilitators to guide students towards recognition of aspects that went well and what could be improved, how to give gentle but accurate consequences such as completion of an incident report for a medication error, and how to deal with a student who begins crying related to a simulation experience. Feedback also needs to ensure participants recognize the amount of concern that should be given to various components of the simulation. For novice, sequential learners, all tasks associated with the scenario may be viewed as carrying a similar weight of importance. In reality, not introducing oneself to a family member is less significant than not following the designated protocols for patient verification before medication administration, or the critical need to maintain aseptic technique.

An alternate form of metacognition evaluation (Tanner, 2012) may be appropriate for students who are so anxious they have difficulty processing the event immediately after it is completed as well as for students who are working towards improved clinical judgment skills. At the conclusion of a scenario, participants can be asked to describe how they plan, monitor, and evaluate their own learning. Planning descriptions would include giving specific examples of resources used and time spent in preparation activities. Examples of how the student monitors their learning could include how they used available resources to answer questions from the preparation activity and the steps they took to prepare for the concept or content of the simulation.

Self-evaluation of the simulation experience is essential in identifying personal outcomes for learners. For this evaluation, students could identify in retrospect what aspects of preparation were effective and what did not work. They could also assess the

outcome of any prescribed measurement tool such as a posttest with an analysis of how any missed information compares to the expected responses by writing rationales for the expected responses. And most importantly, evaluation is the time the student can reflect on their own performance of assigned role with what they did well and what, or how, they would change any behaviors or thinking processes. The identification of any lingering confusion or questions could also be identified along with self-identified resources that could answer any question(s), along with indicating if there is a need to meet with a faculty for further clarification. This format would take more time for both the student and for a faculty reviewer, but could be invaluable for identifying faulty thinking, misperceptions of clinical judgment or skill performance, or identifying patterns of thinking that inhibit progress or need additional development.

Faculty should also agree on how repeating a simulation experience aligns with curricular objectives. While student preparation is a reasonable expectation for simulation, repeated reading of text or watching of videos does not replace the multi-faceted, complex behaviors and thinking required in a fluid scenario situation. Consideration should be given if time available, quantity of supplies and efficacy of repeating a simulation is offset with the opportunity to reinforce correct skill performance, recognition of critical decision points, and the correction of any misperceptions of behavior before students leave the simulation setting.

Faculty Preparation

One overriding theme present when developing simulation activities within an educational setting is the need for quality feedback. Currently only a small portion of faculty receive faculty development from qualified experts (Kardong-Edgren, Wilhaus,

Bennett, & Hayden, 2012). It is imperative that faculty or facilitators receive training from qualified experts to allow optimal support of students before, during, and after the simulation experience. In addition to training, faculty who participate in simulation should meet to review the role of faculty for simulation at varying points of the curriculum for consistency in cueing, enforcement of time limits, consequences for errors, and especially in methods of delivering feedback to students. Measurement of learning from simulation towards course outcomes also needs to be clear to faculty and students.

How mistakes are treated can have a strong influence on future anxiety. It needs to be understood that facilitating simulation is not an intuitive skill that naturally comes to all faculty. Training is essential, not only in preserving the integrity of the learning experience but also in knowing how to give positive and negative feedback that will either help or block learning. It may be tempting to assign faculty from clinical settings to simulation activities, but the type of supervision and feedback is different. Faculty in a clinical setting are ever diligent to protect actual patients, allowing virtually no margin of error. Facilitators in simulation need to develop the skill of knowing how far to let a student progress down a pathway that would endanger a live patient before intervening. Simulation faculty are also simultaneously assessing the learning that may occur by letting the simulation play out versus ending any misperceptions that are occurring.

Expertise in supporting learners while still holding them accountable for actions is a challenge for simulation facilitators, yet this complex skill is needed to help achieve deeper learning in simulation. Students also need to receive feedback on their ability to give feedback to others. In the highly interdisciplinary arena of health care, being open

to feedback and being able to give feedback to others are skills embedded in current health care practice.

Training to develop expertise in the technologies used in simulation is also important. It can be challenging to simultaneously monitor observers, critique scenario performance, respond verbally to "patient" questions through the mannequin microphone, make adjustments to mannequin settings and interject any cuing needed for a simulation experience.

Learning Preferences

Anxiety is present in simulation activities, and Sensing, Verbal, and Sequential learners have more anxiety than their counterparts of Intuitive, Visual, and Global learners. No one learning strategy can meet all learning style preferences, and through the various aspects of simulation there are opportunities to engage all style preferences. For example, active learners prefer physical activity. If not actively participating in the scenario, an assignment of recording events on a white board will allow a physical learning opportunity. Administering medications is a concrete procedure that may be a strength for sensory learners. Visual learners may be assigned to track diagnostic test results. Sequential learners appreciate the checklists often associated with learning nursing skills.

Allowing time to reflect and then submit a short paragraph on the feedback received from peers allows the Active, Reflective and Sensing learner to channel the internal emotions generated in simulation into an active, cognitive process. All types of learners can benefit from an understanding of what is expected when performing the

secondary nurse role. Allowing open practice laboratory time can help the Active and Sequential learner manage anxiety.

