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DOES LEARNING STYLE INFLUENCE STUDENT ANXIETY DURING A HUMAN PATIENT SIMULATION EXPERIENCE?

BY

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Approval of Thesis

The undersigned certify that they have read the thesis entitled

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Dedication

I would like to dedicate this thesis to my parents, Ron and Lorna Stephen and my partner Marko Jalava. I could not have completed this thesis without your constant love and support.

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evenings and weekends proof reading my papers and listening to my excitement and my feelings of trepidation.

Abstract

Human patient simulation (HPS) is becoming increasingly popular in nursing education. HPS learning activities can enhance the development of critical thinking, clinical judgment, and decision in an environment that poses no risk to patients. Many studies have been conducted examining the student experience during HPS events and student anxiety has been identified as a challenge. A quantitative correlation design was used to gain an understanding of the relationship between learning style and student anxiety during an HPS event. Thirty nine students completed the Index of Learning Styles Inventory, and wore portable heart rate monitors during an HPS event. There was a statistically significant change in HR from the resting HR during the role assignment, hands-on care and debriefing phases of the HPS event. However, there was no statistically significant relationship between learning style and student anxiety during the HPS experience.

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Chapter One: Introduction

Human patient simulation (HPS), utilizing life like manikins, is a teaching strategy that is becoming increasingly popular in nursing education. This teaching approach may also be called high-fidelity simulation (HFS). The need for this type of teaching method has arisen due to: the difficulty experienced by students when transferring knowledge from the classroom to the clinical environment (Medley & Horne, 2005), a new generation of learners who are comfortable with and expect the use of technology in their educational programs (Bassendowski, 2007), advances in learning theory (Lisko & O'Dell, 2010), limited clinical opportunities (Baxter, Akhtar-Danesh, Valaitis, Stanyon, & Sproul, 2009; Lasater, 2007), nurse educator shortages (Baxter et al., 2009) and, increased patient acuity (Baxter et al., 2009).

HPS learning activities are believed to enhance the development of critical thinking, clinical judgment and decision making skills in an environment that poses no risk to patients (Bambini, Washburn, & Perkins, 2009; Brewer, 2011; Jeffries, Bambini, Hensel, Moorman, & Washburn, 2009a; Kuhrik, Kuhrik, Rimkus, Tecu, & Woodhouse, 2008). Many studies have been conducted examining the student experience during an HPS event and student anxiety during these experiences has been identified.

Anxiety is an unpleasant emotion which is pervasive in nature and "encompasses tension, nervousness, fear and worry" (Spielberger, 1979, p. 6).

Depending on the amount of anxiety a student experiences, performance can be affected positively or negatively (Chiffer McKay et al., 2010, Yerkes & Dobson, 1908). A moderate level of anxiety can help students focus their attention, however high levels of anxiety can cause a student to perform poorly (Spielberger, 1979). The researcher has proposed that learning styles may influence anxiety during an HPS event.

"Learning styles are preferences and tendencies students have for certain ways of taking in and processing information and responding to different instructional environments" (Felder, 2010, p. 4). It has been theorized that students who are taught in a manner that is compatible with their learning style will retain information longer, apply the information more effectively and will have a more positive learning experience (Felder, 1993). Thus, if students, during an HPS experience, are taught in a manner that is not consistent with their learning style they may experience some dissatisfaction and consequently a heightened level of anxiety.

Purpose of the Study

The purpose of this study is to gain an understanding of the relationship between student learning style and student anxiety during an HPS experience.

Research Question

The research question is "is there a relationship between student learning style and student anxiety during an HPS experience?"

The null hypothesis is that there is no relationship between learning style and student anxiety during an HPS experience.

Definition of Terms

Human patient simulation (HPS) is a situation in which a "life-size full-body mannequin capable of electronically interacting with humans" (Brewer, 2011, p. 311) is used to create a learning environment similar to a clinical setting. The term HPS and high fidelity simulation (HFS) are used interchangeably.

Learning styles "are characteristic preferences for alternative ways of taking in and processing information" (Litzinger, Lee, Wise, & Felder, 2007, p. 309).

Anxiety "is an unpleasant emotion which is pervasive in nature and "encompasses tension, nervousness, fear and worry" (Spielberger, 1979, p. 6).

Assumptions

1) Students experience anxiety during HPS scenarios and this anxiety could be linked to student learning style.

2) When an individual experiences anxiety during an HPS experience there is an activation of the sympathetic nervous system which increases heart rate.

Significance of the Study

The literature indicates some nursing students experience anxiety during HPS learning events. Understanding whether student anxiety during an HPS experience is related to learning styles may provide nurse educators with additional information on how to best support these students during HPS learning activities.

Chapter Two: Literature Review

In this chapter, I will discuss simulation in its broadest context, the HPS experience, the benefits and challenges of using HPS as a teaching approach, the anxiety students experience during an HPS event, the concept of anxiety, anxiety and its effect on learning, learning style, and student learning style and its influence on the student experience during an HPS event.

Overview of Simulation

"Simulation is a technique, not a technology, to replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully interactive faction" (Gaba, 2004, p. i2). HPS is a teaching approach where mock up situations are used to provide students with an opportunity to gain clinical skills which can be implemented in real life situations (Jeffries, 2005; Medley & Horne, 2005; Schiavenato, 2009). These situations can enhance students problem solving, critical thinking and psychomotor skills, in a safe, controlled realistic environment (Reilly & Spratt, 2007; Bambini, et al., 2009).

There are a vast array of simulators and simulation activities available to nurse educators. These include low fidelity simulation such as task trainers and simulators that are non-computerized, mid or medium-fidelity simulation such as standardized patients, computer programs and video games, and high-fidelity simulations which are computerized human patient simulator manikins that respond physiologically (Harder, 2010). The proposed study is of the experience

within a high fidelity or human patient learning environment, so in this review. I will focus on HPS.

HPS is a relatively new technology utilized in nursing education (Kardong-Edgren, Starkweather, & Ward, 2008; Lasater, 2007); however, simulators have traditionally been used in commercial aviation, nuclear power production, and the military when training students for a few decades (Gaba, 2004). These professions are similar to the health care profession in their complexity and their intrinsic hazards to human life (Gaba, 2004).

The Human Patient Simulation Experience

Typically the HPS learning activity consists of two parts: 1) the simulation experience where appropriate care is provided to the patient (manikin), and 2) a debriefing, which follows providing care of the patient (Shinnick, Woo & Mentes, 2011). There is also a pre-simulation phase where students are typically provided with learning objectives and some pre-readings prior to the HPS experience (Jeffries, 2005). Upon arrival at the HPS laboratory, students are divided into groups of five or six members (Jeffries, 2005). Sometimes the groups may be larger or smaller depending on the class size. During this time, students are assigned to specific roles by the course instructor. Usually one student will act as the primary nurse and the others will play secondary roles or act as observers (Jeffries, 2005). The students then enter the HPS lab and act out the scenario with the medium or high-fidelity simulator. The faculty member may observe the scenario from a control room and will only intervene if necessary (Jeffries, Clochesy, & Tovancsek, 2009b). Once the HPS scenario is complete, the students

enter into the debriefing phase (Jeffries, 2005). During this phase the instructor asks questions that promote reflective thought and encourage discussion (Jeffries, 2007). It is thought that most of the learning occurs during the debriefing phase (Jeffries et al., 2009b).

Benefits of HPS as a Teaching Strategy

Safety. An undeniable benefit of the HPS teaching approach is that students are able to learn in an environment where their mistakes will not harm actual patients. With no risk to patients, students are able to apply concepts learnt in the classroom and laboratory in an environment that mimics the hospital (Brewer, 2011). They are able to develop skills such as decision making, assessments and medication administration (Bambini, et al, 2009; Brewer, 2011; Jeffries et al., 2009a; Kuhrik, et al., 2008; Reilly & Spratt, 2007), can repeat skills until they are competent (Brewer, 2011; Gaba, 2004), and make errors and see the outcome of those errors (Jeffries et al., 2009a). Additionally, students can learn from their mistakes since the instructor does not have to intervene in order to ensure patient safety (Jeffries, 2007). As students do not practice on live patients, simulation can help faculty minimize ethical concerns (Cato, Lasater, & Peeples, 2009).