Having a variety of roles and activities as part of simulation allows opportunities to gain differing perspectives of problem-solving. The opportunity to use more than one learning preference, even if not an individual's preferred style, allows the development of alternate problem-solving skills. Therefore, it is preferable that simulation facilitators not alter activities to meet the preference of a specific student (Durham, et al., 2015). Altering the simulation environment to accommodate for one style may create a positive student experience, but it may not challenge the student's thinking (Kaakinen & Arwood, 2009).

A student who understands their personal learning style preferences becomes more adept at knowing their own strengths. Allowing opportunities for each style to verbalize how they reach conclusions related to care provides insight for fellow learners on differing ways to understand a situation. This active process can build team competency as strengths of each member become amplified within the team dynamics. Written reflection activities allow all preferred learning styles to demonstrate understanding of simulation processes.

One of the strengths of debriefing is that it allows a forum where the various learning style learners can collaborate and learn from each other. Debriefing by a skilled facilitator who recognizes learning preferences can be a mechanism to connect learners to content in a more meaningful manner.

Several of the above recommendations would require little in resource allocation beyond faculty training, but could help decrease student anxiety related to the simulation

experience. It is unlikely, and undesirable, to structure a learning environment devoid of all anxiety. It is desirable, though, to engage in deliberate planning in the structure of simulation to address the sources of student anxiety. Having measures in place to control obvious sources of anxiety can improve opportunities to assess outcomes without the limitations associated with excessive anxiety.

Limitations of the Study

Methodological limitations in this study may restrict the ability to generalize the findings. Threats to internal validity are considered in studies to examine if changes in the independent variables are responsible for the variation in the dependent variable and if any variation in the dependent variable might be attributable to other causes. Threats to external validity limit the ability to state that results are applicable to groups beyond the study group. It is important to attempt to mitigate possible threats to internal and external validity. Towards this goal, the study environment was carefully considered. The focus groups met in a setting familiar to the participants and at a time of the group's choosing. The setting for completion of the web-based main survey data was of the participants' choosing and should not have affected participant responses.

Internal validity may be affected by several factors, such as history, testing effects, maturation, instrumentation, regression, selection, and attrition (Cook & Campbell, 1979). For this study, the history, or the effect of experience between participants and the data was limited as the study did not use repeated measures and data was collected in a single survey collection. No pretesting was done to expose participants to the study, although students who participated in the focus group had early exposure to various aspects of simulation anxiety and may have discussed their feelings

with other potential participants. Maturational changes of participants should be minimal as data was collected at a single point of time. Due to the single collection of data, testing effects should also be minimal. The same instrument was used for all participants. Homogeneity of subjects was verified via the demographic data, particularly the age and health care background, and attrition was minimal as data collection was done once and total time was approximately 20 minutes. Number and length of all surveys were minimized to decrease attrition. No interventions were implemented for the study, so there should be no effect from multiple interventions.

Caution should be used when interpreting learning style preferences results due to the small group numbers identified as Intuitive (n =8) and Global (n = 16) learners. Small numbers can lead to a violation of the assumptions of normality and variance making it difficult to generalize results. Replication of learning style assessment and anxiety causes are needed to validate the findings from this study.

Factors that can negatively impact external validity were also controlled to the extent possible. One external validity concern for this study was sample selection. A convenience, purposive sample may not represent the general population of nursing students and limits the ability to generalize to students in other nursing education programs, although demographic variable analysis did allow some comparison to expected undergraduate nursing student characteristics. Participants self-selected to complete the study, so there may have been personal bias present for choosing to participate based on the topic. Including students in the beginning and end of their educational program may have missed any variations that could occur in the middle of the educational process.

The sample population was extracted from one school with simulation policies consistently implemented across the courses, although there may have been variations in implementation of simulation processes between the faculty involved. Multiple faculty who have not had standardized training facilitated simulation with students. Student responses may have included consideration of anxiety arising from having multiple evaluators who may have different expectations for performance and implementation of simulation events along with variable feedback processes. Administration in programs with standardized training of simulation facilitators may get differing results. Programs with alternate formats, such as different preparation for simulation or different placement of simulation within the curriculum may get other results. Comparative studies at other nursing programs should be utilized to validate the results.

There was limited diversity among the study population with most participants similar in age and previous health care experience. Additional input from non-traditional age participants might give an alternate range of responses. While there were male participants in the focus groups, no males opted to complete the primary study survey. There may be other personal traits not measured by this study that affect the amount of perceived anxiety. While these limitations may prevent generalization of findings, the findings are useful for faculty who desire to address the anxiety they observe during simulation in their own program.

Suggestions for Additional Research

Simulation is a multi-faceted learning setting. The many variables of the simulation environment invite ongoing research. Variables related to anxiety that cannot be controlled in the practice setting can be examined in the simulation setting. Due to the

ongoing level of anxiety that occurs from simulation activities, exploration of ways to address the highest anxiety-producing factors can be investigated. Specific interventions could be explored for effectiveness at various stages of the educational process to determine not only effectiveness of the interventions, but also to determine if decreasing anxiety earlier in an educational program leads to a subsequent decreased anxiety level in more complex simulation and practice settings. If managing anxiety creates less cognitive interference, it may be that improved problem-solving will also occur.

Identifying the amount of anxiety that fosters learning without becoming overwhelming can direct the amount of complexity to include in simulation scenarios. Being able to quantify learning outcomes is important when reviewing resource management. Being able to consciously create the right amount of stress that promotes learning, as measured by course outcomes, without creating situations that prevent learning from excess anxiety can validate the resources needed for simulation as a learning strategy.

Similarly, developing ways to screen students for anxiety so high it is likely to impair learning may create options for early intervention to improve learning outcomes. If future research validates that anxiety that impairs performance in simulation is also impairing learning in clinical settings, interventions can be tested in simulation that can positively impact actual patient care.

A comparison of simulation anxiety experienced across types of nursing programs can help identify common themes. Best practice guidelines for student preparation and facilitator training to reduce student anxiety can begin to be identified.

The anxiety generated from simulation objectives, roles, and complexity of scenarios could also be explored across multiple types of programs.

Another area of exploration would be a comparison of the anxiety students experience in the various components of simulation with the anxiety experienced during the initial period of work immediately after licensure is secured. If anxiety is similar, the simulation setting may be able to be adapted to prepare students to offset some of the anxiety experienced in the workplace. And despite any anxiety experienced in the simulation setting, it would be valuable to measure if clinical skills and judgment are being transferred from simulation to clinical practice.

Conclusion

This study explored the amount and sources of nursing student anxiety associated with simulation learning activities. It also sought to examine if these factors were associated with student preferred learning styles. Findings of this study reveal that simulation produces a high normal level of anxiety for learners, the level of anxiety did not decrease over time, learning style affected the amount of anxiety experienced, and certain factors of simulation cause increased anxiety for certain learning style preferences. Increased anxiety has been linked to decreased learning outcomes of performance, focus and learning (Cheung & Au, 2011; Harvey, Bandiera, Nathens & LeBlanc, 2012). Because of the need for space, specialized equipment and intensive use of faculty time it is important to maximize the learning outcomes from simulation experiences by addressing anxiety sources.

Neither the overall level of anxiety nor the primary sources of anxiety identified by participants in this study changed over time in the educational program. These

findings contradict previous research reporting that simulation anxiety decreases with ongoing practice with the learning strategy (Walton, Chute, & Ball, 2011). The top source of anxiety in this study was associated with being assigned the role of primary nurse, which includes assuming the responsibility of taking charge of the actions performed in the simulation scenario. This finding supported the report by students in a study by Lasater (2007) that they did not like being assigned to the primary nurse role. Being assigned to the role of observer generated the least amount of anxiety. Reviewing how student role assignments are made and taking measures to assure that all participants are actively engaged in the learning process, especially the role of observer, may enhance the simulation learning experience.

Concerns related to being recorded along with concerns about the possibility of making a mistake cause more anxiety for beginning students. This finding may impact simulation development and expectations for various levels of students. The high number of participants in this study who prefer sequential learning also factors into the anxiety associated with performance and the possibility of making a mistake. Feeling a need for heavy reliance on lists and correct steps is not surprising in novice learners who prefer Sequential learning modalities when being immersed in new content and experiences.

More time in the educational process did little to reduce the concern over the possibly of making a mistake, indicating that students did not reach a state of comfort with performance expectations. Information gleaned from focus groups imply that first semester student concerns center on “doing” functions of being a nurse while final semester students are concerned with the “thinking” associated with being a nurse. This

transition may show progress in the development towards the skills needed for entry into practice but also contributes to the overall amount and sources of anxiety occurring in simulation.

There was no significant difference in learning style associated with simulation anxiety between beginning and ending students. This finding is likely due to the homogeneity of the study population. Because of the complexity involved with simulation there are components of this learning modality that simultaneously attract and distress all of the various preferences. But in general, participants indicated that simulation was helpful for their learning and preparation to be a professional nurse.

Nursing educators are held accountable for learning outcomes, especially outcomes that impact patient care. Simulation attempts to prepare students for patient care by replicating a patient situation requiring demonstration of clinical judgment and interventions. Simulation is a resource intensive learning modality that requires significant space, faculty time and equipment. As faculty and programs are increasingly held accountability from accrediting bodies and regulatory boards for the outcomes and efficacy of this modality, it becomes more imperative that best practices be developed to maximize this educational strategy. In an effort to explore dynamics that impact the use of simulation strategies, this mixed methods study provides insight on perceived levels and sources of anxiety experienced by students. Based on the high normal level of anxiety reported and the specific sources of anxiety identified, further research is needed to extend this study by identifying interventions that decrease student anxiety in simulation to expand the learning opportunities of simulation.

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APPENDIX A

DEMOGRAPHIC INFORMATION

Demographic Survey

Please check the appropriate response:

1. Which semester of your program have you most recently participated in simulation?
   First semester_____ Final Semester_____

2. Age in years _____

3. Race: Indicate your ethnic background:

   White _____ African/ African American _____ Other_____ Prefer not to answer____

4. Gender
   Male ____ Female____ Prefer not to answer____

5. How much healthcare-related work/experience did you have BEFORE you started your nursing education program?

   0_____<1 year____ 1-3 years_____4-6 years____ >6 years_____

6. If you have experience, in what capacity did you have healthcare experience?

   Certified Nursing Assistant (CNA)_____
   Licensed Practical Nurse (LPN)___
   Emergency Medical Technician (EMT)___
   Other_____

APPENDIX B

WESTSIDE TEST ANXIETY SCALE, PERMISSION TO ALTER SCALE

Yockey, Jean

From: Rich Driscoll <dr.rich.driscoll@gmail.com>
Sent: Wednesday, April 09, 2014 1:51 PM
To: Yockey, Jean
Subject: Re: [FWD: Contact Form.]