Preparing students for the clinical environment. There are several ways that HPS experiences can help students prepare for the clinical environment. The experience can provide the student with a greater understanding of what to expect and how to behave in clinical situations prior to entering the real world setting (Bambini, et al., 2009). When students are involved in an HPS experience,

they are engaged in problem solving, critical thinking and making clinical judgments (Brewer, 2011), preparing them for the types of thinking that will be required during their clinical practice. As a result, students report a decrease in the anxiety they experience prior to entering a new clinical area (Campbell, 2007; Howard, Englert, Kameg, & Perozzi, 2011). Students also feel more prepared for practicing in the clinical environment as they have an increased knowledge of medication side effects, differences between patient's responses to medication, ability to administer medications, and confidence when administering medication (Bearnson & Wiker, 2005). In a study conducted by Wotton, Davis, Button, & Kelton (2010), 95% of students felt that knowledge gained in an HPS environment could be transferred to their clinical experiences.

Curriculum consistency. In the current healthcare setting, it is not always possible to provide each student with the same clinical experience. However HPS can provide educators with a way to ensure each student is exposed to similar situations, as well as to ones they may not encounter during their clinical placements (Wotton, et al., 2010). HPS, with no risk to human life, can repeatedly expose students to rare health conditions for which interventions must be done correctly (Bremner, Aduddell, & Amason, 2008). The ability to replicate scenarios and have the students repeat the scenario several times can enhances students' long-term retention of the skill or concept (Gaba, 2004). Thus, HPS activities allow for more consistent and equitable delivery of the curriculum (Brewer, 2011) which is beneficial to both faculty and students.

Collaborative environment. The HPS environment promotes teamwork and simulates what it would be like to work within a healthcare team (Brewer, 2011). The primary nurse often works with the secondary nurse when caring for the patient and the patient's family member. Students enjoy working as part of a team (Bearnson & Wiker, 2005) and feel that HPS provides them with the necessary skills to be a valuable team member (Schoening, Sittner, & Todd, 2006). Students also feel that working as part of a team during an HPS experience improves their problem solving skills and understanding of how to effectively communicate with others (Schoening, et al., 2006). Communication and working as part of an interdisciplinary team are essential skills for nurses in the real working world.

Student satisfaction. Students feel that HPS experiences are valuable. They indicate that these experiences can improve their self confidence, increase their awareness, provide a realistic environment to learn in, and help them practice assessment data gathering skills (Ganley & Linnard-Palmer, 2012). Students have also reported satisfaction with the active learning environment of an HPS experience (Baxter et al., 2009). In a study conducted by Howard, et al., (2011), students felt that HPS was a valuable part of their undergraduate curriculum because it increased their understanding of concepts and stimulated critical thinking. They also felt that HPS experiences aided in the transfer of classroom knowledge into the clinical setting; however they did not feel that HPS should entirely replace clinical placements (Howard et al., 2011; Sinclair & Ferguson, 2009).

A study done by McCaughey and Traynor (2010), found 96.8% of the students (n=90) felt HPS was a good way to test their assessment abilities, 92.5% reported it increased their confidence in relation to clinical judgments, 97.8% felt that they learnt from their mistakes during the HPS event, 87% felt that HPS helped them recognize the relevance of classroom theory, and 72% felt that HPS would help them transition from student to nurse. These results lend further evidence that HPS is a valuable teaching learning method from the student perspective.

Today's students are often referred to as the millennial generation (Rothgeb, 2008). The literature states that today's student has a high level of technological knowledge, enjoys experimental learning, expects and appreciates technology in their leaning experiences, requires immediate feedback, and benefits from collaborating with others (Earle & Myrick, 2009; Rothgeb, 2008; Wellman, 2009). The use of HPS in nursing education embraces this type of learning. The technology and active involvement used in HPS corresponds with the expectations of this generation of learners.

Challenges of HFS as a Teaching Strategy

Cost. The cost of implementing and maintaining a medium to high fidelity simulation lab is often one of the primary challenges to the incorporation of HPS into a nursing curriculum (Rothgeb, 2008). Many manikins end up as "expensive bed weights" (Schiavenato, 2009, p. 388; Medley & Horne, 2005). The costs are associated with designing, building or remodeling the HPS room(s), purchasing the manikin(s) and the props needed to enhance the reality of the HPS

environment, and the training and salary of faculty and support staff (Rothgeb, 2008; Valler-Jones, Meechan, & Jones, 2011). The need for faculty presence, and therefore costs, often increase since HPS scenarios work best when there are small groups of two to six students participating in the experience (Jeffries, 2007). Additional costs can include the purchase of case scenarios, warranty on the manikin(s), and additional sound and video equipment (Jeffries, 2005; Rothgeb, 2008).

Faculty. The implementation of HPS into a nursing curriculum affects Faculty for a variety of reasons. When utilizing HPS as a teaching tool, Faculty must adopt a learner-focused teaching approach (Jeffries et al., 2009b). This can be difficult for some faculty members as they must move from traditional pedagogies such as lecturing to more innovative ones (Medley & Horne, 2005; Rothgeb, 2008). Further, Faculty must become familiar with and comfortable in using the new technologies that HPS teaching methods bring. This requires that they study and learn how to use HPS effectively, often on their own time (Jeffries, 2005). In addition, HPS experiences require more preparatory time than do more traditional lessons (Childs & Sepples, 2006). In order for the implementation of HPS to be successful, nursing faculty must believe in its effectiveness, be willing to change teaching strategies and be committed to the time required to effectively implement simulation experiences (Rothgeb, 2008).

Realism. One drawback to HPS that has been identified in the literature by students, is that there are elements in the HPS experience that do not translate well to the clinical setting. As an example, students find it unrealistic when the

manikin can only speak in a female voice. However, this is often quickly overlooked once the scenario begins (Childs & Sepples, 2006; Lasater, 2007). Another concern expressed is that the manikin is not able to communicate non-verbally, such as a frown or a wince, which is an integral part of nursing care (Lasater, 2007). Further, some assessments are not yet possible on many manikins such as the testing of reflexes, indications of swelling or noticeable color changes (Lasater, 2007). McCaughey & Traynor (2010) conducted a study examining HPS in undergraduate students' preparation for clinical as well as ease of transition to staff nursing. They found that 58.1% of students (n=54) felt that their HPS experience was realistic (McCaughey & Traynor, 2010). Students who do not find the HPS environment realistic, may react differently than they would if they were working with a live patient, therefore nursing faculty must be wary of this if student performances during HPS experiences are used to judge clinical performance (Baxter et al., 2009; Valler-Jones, et al., 2011). Some students feel that even though HPS does not replicate the real world exactly, the experience provides them with the opportunity to get a feeling of how skills might be done (Baxter et al., 2009).

Student anxiety. Anxiety among students during an HPS experience has been identified as a challenge of this teaching strategy (Rothgeb, 2008). Student anxiety during an HPS experience can be caused by peer and instructor observation, video recording of the event (Elfrink, Nininger, Rohig, & Lee, 2009), critiquing of student performance (Rothgeb, 2008), fear of the unknown (Cordeau, 2010), or anticipation of a more "critical event" (Lasater, 2007). Students have

reported that their anxiety decreases as they progress through the nursing program curriculum (Howard et al., 2011). It appears that anxiety is most prevalent in students who perform the role of primary nurse (Lasater, 2007). Despite feeling anxious, students do report learning during HPS scenarios (Lasater, 2007). It has been noted that not all students experience anxiety in an HPS learning activity (Howard et al., 2011).