Jean,

You are welcome to use "simulation."

I ask only that you footnote to the actual title.

Best

Richard Driscoll

On Wed, Apr 9, 2014 at 9:45 AM, <dwilson@westsidepsychology.com> wrote:

Dana Wilson
Office Manager

-------- Original Message --------
Subject: [FWD: Contact Form.]
From: <westside@westsidepsychology.com>
Date: Wed, April 09, 2014 8:18 am
To: dwilson@westsidepsychology.com

-------- Original Message --------
Subject: Contact Form.
From: submission@secureserver.net
Date: Tue, April 08, 2014 12:31 pm
To: westside@westsidepsychology.com

First Name : Jean
Last Name : Yockey
Address Street 1 : 414 E. Clark
Address Street 2 :
City : Vermillion
Zip Code : 57069
State : SD
Daytime Phone : 605-677-5510
Evening Phone : 605-624-6950

Email : Jean.Yockey@usd.edu
Comments : I would like to get a message to Dr. Driscoll concerning use of his Westside Anxiety Test for doctoral dissertation. I would like to substitute the word "test" with "simulation" to reflect the focus of the research (causes of anxiety in nursing simulation). If you could forward this to him I would appreciate it. Thank you, Jean Yockey

APPENDIX C

WESTSIDE SIMULATION ANXIETY SCALE

Westside Simulation Anxiety Scale ("exam" and "test" edited by permission to "simulation," Driscoll, 2007)

A. Rate how true each of the following is of you, from extremely or always true, to not at all or never true.
Use the following 5 point scale. Circle your answers:

5	4	3	2	1
extremely always true	highly usually true	moderately sometimes true	slightly seldom true	not at all never true

__ 1) The closer I am to a simulation, the harder it is for me to concentrate on the material.

5 4 3 2 1

__ 2) When I study for my simulations, I worry that I will not remember the material for simulation.

5 4 3 2 1

__ 3) During important simulations, I think that I am doing awful or that I may fail.

5 4 3 2 1

__ 4) I lose focus in important simulations, and I cannot remember material that I knew before the simulation.

5 4 3 2 1

__ 5) I finally remember the answer to exam simulation questions after the simulation is already over.

5 4 3 2 1

__ 6) I worry so much before a simulation that I am too worn out to do my best on the simulation.

5 4 3 2 1

__ 7) I feel out of sorts or not really myself when I do simulations.

5 4 3 2 1

__ 8) I find that my mind sometimes wanders when I am doing simulation.

5 4 3 2 1

__ 9) After a simulation, I worry about whether I did well enough.

5 4 3 2 1

__ 10) I struggle with simulation, or try to avoid doing it, because I feel that whatever I do will not be good enough. I want it to be perfect.

5 4 3 2 1

B. _____ Sum of the 10 questions < _____ > Divide the sum by 10. This is your Test Anxiety score.

What does your score mean?

< _____ > simulation Anxiety score (calculated from 10 item scale above, line B).

Interpreting your test anxiety scores:

1.0—1.9 Comfortably low simulation anxiety

2.0—2.5 Normal or average simulation anxiety

2.5—2.9 High normal simulation anxiety

3.0—3.4 Moderately high (some items rated 4=high)

3.5—3.9 High simulation anxiety (half or more of the items rated 4=high)

4.0—5.0 Extremely high simulation anxiety (items rated 4=high and 5=extreme)

Scale Rationale.

The SCALE picks up the three major features of debilitative anxiety-performance impairment, intrusive thoughts, and physiological distress.

Incapacity (memory loss and poor cognitive processing) – Items #1, 4, 5, 6, 8 & 10

Worry (catastrophizing) – items #2, 3, 9

Physiologic symptoms –Item #7

The SCALE is constructed to measure anxiety impairments, with most items asking directly about performance impairment or about worrying, which interferes with concentration. Simple indications of physiological stress are found to be relatively weak indicators of performance impairment.

Recommendations.

We have found that students who score at least 3.0 or more on our scale (moderately high anxiety) tend to benefit from anxiety reduction training, experiencing lower anxiety on tests and achieving better grades.

APPENDIX D

FELDER-SOLOMAN'S INDEX OF LEARNING SCALE

INDEX OF LEARNING STYLES*

DIRECTIONS

Enter your answers to every question on the ILS scoring sheet. Please choose only one answer for each question. If both "a" and "b" seem to apply to you, choose the one that applies more frequently.

1. I understand something better after I
- **a)** try it out.
- **b)** think it through.

2. I would rather be considered
- **a)** realistic.
- **b)** innovative.

3. When I think about what I did yesterday, I am most likely to get
- **a)** a picture.
- **b)** words.

4. I tend to
- **a)** understand details of a subject but may be fuzzy about its overall structure.
- **b)** understand the overall structure but may be fuzzy about details.