Sometimes it is the interaction with the manikin that is the anxiety provoking cause for nursing students as they can experience pediophobia or fear of dolls during HPS scenarios (Smith-Stoner, 2009). It is noted however, that these students quickly overcame their fears when they were permitted to work with the manikins prior to the actual HPS scenario (Smith-Stoner, 2009). On the contrary, students who do not engage themselves fully in the HPS experience can experience less stress because they feel they are not caring for a real person (Chiffer McKay, Buen, Bohan, & Maye, 2010).

Cordeau (2010) studied the lived experience of nursing students during an HPS scenario where their performance was being evaluated. She noted that during the HPS experience there are a variety of occasions within the learning activity when students perceive anxiety (Cordeau, 2010). These include pre-simulation, beginning anxiety, intermittent anxiety, continuous anxiety and debriefing anxiety (Cordeau, 2010). Pre-simulation anxiety relates to the unknowns of the HPS scenario (Cordeau, 2010). Beginning anxiety occurs at the onset of the HPS scenario and generally lessens once the students become confident in their ability to provide nursing care (Cordeau, 2010; Lasater, 2007). Beginning anxiety often

causes physical symptoms such as a pounding heart, sweating, and an elevated voice (Cordeau, 2010). Intermittent anxiety is experienced at high, moderate or low levels throughout the experience depending on the student's understanding of the situation or their perceptions of their performance (Cordeau, 2010). Continuous anxiety occurs throughout the entire experience and can be low, moderate or high (Cordeau, 2010). The causes of continuous anxiety were found to include being assigned a grade, video recording, a feeling of not being able to accomplish the required nursing interventions during the allotted time, and fear of failure (Cordeau, 2010). Debriefing anxiety occurs during the debriefing session and is caused by self-critique, concerns regarding instructor-student interaction, and not knowing what to expect (Cordeau, 2010).

Beischel (2013) studied the effect that the learning variables sleep, nutrition, and learning style can have on student anxiety during an HPS event. Students in this study reported debilitating levels of anxiety (Beischel, 2013). The anxiety was caused by fear of failure, feeling that they were not caring for the manikin in an appropriate manner, and the anxiety was infectious (Beischel, 2013). The students reported that if one student was experiencing anxiety, this anxiety heightened the anxiety that the other students felt (Beischel, 2013). The students reported that the anxiety that they experienced interfered with their ability to think clearly and affected their performance negatively (Beischel, 2013). Students in the role of observer reported that they were able to learn by watching the HPS event because they did not feel nervous. The anxiety that the students

reported did not quantitatively, negatively, affect learning outcomes (Beischel, 2013).

Anxiety and Student Learning

Anxiety is an unpleasant emotion which is pervasive in nature and "encompasses tension, nervousness, fear and worry" (Spielberger, 1979, p. 6). Often the terms stress and anxiety are used interchangeably in both the literature and by laymen (Spielberger, 1979). Spielberger (1979) attempted to differentiate between these terms by defining stress as being comprised of three different factors. These include the stressor which is a harmful or dangerous situation or stimulus (internal or external) that the person encounters, the interpretation of the situation or how the person perceives the situation, which then leads to the outcome of an anxiety state. The anxiety state is comprised of a subjective feeling and the activation of the autonomic nervous system, and is proportional to the individual's perception of the threat (Spielberger, 1979).

Spielberger (1979) identifies two different types of anxiety: state and trait. State anxiety is experienced from time to time and the intensity and frequency of this type of anxiety differs amongst individuals (Spielberger, 1979). Trait anxiety is used to describe an individual's anxiety proneness (Spielberger, 1979). Individuals with high trait anxiety can experience out of proportion anxiety responses to stimuli, such as in evaluative situations (Spielberger, 1979).

Anxiety can cause cognitive as well as physiological changes in an individual which result from the fight-or-flight response (Witek-Janusek & Yuzik, 2010). When an individual perceives a situation as dangerous or threatening, there

is an increase in sympathetic nervous system activity which leads to an increase in heart rate, respiratory rate, blood pressure, muscle tension, brain activity and a decrease in skin temperature (Witek-Janusek & Yuzik, 2010). Cognitive changes include an inability to concentrate, impaired speech, crying, frustration, accident proneness, forgetfulness, and inability to make decisions (Witek-Janusek & Yuzik, 2010). The body is designed to adapt to stressful situations by mobilizing physiological reserves to counteract the initial fight or flight response (Witek-Janusek & Yuzik, 2010). When the body is under stress for more than five to ten minutes, the baroreflex system, a short-term blood pressure regulation system, starts to counteract the effects of the sympathetic system which can cause a decrease in heart rate (Mulder, Dijketerhuis, Stuiver, & De Waard, 2009).

Anxiety related to academic performance is often labeled as test anxiety. Spielberger (1979) indicated that test anxiety consists of two major components: worry and emotionality. The worry component "involves the cognitive element of the anxiety reaction and consists of negative expectations, lack of confidence and anticipation of harmful consequences with regards to the feared object or event", and the emotional component is "primarily physiological and affective in nature and consists of the autonomic reactions of the body to stressful situations" (Morris, Spiegler, & Liebert, 1974, p. 219). "Both the "worry" and the "emotionality" components of test anxiety appear to contribute to reducing the achievement of test-anxious students in intelligence tests and learning tasks: worrying thoughts distract the individual's attention from the task, and intense emotional reactions lead to mistakes and cause repression that blocks memory"

(Spielberger, 1979, p. 87). The worry component of test anxiety is found to be more detrimental to performance than the emotional component (Spielberger, 1979).

Conversely, not all levels of anxiety will impact learning negatively. Anxiety can affect performance by either increasing it or decreasing it (Chiffer McKay et al., 2010). Yerkes & Dobson (1908) studied mice to determine what the relationship was been the strength of a stimulus and the rate of learning. They found that learning occurred when there was a moderate amount of stimulus; however, too much stimuli or too little influenced learning negatively (Yerkes & Dodson, 1908). While this example is rather simplistic, as each individual is unique and what one perceives as stressful will be different than what another does (McKeachie, 1977), others, such as Spielberger (1979), have supported this concept. A moderate level of anxiety can help students focus their attention and increase effort, however a high level of anxiety often causes students to perform poorly (Spielberger, 1979). Additionally, students who have high anxiety during academic stressors tend to have lower grades (Huwe, Henning & Netter, 1998).

It is difficult to determine the optimal level of anxiety for enhancing learning during a simulated event (Looi Bong, Lightdale, Fredette, & Weinstock, 2010). In the study conducted by Beischel (2013) the students perceived that their anxiety influenced their learning negatively however, when measured quantitatively this was not the case. Anxiety did not seem to have an effect on learning outcomes (Beischel, 2013). Chiffer McKay et al. (2010), when studying the anxiety experienced by student nurse anesthetists during an HPS experience,

also found that there was no relationship between student anxiety and learning outcomes during an HPS event. However, Looi Bong, et al. (2010), found that the anxiety experienced during an HPS event may in fact be greater than the anxiety experienced during a real event. Therefore, it is important that nurse educators implement strategies to ensure that nursing students experience the optimal level of anxiety during an HPS event (Beischel, 2013).

Learning Styles

When designing learning activities for students, some theorists believe that educators should consider the students' learning style or preferred way to learn. With an understanding of different learning styles, Faculty can develop curricula that suit the learning styles of a greater number of the students (Felder, 1996). "Students whose learning styles are compatible with the teaching style of a course instructor tend to retain information longer, apply it more effectively, and have more positive post-course attitudes toward the subject than do their counterparts who experience learning/teaching style mismatches"(Felder, 1993).