5. When I am learning something new, it helps me to
- **a)** talk about it.
- **b)** think about it.

6. If I were a teacher, I would rather teach a course
- **a)** that deals with facts and real life situations.
- **b)** that deals with ideas and theories.

7. I prefer to get new information in
- **a)** pictures, diagrams, graphs, or maps.
- **b)** written directions or verbal information.

8. Once I understand
- **a)** all the parts, I understand the whole thing.
- **b)** the whole thing, I see how the parts fit.

9. In a study group working on difficult material, I am more likely to
- **a)** jump in and contribute ideas.
- **b)** sit back and listen.

10. I find it easier
- **a)** to learn facts.
- **b)** to learn concepts.

11. In a book with lots of pictures and charts, I am likely to
- **a)** look over the pictures and charts carefully.
- **b)** focus on the written text.

12. When I solve math problems
- **a)** I usually work my way to the solutions one step at a time.
- **b)** I often just see the solutions but then have to struggle to figure out the steps to get to them.

13. In classes I have taken
- **a)** I have usually gotten to know many of the students.
- **b)** I have rarely gotten to know many of the students.

14. In reading nonfiction, I prefer
- **a)** something that teaches me new facts or tells me how to do something.
- **b)** something that gives me new ideas to think about.

15. I like teachers
- **a)** who put a lot of diagrams on the board.
- **b)** who spend a lot of time explaining.

16. When I'm analyzing a story or a novel
- **a)** I think of the incidents and try to put them together to figure out the themes.
- **b)** I just know what the themes are when I finish reading and then I have to go back and find the incidents that demonstrate them.

17. When I start a homework problem, I am more likely to
- **a)** start working on the solution immediately.
- **b)** try to fully understand the problem first.

18. I prefer the idea of
- **a)** certainty.
- **b)** theory.

19. I remember best
- **a)** what I see.
- **b)** what I hear.

20. It is more important to me that an instructor
- **a)** lay out the material in clear sequential steps.
- **b)** give me an overall picture and relate the material to other subjects.

21. I prefer to study
- **a)** in a study group.
- **b)** alone.

22. I am more likely to be considered
a) careful about the details of my work.
b) creative about how to do my work.
23. When I get directions to a new place, I prefer
a) a map.
b) written instructions.
24. I learn
a) at a fairly regular pace. If I study hard, I'll "get it."
b) in fits and starts. I'll be totally confused and then suddenly it all "clicks."
25. I would rather first
a) try things out.
b) think about how I'm going to do it.
26. When I am reading for enjoyment, I like writers to
a) clearly say what they mean.
b) say things in creative, interesting ways.
27. When I see a diagram or sketch in class, I am most likely to remember
a) the picture.
b) what the instructor said about it.
28. When considering a body of information, I am more likely to
a) focus on details and miss the big picture.
b) try to understand the big picture before getting into the details.
29. I more easily remember
a) something I have done.
b) something I have thought a lot about.
30. When I have to perform a task, I prefer to
a) master one way of doing it.
b) come up with new ways of doing it.
31. When someone is showing me data, I prefer
a) charts or graphs.
b) text summarizing the results.
32. When writing a paper, I am more likely to
a) work on (think about or write) the beginning of the paper and progress forward.
b) work on (think about or write) different parts of the paper and then order them.
33. When I have to work on a group project, I first want to
a) have "group brainstorming" where everyone contributes ideas.
b) brainstorm individually and then come together as a group to compare ideas.

34. I consider it higher praise to call someone
a) sensible.
b) imaginative.
35. When I meet people at a party, I am more likely to remember
a) what they looked like.
b) what they said about themselves.
36. When I am learning a new subject, I prefer to
a) stay focused on that subject, learning as much about it as I can.
b) try to make connections between that subject and related subjects.
37. I am more likely to be considered
a) outgoing.
b) reserved.
38. I prefer courses that emphasize
a) concrete material (facts, data).
b) abstract material (concepts, theories).
39. For entertainment, I would rather
a) watch television.
b) read a book.
40. Some teachers start their lectures with an outline of what they will cover. Such outlines are
a) somewhat helpful to me.
b) very helpful to me.
41. The idea of doing homework in groups, with one grade for the entire group,
a) appeals to me.
b) does not appeal to me.
42. When I am doing long calculations,
a) I tend to repeat all my steps and check my work carefully.
b) I find checking my work tiresome and have to force myself to do it.
43. I tend to picture places I have been
a) easily and fairly accurately.
b) with difficulty and without much detail.
44. When solving problems in a group, I would be more likely to
a) think of the steps in the solution process.
b) think of possible consequences or applications of the solution in a wide range of areas.

ILS SCORING SHEET

1. Put "1"s in the appropriate spaces in the table below (e.g. if you answered "a" to Question 3, put a "1" in Column A by Question 3).
2. Total the columns and write the totals in the indicated spaces.
3. For each of the four scales, subtract the smaller total from the larger one. Write the difference (1 to 11) and the letter (a or b) for which the total was larger on the bottom line.

   For example, if under "ACT/REF" you had 4 "a" and 7 "b" responses, you would write "3b" on the bottom line under that heading..
4. On the next page, mark "X"s above your scores on each of the four scales.