Learning Styles Continuum

Learning style theory is a complex field of study. This field "consists of a wide variety of approaches that stem from different perspectives which have some underlying similarities and some conceptual overlap" (Coffield, Moseley, Hall, & Ecclestone, 2004b, p. 53). Coffield, F., Moseley, D., Hall, E., and Ecclestone, K. (2004a) developed a continuum of learning styles that includes five different paradigms. At one end of this continuum is the constitutional based learning styles and preferences category (Coffield et al., 2004b). The theorists in this group

believe that learning styles are fixed and that genetics plays a large part in the way that an individual learns (Coffield et al., 2004b; Hall & Moseley, 2005). The next group on the continuum is the cognitive structured group and these theorists believe that learning styles are cognitively structured, difficult to change, and are measures of ability (Coffield et al., 2004b). Next is the stable personality type in which these theorists feel that leaning styles are one part of an individual's personality type and remain relatively stable (Coffield et al., 2004b). The next category is the flexible stable personality type where theorists feel that learning styles are not fixed traits and may change depending on the situation (Coffield et al., 2004b). The last group is the learning approaches and strategies category and these theorists believe that learning styles are influenced by previous experience and the context within which the learning takes place (Coffield et al., 2004b).

Resulting from this diversity of thought, a variety of learning style definitions can be found in the literature. For this study, I will use Felder's definition: "learning styles are preferences and tendencies students have for certain ways of taking in and processing information and responding to different instructional environments" (Felder, 2010, p. 4). This definition takes into consideration the effect of the environment on learning. Learning preferences may be mild, moderate or strong and an individual does not have to belong to one category or another, there can be some overlap (Felder, 2010). For example individuals can prefer active learning at times and reflective learning at other times (Felder & Soloman, 1993).

Since there are a variety of interpretations of individual learning style, there is no single conceptual framework for learning style or learning style measurement (Romanelli, Bird & Ryan, 2009). This is a common criticism of learning style theories (Romanelli et al., 2009). Other criticisms of learning style theory and instrument use include: 1) learning styles are only one part of an host of factors that impact an individual's learning and are not necessarily the most significant, 2) when measuring the learning styles of students, the information comes from how the student feels they learn, therefore it is not objective, making it difficult to ensure the reliability and validity of the data gathered, 3) there are concerns about the appropriateness of the questions included in learning styles inventories when considering cultural differences, and 4) there is some trepidation regarding the commercialization of learning style inventories (Coffield, Moseley, Hall, & Ecclestone, 2004a). A majority of the criticisms arise from the assumption that learning styles are used to design individualized instruction that only addresses students' preferences (Litzinger et al., 2007).

While many of the listed criticisms have some merit, there is also value in utilizing learning style theory and the measurement tools that are developed from it. Benefits of employing learning style theory include: 1) when students understand their own learning style they are empowered to use different techniques in their studies which can lead to increased satisfaction (Romanelli et al., 2009), 2) it can be utilized as a guide to help instructors understand the differences between their students and to help students understand why they might prefer a specific style of teaching over another (Felder, 2010), 3) it provides clues

to students' strengths as well as areas where they may need additional support (Litzinger et al., 2007), and 4) it provides an answer as to why traditional methods of teaching are often ineffective (Coffield et al., 2004a). Additionally, it has been proposed that understanding students' learning styles will increase student motivation, attendance and attitude (Coffield, et al., 2004a).

Index of Learning Styles

In this study, the Index of Learning Styles (ILS) will be utilized to gain an understanding of students' preferred learning styles. The ILS model was developed by Felder and Silverman in 1988, followed by the questionnaire which was developed by Felder and Soloman in 1993 (Felder, n.d.). The questionnaire consists of 44 forced choice questions which are assigned to one of four dimensions of learning. These four dimensions assess the ways that an individual: 1) perceives the world (sensing or intuitive), 2) receives information (visual or auditory), 3) processes information (active or reflective), and 4) understands information (sequential or global) (Felder & Spurlin, 2005). There are a total of eight different learning types, two for each dimension, which produce 32 different learning styles (Felder & Silverman, 1988). For example one student could be a sensing, visual, active and sequential learner whereas another could be a sensing, verbal, reflective, sequential learner. The eight different learning types that have been identified by Felder and Soloman (1993): 1) sensing, 2) intuitive, 3) visual, 4) verbal, 5) active, 6) reflector, 7) sequential, and 8) global. A student's preference for one learning type or another may be strong, moderate or mild (Felder & Soloman, 1993). Sensing learners like facts, solving problems by

established methods, details and memorizing, doing laboratory work, and connections to the real world (Felder & Soloman, 1993). Sensing learners are more practical and careful (Felder & Soloman, 1993). Intuitive learners enjoy discovering possibilities and relationships, innovation, abstractions and mathematical formulations, and they do not like memorization and routine calculations (Felder & Soloman, 1993). Visual learners retain information better when they can see pictures, diagrams, demonstrations, flow charts, films and time lines (Felder & Soloman, 1993). Verbal learners retain information when it is presented to them in a spoken or written format (Felder & Soloman, 1993). Active learners are those individuals who understand information best when discussing, applying or explaining it to others, and do well working in a team environment (Felder & Soloman, 1993). Reflectors understand information best if they can think it through and they like to work alone (Felder & Soloman, 1993). Sequential learners gain understanding in linear steps and like to follow stepwise paths (Felder & Soloman, 1993). Global learners learn in large leaps, seem to randomly absorb material without necessarily seeing connections until suddenly coming to a conclusion, and are better able to solve complex problems in novel ways once they have an understanding of the bigger picture (Felder & Soloman, 1993).

Common learning style inventories that influenced the development of the ILS include Kolb's inventory of learning styles, the Myers-Briggs Type Indicator, and the visual-auditory-kinesthetic (VALK) formulation of modality theory (Felder & Spurlin, 2005). Kolb's inventory of learning styles was developed utilizing his experiential learning theory (Kolb, 1984). His inventory identified

four learning styles: 1) convergent (abstract, active), 2) divergent (concrete, reflective), 3) assimilation (abstract, reflective), and 4) accommodative (concrete, active) (Kolb, 1984). The active/reflective learning dimension as defined by Felder and Silverman (1988) is similar to Kolb's convergent learning style (Felder & Spurlin, 2005). This learning dimension is also similar to the introvert/extravert of the Myers-Briggs Type Indicator (MBTI) (Felder & Spurlin, 2005). In the MBTI theory there are four structured preferences that make up a person's personality (Briggs Myers & Myers, 1995). These four preferences include extraversion/introversion, sensing/intuition, thinking/feeling, and judgment/perception (Briggs Myers & Myers, 1995). "The sensing/intuitive dimension is taken directly from the MBTI and may have a counterpart in the concrete/abstract dimension of the Kolb model" (Felder & Spurlin, 2005, p. 103). The dimensions of visual/verbal and active/reflective dimension of the ILS are similar to the visual, aura, reading/writing, and kinesthetic sensory modalities (VALK) developed by Neil Flemming (Felder & Spurlin, 2005; Flemming & Mills, 1992). Other influences on the development of the ILS include theory from neurolinguistic programming and cognitive studies (Felder & Spurlin, 2005). Coffield, et al, (2004a) categorized the ILS as having it's foundations in the flexible learning styles theory category; however Litzinger et al., (2007) stated that the ILS was developed utilizing the theory and philosophy from the learning approaches and strategies category.

According to Felder (2010), students take in and process information in an individual and unique manner. Some students learn best from visual stimuli such

as pictures and diagrams, while others learn best from written and spoken explanations, and still others learn best when they can interact with the learning material (Felder, 1996). Instructors who take learning style into consideration when developing curriculum often provide the student with a more satisfying and enlightening experience (Amerson, 2006; Felder, 1996). Instructors should also utilize a variety of learning style methods during each lesson to ensure that the needs of all students are met. If only one learning style is utilized there is the risk that some students will not learn and others will not develop skills for learning when using styles that are not their preferred ones (Felder, 1996). However, one must be careful that students do not feel that they can only learn in one style and that instructors do not teach using only one style (Felder, 2010). Optimal teaching and learning occurs when a variety of styles are used (Felder, 2010). This is an important issue to keep in mind when educating students because professionals must use all learning style modes (Felder, 1996).