ACT/REF	**SNS/INT**	**VIS/VRB**	**SEQ/GLO**
Q a b	Q a b	Q a b	Q a b
1 ___ ___	2 ___ ___	3 ___ ___	4 ___ ___
5 ___ ___	6 ___ ___	7 ___ ___	8 ___ ___
9 ___ ___	10 ___ ___	11 ___ ___	12 ___ ___
13 ___ ___	14 ___ ___	15 ___ ___	16 ___ ___
17 ___ ___	18 ___ ___	19 ___ ___	20 ___ ___
21 ___ ___	22 ___ ___	23 ___ ___	24 ___ ___
25 ___ ___	26 ___ ___	27 ___ ___	28 ___ ___
29 ___ ___	30 ___ ___	31 ___ ___	32 ___ ___
33 ___ ___	34 ___ ___	35 ___ ___	36 ___ ___
37 ___ ___	38 ___ ___	39 ___ ___	40 ___ ___
41 ___ ___	42 ___ ___	43 ___ ___	44 ___ ___

Total (sum X's in each column)

ACT/REF	**SNS/INT**	**VIS/VRB**	**SEQ/GLO**
a b	a b	a b	a b
___ ___	___ ___	___ ___	___ ___

(Larger – Smaller) + Letter of Larger (see below)

_____	_____	_____	_____

*

APPENDIX E

ELEMENTS OF SIMULATION SURVEY TOOL

Elements of Simulation Tool

Rate the following factors related to simulation according to feelings of anxiety you experience.

5	4	3	2	1
extremely anxious	highly anxious	moderately anxious	slightly anxious	not at all anxious

Rate the degree of anxiety you feel related to each of the following aspects of simulation:

A. Unfamiliar Clinical situation 5 4 3 2 1
B. Cameras present or being recorded 5 4 3 2 1
C. Being observed by faculty 5 4 3 2 1
D. Being observed by peers 5 4 3 2 1
E. Receiving feedback from faculty in front of peers 5 4 3 2 1
F. Receiving feedback from peers in front of others 5 4 3 2 1
G. Role in simulation
    a. Primary nurse 5 4 3 2 1
    b. Secondary nurse 5 4 3 2 1
    c. Observer 5 4 3 2 1
H. Performing skills during scenario 5 4 3 2 1
I. Ability to recognize changes in patient condition 5 4 3 2 1
J. Recognizing significance of diagnostic/lab results 5 4 3 2 1
K. Administering medications in timely manner 5 4 3 2 1
L. Prioritizing nursing actions 5 4 3 2 1
M. Assigned title of Primary nurse 5 4 3 2 1
N. Simulation debriefing session 5 4 3 2 1
O. Performing in front of others 5 4 3 2 1
P. Being timed during simulation 5 4 3 2 1
Q. Possibility of making a mistake 5 4 3 2 1
R. Determining what is real and what is simulated 5 4 3 2 1
S. Preparing for simulation 5 4 3 2 1
T. Observing other students' performances 5 4 3 2 1
U. Knowledge level of simulation focus 5 4 3 2 1
V. Knowing what to do 5 4 3 2 1
W. Please describe anything else that may cause you anxiety during simulation

APPENDIX F

EMAIL INVITATION FOR PARTICIPATION IN FOCUS GROUP

UNIVERSITY of NORTHERN COLORADO

Dear Student:
You are invited to participate in a research study about sources of anxiety in simulation.

The purpose of the study is to understand what students perceive as sources of anxiety in simulation activities. We are inviting you to be in this study because you are a nursing student who will or who has completed the first semester or the final semester of your program. You will be asked to participate in a focus group session with the researcher and some of your classmates to answer questions associated with any anxiety you experience related to simulation.

PROCEDURE: If you choose to participate, you will:

1. Meet in a small student group session with the researcher for approximately 60 minutes.
2. Discuss causes of anxiety during simulation.

DESCRIPTION: You will be asked to participate in a small group session with the researcher and answer questions associated with your participation in simulation. Handwritten notes will be taken of your verbal description of your experiences. The interview session will occur in the simulation lab on campus and last approximately 60 minutes. The main question will be, "What causes anxiety for you related to the simulation experience?" Your participation will not affect your course grades.

RISKS AND BENEFITS: Associated risks with this activity are minimal and not expected to vary from risks associated with the daily life of a student, although discussing anxiety associated with simulation may cause memories of previous anxiety. The benefits which may reasonably be expected to result from this study are an increased understanding of the causes of anxiety for you during simulation which may lead to enhanced coping with this anxiety. Data from the study will be used to inform nursing faculty for the implementation of simulation from a student perspective. No individual responses by you will be reported. Your decision whether or not to participate in this study, or to withdraw, will not affect any of your course grades or standing in this program. The notes from the session will be stored for three years. While there is no financial payment for participating in this study, snacks will be provided during the interview session and you may choose to be entered in a drawing for one of five $10 gas cards.

SUBJECT'S RIGHTS: *Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns*

about your selection or treatment as a research participant, please contact the Sponsored Programs and Academic Research Center, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-2161.