Learning Styles and Nursing Students

Many studies have been done to determine which learning style nursing students favor. Only a few have studied how learning style might influence students experience during HPS activities. As a result, I will focus on the studies that have examined the learning style of nursing students, and then on those that linked learning style to simulation.

Kolb's Learning Styles Inventory (LSI) has been utilized in several studies that examined nursing students' preferred learning style. DeCoux (1990) reviewed the literature relating to Kolb's LSI and nursing students, and found that most

nursing students' preferred learning styles are divergent, accommodation, or assimilation. Few, if any, of the students preferred convergent (DeCoux, 1990). Joyce-Nagata (1996) studied traditional and nontraditional nursing students learning styles using Kolb's LSI and found a majority of students preferred the assimilation learning style. Rakoczy and Money (1995) conducted a longitudinal study of nursing students' learning styles and reported similar findings. They also found that the learning styles of the students remained consistent over the 3 years of their study (Rakoczy & Money, 1995). Cavanagh, Hogan, and Ramgopal (1995) found that when using Kolb's LSI, the students' preferred learning styles were very similar; however their findings were slightly different from the above studies as the divergent style occurred most often. Several theorists have criticized Kolb's LSI since students are often distributed evenly across the different styles (Cavanagh et al., 1995; DeCoux, 1990; Joyce-Nagata, 1996). While this learning styles inventory has been utilized frequently, the validity and utility of this assessment tool is still questionable (Joyce-Nagata, 1996).

A learning styles questionnaire consisting of 80 items was developed by Honey and Mumford and has been used in several nursing studies. Honey and Mumford developed four learning styles from their assessment tool: 1) the activists, individuals who learn best when they are able to learn through trial and error in hands-on experiences, 2) the reflections, individuals who learn best when they are thoroughly briefed, and are told what to do, 3) the theorists, individuals who want reassurance that a project makes sense, and 4) the pragmatic learners, individuals who learn best through demonstration from an acknowledged expert

("The learning styles questionnaire", n.d.). Most research using this tool has identified the reflector as the most commonly preferred learning style, and activist as the least preferred learning style of nurse students (Fleming, McKee, & Huntley-Moore, 2011). This finding was also supported by the research conducted by Rassool and Rawaf (2007).

Zhang and Lambert (2008) studied the learning styles of Chinese undergraduate nursing students using the ILS. Zhang and Lambert (2008) found that most students preferred the reflective, sensing, visual and global learning styles. They interpreted this as meaning most students like "to learn by thinking things through and working alone, use a concrete and practical orientation toward facts and procedure, prefer visual representations of presented materials, and use holistic thinking to learn in large leaps" (Zhang & Lambert, 2008, p. 177-178).

Neil Flemings developed the VARK learning styles inventory, which examines visual, aura, reading/writing, and kinesthetic sensory modalities to determine different ways of receiving information (Flemming & Mills, 1992). Meehan-Andrews (2008) utilized this inventory and found that of the 86 first year nursing students in her study, 68% preferred kinesthetic methods, 17% preferred the read/write approach, 11% preferred visual, and only 4% preferred the aural or lecturing mode. Kinesthetic learners prefer a hands-on approach and learn by doing (Flemming & Mills, 1992; Meehan-Andrews, 2008). These students take in information best when it is presented in case study or computer simulated formats (Meehan-Andrews, 2008).

Learning Styles and Simulation

Beischel (2013) conducted a study in which she examined junior baccalaureate nursing students (n= 124) and the effects of different learning variables on anxiety and cognitive learning outcomes during an HPS experience. Beischel (2013) measured anxiety prior to starting the hands-on care portion of an HPS experience and found that having a strong auditory-verbal learning style directly affected anxiety during an HPS experience, especially in anticipation of the event (Beischel, 2013)

Valler-Jones et al. (2011) noted that all forms of simulation activity, including HPS, might be challenging for some individuals, dependent on their learning style. They stated students with the learning style of reflector and theorists might find simulation challenging (Valler-Jones et al., 2011). Reflectors prefer to stand back and observe; therefore the simulation activity may cause them to disengage (Valler-Jones et al., 2011). Theorists may be challenged because they like order, thus they may have difficulty appreciating the learning that can occur during a simulated experience (Valler-Jones et al., 2011). "Although it could be argued that students are multi-modal and do not fit completely into on category, learning is more natural and therefore easier and quicker if student's natural style is allowed to prevail" (Valler-Jones et al., 2011, p. 3).

Multiple Intelligence Learning Theory is not well utilized in nursing education literature (Amerson, 2006). However, Fountain and Alfred (2009) used this theory to identify nursing students' preferred learning style during an HPS experience. They found that students who preferred solitary learning or social

learning were the most satisfied with an HPS experience (Fountain & Alfred, 2009). The student who prefers social learning benefits from "comparing, listening, networking and interact[ing] with others" (Fountain & Alfred, 2009, p. 98). Students who prefer solitary learning can actively learn when observing others' actions and when reflecting on the experience (Fountain & Alfred, 2009).

Conclusion

There appears to be a paradox between student satisfaction and student anxiety during an HFS experience (McCaughey & Traynor, 2010). Some students experience anxiety while others do not (Ganley & Linnard-Palmer, 2012). Anxiety at a moderate level can enhance learning, and if it is managed carefully, the student can focus on affective, cognitive, and psychomotor skill acquisition rather than the physical and emotional sensations that the anxiety can produce (Cordeau, 2010). Anxiety at high levels however, can impede learning (Spielberger, 1979). Therefore, when using HPS as a teaching method, the instructor must remember that stress and anxiety may hinder learning (Ganley & Linnard-Palmer, 2012). With a greater understanding of anxiety and HPS learning approaches, there is potential for managing anxiety in the HPS environment. Future research is needed to gain a better understanding of why some students experience anxiety and others do not (Ganley & Linnard-Palmer, 2012). As noted by Bremner et al. (2008), further research is needed to better understand which learning styles are not suited for this teaching/learning strategy.

Chapter Three: Methodology

A descriptive quantitative correlation design was used to gain an understanding of the relationship between student learning style and student anxiety during an HPS experience. This design was chosen because it provided the researcher with the ability to use statistical analysis techniques to gain an understanding of the degree of association between two variables (LoBiondo-Wood, Harber, & Singh, 2005). This design is often chosen when it is impractical or unethical to manipulate the variables in the study (Kinnear & Gray, 2011). Manipulating the independent variable, learning style, would have been impractical for this study.

Study Variables

The independent variable was student learning style and the dependent variable was student anxiety. The context was a HPS laboratory. The independent variable, students learning style, was measured utilizing the Felder and Soloman's Index of Learning Styles on-line questionnaire. The dependent variable, student anxiety, was measured by a continuous recording of the students' heart rate (HR).

Setting

The study took place at a University in Western Canada. The University offers three entry options in its Bachelor of Nursing program. Students can enter a three year or four year program, or students who hold a Practical Nursing License can enter the program at the beginning of year two. Students in the three year and four year options enter the nursing program at the same time. The students who wish to enter the three year program submit their application in the middle of the

first year. Students are then chosen for the three year option based on grade point average and clinical performance. The nursing school has incorporated HPS learning activities in its curriculum for all years of the program.

Participants and Sample Size

A convenience sampling technique was used to select nursing students from the fourth, sixth and eighth semester clinical courses. Students in the fourth semester were enrolled in an adult surgical clinical course, students in the sixth semester were enrolled in an acute adult medical clinical course, and students in the eighth semester were enrolled in a preceptored clinical course in the clinical area of their choice. The inclusion criterion was the consent of the participants who were enrolled in the selected clinical courses. The exclusion criterion was the students who would be absent during the HPS experience. The sample population for: semester four was 35, semester six was 32, and semester eight was 33.