If you are interested in attending this small group activity, please respond to the researcher at Jean.Yockey@usd.edu by (date) to arrange a meeting time. Thank you for your consideration.

APPENDIX G

FOCUS GROUP CONSENT FORM

UNIVERSITY of NORTHERN COLORADO

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH

Project Title: Anxiety in Simulation

Researcher: K.L. Jean Yockey, MSN, FNP-BC, CNE, PhD student, School of Nursing
Phone number: 6059677-5510
Research Advisor: Dr. Melissa Henry, PhD, RN, FNP-C. Associate Professor, School of
Nursing, Phone number: (970) 351-1707

DESCRIPTION: You are invited to participate in a research study on the student perception of anxiety associated to nursing simulation activities. The purpose of this study is to gain a greater understanding of the sources of student-perceived anxiety associated with simulation activities in their nursing program. You will be asked to participate in an interview session with the researcher in a small group setting and answer questions associated with your participation in simulation. The verbal descriptions of your experiences will be handwritten in notes and stored for three years. The interview session will occur in the simulation lab on campus and last approximately 60 minutes. The priority question will be, "What causes anxiety for you related to the simulation experience."

PROCEDURE: If you choose to participate, you will:

1. Complete an interview session with a few of your classmates and the researcher.
2. Provide your input on what causes anxiety for you during simulation.

RISKS AND BENEFITS: Associated risks with this activity are minimal and not expected to vary from risks associated with the daily life of a student, although discussing anxiety associated with simulation may cause memories of previous anxiety. The benefits which may result from this study are an increased understanding of the causes of anxiety for you during simulation which may lead to enhanced coping with this anxiety. Data from the study will be used to inform nursing faculty on the implementation of simulation from a student perspective. No individual responses by you will be reported. Your decision whether or not to participate in this study, or to withdraw, will not affect any of your course grades or standing in this program. While there is no financial payment for participating in this study, snacks will be provided during the interview session and you may choose to be entered in a drawing for one of five $10 gas cards.

SUBJECT'S RIGHTS: *Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at*

any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact the Sponsored Programs and Academic Research Center, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-2161.

The extra copy of this consent form is for you to keep.

SIGNATURE _____ DATE _____

Participant

SIGNATURE _____ DATE _____

Researcher

APPENDIX H

FOCUS GROUP SCRIPT

Focus Group Script

Welcome

"Welcome. Thank you for taking the time to join our discussion of simulation and anxiety from a student perspective. My name is _____ (Research Assistant) and I am assisting Jean Yockey, who is doing research towards a PhD from the University of Northern Colorado.

Overview of the Topic

"We are asking you to share information about how you, as a nursing student, feel about anxiety that students experience during simulation experiences. We want to gain a better understanding of simulation anxiety in order to improve the learning that we want to occur during simulation activities.

"You were invited to participate because you are nursing students who have participated in simulation activities in your undergraduate education experience. We want to capture what your experience is regarding anxiety and simulation."

Ground Rules

"There are no right or wrong answers. We expect that you will have differing points of view. Please feel free to share your point of view even if it differs from what others have said.

I will be taking written notes because we do not want to miss any of your comments. No names or other information that could identify you will be included on the written notes or in any reports. Your comments are considered confidential, and we ask that you respect the privacy of the other participants by not sharing comments outside of this meeting.

"Please don't feel that you need to respond only to me. If you want to follow-up on something that someone has said by making an additional comment, giving an example, or an alternate view, feel free to do so. We are hoping to generate discussion amongst the group members. I am here to ask questions, ask for clarification, make sure everyone has a chance to share, and above all to listen to your comments. We are interested in hearing from all participants; if you aren't saying much I may call on you for your thoughts.

"If you have a cell phone with you, please put it on the quiet mode, and if you need to answer it step out to do so. Feel free to get more refreshments if you would like."

Opening Question

"Let's begin. Let's find out a little about each other by going around the table with each person sharing a simulation that was memorable to them and why it was memorable.

"Now we won't go around the table, so just jump into the conversation at any time as I throw out the question, "What causes anxiety for you related to simulation?" If needed, an alternate question of, "Think back to when you were in simulation in your nursing course. Was there anything that made you feel anxious during simulation?"

Adapted from Krueger & Casey, 2009, pp. 96-98.

APPENDIX I

EMAIL FOR PILOT AND FULL STUDY INVITATION

UNIVERSITY of NORTHERN COLORADO

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH

UNIVERSITY OF NORTHERN COLORADO

Project Title: Simulation Anxiety and learning Style
Researcher: K.L. Jean Yockey, MSN, FNP-BC, CNE, School of Nursing
Phone Number: (605) 677-5510 email: Jean.Yockey@usd.edu
Researcher Advisor: Dr. Melissa Henry, PhD, RN, FNP-BC, Associate Professor, School of Nursing
Phone Number: (970) 351-2293 e-mail: Melissa.Henry@unco.edu

I am researching student anxiety related to simulation activities. As a participant in this research, you will be asked to complete a learning style inventory, a simulation anxiety scale, a scale on possible causes of anxiety, and basic demographic information. These will be completed in an online survey format from your personal computer. The surveys will consist of items that you will rank by how much they apply to you. The surveys will require you to assess your attitude about various features of simulation in the nursing program and any associated anxiety. The learning style survey will assess your preferred learning style. The surveys are expected to take approximately 15-20 minutes to complete.