Instruments

Demographic Survey. A demographic survey (Appendix A) was used to gather data that described certain aspects of the participants. Information gathered from the survey included age, gender, ethnicity, current semester and program option enrolled in, number of times involved in an HPS experience, number of times as a primary nurse, secondary nurse, family member, charge nurse or observer, and nursing related work experience. The results from the demographic survey provided the researcher with an understanding of who the sample population was, and factors that might influence anxiety such as number of HPS experiences, semester, and role during the HPS experience.

Index of Learning Styles (ILS). The ILS (Appendix B) was utilized in this study to determine students' preferred learning style. The ILS is a questionnaire that consists of 44 questions divided into four categories with 11 questions per category. The questions are forced-choice "with each option (a or b) corresponding to one or the other category of the dimension (e.g., active or reflective)" (Felder & Spurlin, 2005, p. 104). This questionnaire supports the notion that learning styles are on a continuum and students can have strong, moderate or weak tendencies towards a particular style (Felder & Spurlin, 2005). The questionnaire is available on-line at http://www.engr.ncsu.edu/learningstyles/ilsweb.html and can be completed at no cost to the user, if the user is an individual who wants to assess his/her learning style, an instructor or student who wishes to use the ILS for research, or classroom instruction (Felder & Spurlin, 2005). The participants had taken a basic computer course in semester two; therefore they had the required skills to complete the inventory on-line.

Heart Rate Monitor. Participants' anxiety levels were measured using a Polar RS400 portable heart rate (HR) monitor. The HR monitor has a chest strap which transmits the HR to a wrist watch device. This device was placed in the participants' pocket. The relationship between elevated heart rate and an increased anxiety level has been established in the literature (Tran & Smith, 2004). A concern associated with a physiological data collection approach is that the equipment required to measure the data can be intrusive (LoBiondo-Wood et al., 2005). In order to minimize this concern, students were invited to handle and try

on the HR monitors when they signed the consent form. They were also told that they could contact the researcher at any time prior to the HPS experience to become more familiar with the HR monitors. Prior to the start of the HPS experience, the students had the HR monitors on for at least five minutes in order to minimize the potential risk of the HR monitor elevating the students' beginning heart rate.

Data Collection

After obtaining ethical approval from Athabasca University (Appendix C) and the University were the study took place (Appendix D), all students in semester four, six and eight of the nursing program were invited to participant in the study. The researcher invited participants by providing students with written (Appendix E) and verbal information (Appendix F) about the study during an introductory class at the beginning of the semester. This information informed students about the purpose of the study, what was required of them during their involvement in the study, how confidentiality would be addressed, and the risks and benefits of participating in the study. Students were also notified that there would be no penalty for not participating, and that they could withdraw from the study at any time with no negative effect to their grade. Students were asked to complete a consent form (Appendix G) if they wished to participate. The researcher handed out the consent forms and then left the room. A nursing program assistant entered the room when the researcher left. The students filled out the consent from and submitted them to the nursing program assistant who

placed the signed and unsigned consent forms into a sealed envelope and returned them to the researcher.

Once the researcher had the consent forms she sent an e-mail to the participants who had indicated that they would participate in the study. The e-mail included the participant's identification code, the URL to the demographic survey (Appendix A) and the link to the ILS survey (Appendix B). The demographic survey was delivered using LimeSurvey, thus the researcher had access to the results as soon as the student completed the survey. The students were asked to e-mail the results of the ILS and their resting HR to the researcher. Close to the date of the HPS experience, the researcher e-mailed the participants a room number, which was located away from the laboratory, and asked them to arrive at the room 15 minutes prior to their HPS experience. The room, being away from the HPS laboratory, was to help with confidentiality and allow enough time for the student to be equipped with the HR monitor prior to the start of the HPS experience. The e-mail also included a reminder, to those students who had not completed the demographic survey and the ILS that if they still wished to participant in the study they would need to complete the surveys.

The next step in the data collection process occurred just prior to the HPS experience. The students arrived at the predetermined room 15 minutes prior to their HPS experience where the researcher reviewed how the HR monitor worked. The students then went to a nearby washroom to put the HR monitors on. The researcher started each HR monitor to ensure that it was working correctly. During the HPS experience the students' HRs were continually monitored. The

data was recorded by the portable HR monitor and downloaded to a computer a few days later. During the HPS experience the researcher noted the time when the HR monitors were connected, the roles were assigned, the hands on care of the manikin started and ended, and when the debriefing started and ended. Students were asked to keep the HR monitors on for 10 minutes after the debriefing session in order to note any decreases in HR; however, most of the students took the HR monitors off immediately after debriefing.

There were six students who had signed the consent forms and arrived at the assigned room to have their HR monitor put on, but they had not completed the demographic survey or the ILS. When the HR monitors were being assigned these students mentioned that they had not completed the other surveys, but that they would when they had time. These participants were sent one last e-mail with a deadline for survey completion, if they wished to remain a participant in the study. The HR data of the students who did not respond were not used.

There were a few notable differences between the semesters in relation to the students' HPS experience. Semester four was the only group who did not have students in the observer role and who had their clinical instructor as the faculty facilitator. They had the longest pre-briefing session, time to go over questions they might have about the scenario, prior to the hands-on care of the manikin. Semesters six and eight students had a small pre-briefing session during which they spent time in the room with the manikin in order to familiarize themselves with the manikin and equipment. They also had the same faculty member facilitated all of their HPS scenarios. Each semester's HPS scenario was different,

but the scenarios were leveled so that students were required to provide interventions appropriate to their nursing knowledge and skill. The semester four HPS scenario involved caring for a surgical patient, semester six students cared for a palliative patient, and the semester eight students provided care for a patient who had a chest tube.

Data Analysis

The data were analyzed using Statistical Package for Social Sciences (SPSS) 21 software. Participant characteristics were analyzed using descriptive statistics. A paired t-test was used to gain an understanding of the difference between the mean resting HR and the mean HR during the different phases of the HPS experience. The relationship between student anxiety and student learning style was analyzed using the Fishers Exact test because the sample size was small and because there were fewer than five counts per cell for many of the variables. Fisher's Exact Test should be used instead of a chi squared test if the expected frequencies are less than six for each cell (LoBiondo-Wood & Haber, 2005). Other factors that could have influenced student anxiety during an HPS experience were analyzed using descriptive statistics.

Data from the ILS survey and HR recordings were used to gain an understanding of the relationship between student learning style and student anxiety during three phases of the HPS experience: 1) role assignment, 2) hands-on care of the manikin, and 3) the debriefing session. This information provided the researcher with insight into the relationship between student learning style and student anxiety at multiple points within an HPS learning experience.

Due to the small sample size, it was decided that the interval HR data should be split into categories for more valid statistical testing. Braune, Auer, Schulte-Monting, Schwebrock, and Lucking (1996) found that a change in HR of 10 bpm was clinically meaningful when studying healthy participants who were involved in a mental arithmetic challenge. Looi Bong et al. (2010), Chiffer McKay et al. (2010) and Coetzee (2011) also found that a change in HR of 10 bpm was statistically significant. Therefore, it was decided that the HR data would be assigned to one of two categories as follows: a HR of 10 bpm or less would be considered no anxiety, and a HR of greater than 10 bpm would be considered anxiety.

Rigor

Pounder (1993) identified four major standards when conducting traditional quantitative research. These include internal validity, external validity, reliability and objectivity (Pounder, 1993). She also identified that a fifth standard, congruency, should be added to the original four (Pounder, 1993).

Internal Validity

"Internal validity is the extent to which it is possible to make an inference that the independent variable is causing or influencing the dependent variable" (Loiselle & Profetto-McGrath, 2011, p. 163). Questions posed in the demographic survey provided some insight into students' previous HPS experiences as well as nursing experience. These questions helped the researcher gain an understanding of some of the other possible causes of increased or decreased anxiety. The researcher also recorded the role that the student was assigned as this has been

identified as a potential cause of anxiety. However, it was not possible to control all factors that could contribute to student anxiety or elevated HR. Some of these factors might include family or employment concerns, conflicts with clinical instructors or fellow classmates, and the use of medications or caffeine.

External Validity

"External validity is the generalizability of research findings to other settings or samples" (Loiselle & Profetto-McGrath, 2011, p. 165). The sample population is one that is similar to other Canadian universities; however, because the sample size is small, generalizability will be negatively affected.

Reliability

An accurate measurement of the independent and dependent variable determines reliability (Pounder, 1993). The reliability of the ILS is documented by Felder and Spurlin (2005). In their article, they summarized and analyzed the results of several studies that utilized the ILS as a measure of learning style. In most of the studies they reviewed, the English-language version of the ILS was used and the participants were English speaking undergraduate students (Felder & Spurlin, 2005). Test-retest reliability was found to be satisfactory (Felder & Spurlin, 2005). Internal consistency reliability of each dimension of the ILS was above a Cronbach alpha of 0.5 in three of the four studies that Felder and Spurlin (2005) reviewed.

Construct validity, the degree to which the ILS can measure the learning style of the individual, was determined to be appropriate in a study conducted by Litzinger et al (2007). Additionally, Felder and Spurlin (2005) analyzed several

studies in which the ILS was utilized to assess student learning styles. They found there was a consistent pattern of learning style preferences of engineering students who completed the ILS at ten different English speaking Universities in four different countries (Felder & Spurlin, 2005), demonstrating support for the tool's validity. The active-reflective, sensing-intuitive and visual-verbal scales are considered independent of one another; however the sensing-intuitive and sequential-global preferences had a moderate degree of association (Felder & Spurlin, 2005)

In 2007, Lizinger, Lee, Wise Y, and Felder tested a modified ILS. This ILS included a five point Likert scale response thus providing the respondent with the option of choosing a neutral response or two other levels of strength for learning preference (Lizinger et al., 2007). It was determined that changing the original ILS to a modified one did not improve the instruments internal consistency reliability or it validity (Lizinger et al., 2007).

Participants' heart rates were measured using a Polar RS400 heart rate monitor. This brand of HR monitor has a good reputation for being an accurate way to measure HR and similar models have been used in other research projects.

Objectivity

Objectivity refers to ensuring that researchers do not bias the study results to their personal values and beliefs (Loiselle & Profetto-McGrath, 2011; Pounder, 1993). The research design lends to data from the ILS and HR monitoring which is very objective, thus, any researcher bias should not influence the study findings.

Congruence

Congruence refers to the congruency between the conceptual framework, the identified problem, the question asked and the methods used (Pounder, 1993). The research is situated within the quantitative paradigm. The researcher approached the study topic from a post-positivism view point, recognizing that there can be more than one reality and that knowledge is relative rather than absolute (Welford, Murphy, & Cassey, 2011). The quantitative and post-positivism view point supports the use of a correlation design. The correlation design was chosen because the researcher wanted to gain an understanding of the relationship between learning style and student anxiety during an HPS experience.

Ethical Considerations

Permission for this study was granted from both the Athabasca University Research Ethics Board (Appendix C) and the University where the study took place (Appendix D). In addition, a letter of support was obtained from the Dean of the nursing program where the study was carried out.

When research is conducted utilizing human subjects there are a variety of ethical considerations. Most of these considerations fall within the following categories: protection from harm, informed consent, and right to privacy (Leedy & Ormrod, 2010). The students in this study were will not exposed to any risks greater than they would have experienced in their everyday schooling, since the students all needed to complete the HPS experience in their respective courses. A benefit of the study for participating students is that they gained a better understanding of their individual learning style. The participants were given a written information letter (Appendix E) which included information about the

purpose of the study, confidentiality, the participant's ability to leave the study, and the potential risks and benefits of being a participant in the study. As well as the written information letter, the researcher verbally explained the study to the participants, using a script (Appendix F). This verbal explanation included a description of the ILS and the heart rate monitors. Participants then filled out a consent form once the research had left the room. A nursing administrative assistant then collected the signed consent forms and returned them to the researcher. The researcher was the only individual who had access to the identifying data, and this data was coded utilizing a coding system developed by the researcher. All data has been stored on a password protected computer and will be destroyed after five years. The paper forms that the students fill out are stored in a locked filing cabinet. The researcher is the only one who has access to the key. The researcher knew the students as she had taught them in a previous semester; however the researcher was not responsible for evaluating the students' academic performance during this clinical course, nor will she instruct them during the remainder of their nursing program.

Chapter Four: Results

Demographic Statistics

Fifty-one students completed the consent form. Of these students, 45 wore a HR monitor during the HPS experience. Two of the 45 students did not complete the demographic survey and the ILS survey, and the HR monitors of four students did not pick up accurate readings. Therefore, the final sample size was 39. Fourteen (36%) of the students were enrolled in semester four, 9 (23%) of the students were enrolled in semester six, and 16 (41%) of the students were enrolled in semester eight. The majority of students were female (92%), and enrolled in the Bachelor of Nursing four year program option (92%). The majority of students (61.5%) were between the ages of 21 -24. Three students (7.7%) had experience as an LPN and 56.4% of the students had worked as an employed student nurse. Table 1 provides a summary of the sample's demographic data.

Assigned Roles

When the students arrived at the HPS laboratory, they were assigned to their roles by one of two ways: randomly by drawing out of a hat, or assigned by Faculty. The roles for students in semester six and eight were assigned randomly, and students in semester four had their roles assigned by their clinical instructor. The roles that were assigned in semester four were: primary nurse, secondary nurse, charge nurse, and family member. The roles assigned in semester six were: primary nurse, secondary nurse, charge nurse, family member, night nurse and observer. The roles assigned in semester eight were: primary nurse, secondary nurse, family member, night nurse and observer. The primary and secondary

nurse provided hands-on care for the manikin; the charge nurse, with guidance from the instructor, provided the primary and secondary nurses with assistance; the night nurse gave a shift report to the primary and secondary nurses; the family member acted as the family of the manikin; and the observers watched the HPS scenario via live video feed in another room. The majority of students were assigned the role of observer (38.5%), 25.6% of the students played the role of family member and 23.1% were assigned the role of primary nurse. Table 2 shows the distribution of roles for the sample.

Table 1

Demographic Characteristics of Study Participants

Characteristics	*N*	Percentage (%)
Age		
20 or younger	5	12.8
21-24	24	61.5
25-29	7	18
30 or older	3	7.7
Gender		
Male	3	7.7
Female	36	92.3
Experience as a care aid	11	28.2
Experience as an employed student nurse	22	56.4
Experience as a licensed practical nurse	3	7.7
Program Option		
4 Year Option	36	92.3
LPN Option	3	7.7

Previous HPS Experience

The students' previous HPS experience was assessed as this could have an influence on student anxiety. The majority of students had been involved in two

(48.7%) or three or more (35.9%) HPS experiences. Table 3 summarizes students' prior HPS experience.

Table 2

Role Assignment

Role	*n*	Percentage (%)
Primary Nurse	9	23.1
Secondary Nurse	2	5.1
Charge Nurse	2	5.1
Night Nurse	1	2.6
Family Member	10	25.6
Observer	15	38.5

Table 3

Prior HPS experience

Previous HPS Experiences	*n*	Percentage (%)
1 or less	6	15.4
2	19	48.7
3 or more	14	35.9

Student Learning Style

There are four dimensions of learning, with two options each, that one can assess when utilizing the ILS: (1) active or reflective, 2) sensing or intuitive, 3) visual or verbal, and 4) sequential or global (Felder & Spurlin, 2005). The majority of students in the active or reflective dimension were active learners (56.4%); of those in the sensory or intuitive dimension, 84.6% were sensory learners; in the visual or verbal dimension, 66.7% were visual learners; and in the sequential or global dimension, 76.9% were sequential learners. Table 4 summarizes the students learning styles.