For the surveys, you will not provide your name, but will be asked to provide your semester, gender and race if you would like, and any health care experience you may have. Therefore, your responses will be anonymous. Responses will be entered into an online survey link. There will be no impact on any course or clinical grade. Results of the study will be presented in group form only (e.g., averages) and all associated printout of data will be kept in locked cabinets on campus.

Risks to you are minimal. You may remember feelings of anxiety you experienced from previous simulation activities, but we are trying to minimize these feelings because the results will have no bearing on your final grade. The benefits which may reasonably be expected to result from this study are knowledge of your preferred learning style and an increased understanding of the causes of anxiety for you during simulation, which may lead to enhanced coping with this anxiety. Data from the study will be used to inform nursing faculty for the implementation of simulation from a student perspective.

Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please click on the link below if you would like to participate in this research. By

completing the surveys, you will give us permission for your participation. You may keep this form for future reference. If you have any concerns about your selection or treatment as a research participant, please contact the Office of Sponsored Programs, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-2161.

APPENDIX J

LETTER OF SUPPORT FROM UNIVERSITY OF SOUTH DAKOTA

UNIVERSITY OF
SOUTH DAKOTA
SCHOOL OF HEALTH SCIENCES

Date: April 28, 2014

To: Jean Yockey, MS, RN

From: Carla J. Dieter, EdD, RN, FNP-BC
Professor & Chair

Re: Letter of Support for Dissertation Research

I am providing this letter of support for your research study involving simulation anxiety and learning style. I understand your study will necessitate recruitment of The University of South Dakota nursing students. I understand that the purpose of this study is to explore student interpretations of potentially anxiety-provoking aspects of simulation in the first and final semesters of a nursing program, and compare these identified anxiety factors with self-identified learning style preferences. This study will build on the knowledge base regarding simulation education and further develop the science of nursing education in the field of simulation learning.

Your research will add to the important body of knowledge necessary for faculty to understand how to best implement simulation to prepare students to recognize critical clinical situations and make accurate clinical decisions to implement care that safeguard patients. I look forward to your research in this area both with this study and as an important research trajectory. As you move forward with your study and IRB approval, I am willing to assist in any way to ensure all IRB requirements are met including confidentiality of student participants.

Carla J. Dieter

Carla J. Dieter, EdD, RN, FNP-BC
Professor & Chair
USD Nursing

APPENDIX K

INSTITUTIONAL REVIEW BOARD APPROVAL FROM UNIVERSITY OF NORTHERN COLORADO

UNIVERSITY of NORTHERN COLORADO

Institutional Review Board

DATE:	June 3, 2014
TO:	Karyl Yockey
FROM:	University of Northern Colorado (UNCO) IRB
PROJECT TITLE:	[602453-2] Simulation Anxiety and Learning Style
SUBMISSION TYPE:	Revision
ACTION:	APPROVAL/VERIFICATION OF EXEMPT STATUS
DECISION DATE:	May 31, 2014

Thank you for your submission of Revision materials for this project. The University of Northern Colorado (UNCO) IRB approves this project and verifies its status as EXEMPT according to federal IRB regulations.

Dear Jean,

Thank you so much for your submission of modifications. Everything is in order and Approval is granted. Good luck to you on this interesting and well-developed proposal.

It has been a pleasure working with you.

Nancy White

We will retain a copy of this correspondence within our records for a duration of 4 years.

If you have any questions, please contact Sherry May at 970-351-1910 or Sherry.May@unco.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.

APPENDIX L

INSTITUTIONAL REVIEW BOARD APPROVAL FROM UNIVERSITY OF SOUTH DAKOTA

UNIVERSITY OF
SOUTH DAKOTA

July 29, 2014

The University of South Dakota
414 E. Clark Street
Vermillion, SD 57069

PI: Melissa Henry **Student PI:** Jean Yockey
Project: 2014.146 - Simulation Anxiety and Learning Style
Review Level: Exempt 2 **Risk:** No More than Minimal Risk
USD IRB Initial Approval: 7/29/2014
Approved items associated with your project:

Surveys
Consent

The proposal referenced above has received an Exempt review and approval via the procedures of the University of South Dakota Institutional Review Board.

Annual Continuing Review is not required for the above Exempt study. However, when this study is completed you must submit a Closure Form to the IRB. You may close your study when you no longer have contact with the subjects and you are finished collecting data. You may continue to analyze the existing data on your closed project.

Prior to initiation, promptly report to the IRB, any proposed changes or additions (e.g., protocol amendments/revised informed consents/ site changes, etc.) in previously approved human subject research activities.

The forms to assist you in filing your: project closure, continuation, adverse/unanticipated event, project updates /amendments, etc. can be accessed at http://www.usd.edu/research/research-and-sponsored-programs/irb-application-forms-and-templates.cfm.

If you have any questions, please contact: humansubjects@usd.edu or (605) 677-6184.

Sincerely,

Sandra Ellenbolt

Sandra Ellenbolt, JD
Director, Office of Human Subjects Protection
IRB Member
University of South Dakota
Institutional Review Boards
(605) 677-6184
UT00000005035