Table 4

Student Learning Style

Learning Style	*N*	Percentage (%)
Active	22	56.4
Reflective	17	43.6
Sensory	33	84.6
Intuitive	6	15.4
Visual	26	66.7
Verbal	13	33.3
Sequential	30	76.9
Global	9	23.1

Heart Rate

The students' self reported resting HR ranged from 55 - 88 beats per minute (bpm). Their average HR when role assignment took place ranged from 67 - 144 bpm. During this phase of the HPS experience, the change in HR from resting to when roles were assigned ranged from negative one – 82 bpm. During the HPS experience, the student's average HR ranged from 58 - 127 bpm with a change of HR ranging from negative six – 65 bpm. During the debriefing, the students' average HR ranged from 55 - 99 bpm with a change in HR of negative ten – 28 bpm. Table 5 provides a summary of the mean HR's during the different parts of the HPS experience.

The change in HR was calculated by taking the average HR during the HPS phases and subtracting it from the resting HR. There was a statistically significant change in HR between resting and role assignment $t(34) = 10.165$, $p = .000$, between resting and hands-on care of the manikin $t(37) = 7.675$, $p = .000$ and between resting and debriefing $t(36) = 5.622$, $p = .000$. There was also a statistically significant change in HR between role assignment and hands-on care

of the manikin t(33) = 4.374, p = .000. A statistically significant change in HR between hands-on care of the manikin and debriefing t(36) = 7.088, p = 0.000 was also found. And lastly, there was a statistically significant change in HR between role assignment and debriefing t(32) = 11.028, p = 0.000. Table 6 gives a summary of the categories of HR in each of the phases of the HPS experience and shows that the role assignment phase was the most anxiety provoking time for students.

Table 5

HR during HPS Experience

Heart Rate	Mean	SD
Average HR		
At rest	70.51	8.36
During role assignment	99.69	16.49
During hands-on care of the manikin	90.95	15.50
During debriefing	79.54	10.51
Change in HR		
During role assignment	28.66	16.68
During hands-on care of the manikin	20.37	16.36
During debriefing	9.22	10.78

HR = heart rate

The sample size during: role assignment was n=35, hands-on care of the manikin it was n=38, and debriefing it was n=37. The sample size varied between each of the phases mainly because of technical difficulties. During the role assignment phase, four of the students were late arriving, so they did not have the opportunity to wear the HR monitor for at least five minutes prior to role assignment. During the hands-on care of the manikin phase, one of the student's

HR monitor stopped recording correctly. Finally, during the debriefing phase, two of the student's HR monitors did not accurately record the HR.

Table 6

Change in HR Categories

Category	10 bpm or Less *n* (Percent)	Greater than 10 bpm *n* (Percent)
During Role Assignment	5 (14.3)	30 (85.7)
During Hands-On Care of the Manikin	9 (23.7)	29 (76.3)
During Debriefing	19 (51.4)	18 (48.6)

HR = heart rate

Learning Styles and Change in HR During Phases of Simulation

Role Assignment Phase. The Fisher's Exact Test indicated that there was no statistical association between student anxiety and: the active or reflective learning styles (p = 1.0); sensory or intuitive learning styles (p = .561); verbal or visual learning styles (p = .337); or sequential and global learning styles (p = .297), during the role assignment phase of the HPS experience. Table 7 summarizes the change in HR relating to learning style during the role assignment and illustrates that regardless of learning style, the majority of students were anxious during this phase.

Hands-on Care Phase. The Fisher's Exact Test also indicated that there was no statistical association between student anxiety and: the active or reflective learning styles (p = 1.0); sensory or intuitive learning styles (p = .131); verbal or visual learning styles (p = .456); or sequential and global learning styles (p = .655), during the hands-on care of the manikin phase of the HPS experience. During this phase, the majority of students, regardless of learning style, were

anxious. The one exception was students with the intuitive learning style. For this group, there was the same number of students who were anxious as not anxious. Table 8 summarizes the change in HR relating to learning style during the hands-on phase of the HPS experience.

Table 7

Change in HR During Role Assignment Dependent On Learning Style

Learning Style	10 bpm or less *n* (%)	Greater than 10 bpm *n* (%)	Total *n* (%)
Active	3 (13.6)	19 (86.4)	22 (62.9)
Reflective	2 (15.4)	11 (84.6)	13 (37.1)
Sensory	4 (13.3)	26 (86.7)	30 (85.7)
Intuitive	1 (20)	4 (80)	5 (14.3)
Visual	2 (9)	20 (91)	22 (62.9)
Verbal	3 (23.1)	10 (76.9)	13 (37.1)
Sequential	5 (19.2)	21 (80.8)	26 (74.3)
Global	0	9 (100)	9 (25.7)

N=35

Debriefing Phase. The Fisher's Exact Test indicated that there was no statistical association between student anxiety and the: active or reflective learning styles ($p = 1.0$); sensory or intuitive learning styles ($p = 1.0$); verbal or visual learning styles ($p = 1.0$); or sequential and global learning styles ($p = 1.0$), during the debriefing phase of the HPS experience. Students in this phase of the HPS experience, regardless of learning style, were almost always equally split: 50% anxious and 50% not anxious. Table 9 summarizes the change in HR relating to learning style during the debriefing section of the HPS experience.

Table 8

Change in HR During the Hands-on Part of the HPS Experience Dependent on Learning Style

Learning Style	10 bpm or less *n* (%)	Greater than 10 bpm *n* (%)	Total *n* (%)
Active	5 (23.8)	16 (76.2)	21 (55.3)
Reflective	4 (23.5)	13 (76.5)	17 (44.7)
Sensory	6 (18.8)	26 (81.2)	32 (84.2)
Intuitive	3 (50)	3 (50)	6 (15.8)
Visual	7 (28)	18 (72)	25 (65.8)
Verbal	2 (15.4)	11 (84.6)	13 (34.2)
Sequential	6 (20.7)	23 (79.3)	29 (76.3)
Global	3 (33.3)	6 (66.7)	9 (23.7)

N=38

Table 9

Change in HR During Debriefing Dependent on Learning Style

Learning Style	10 bpm or less *n* (%)	Greater than 10 bpm *n* (%)	Total *n* (%)
Active	10 (50)	10 (50)	20 (54.1)
Reflective	9 (52.9)	8 (47.1)	17 (45.9)
Sensory	16 (51.6)	15 (48.4)	31 (83.8)
Intuitive	3 (50)	3 (50)	6 (16.2)
Visual	12 (50)	12 (50)	24 (64.9)
Verbal	7 (53.8)	6 (46.2)	13 (35.1)
Sequential	15 (51.7)	14 (48.3)	29 (78.4)
Global	4 (50)	4 (50)	8 (21.6)

N=37

Other Factors Affecting Change in HR

There is no statistically significant association between learning style and student anxiety; however there was a statistically significant change in HR between the three phases of the HPS experience. Therefore, the researcher decided to examine alternative hypothesis to determine if some other variable

could influence student anxiety. A few factors that may have influenced student anxiety during the HPS experience could include student semester, student role during the HPS experience, student age, student gender, and number of previous HPS experiences.

Role Assignment Phase. During the role assignment phase, regardless of semester, role in HPS experience, age, gender, or number of HPS experiences, the majority of students were anxious. Table 10 shows a summary of these variables as they relate to change in HR during role assignment.

Hands-on Care Phase. During the hands-on care of the manikin phase, regardless of semester or age, the majority of students were anxious. When in the roles of primary, secondary or charge nurse, all of the students were anxious. The majority of students were anxious whether they were a family member or an observer, however there was the same percentage of anxious students as not anxious students in these roles. The night nurse was not anxious. The males were less anxious than the females. The majority of students were anxious regardless of number of HPS experiences; however as the number of HPS experiences increased the percentage of anxious students decreased. Table 11 shows a summary of these variables as they relate to change in HR during the hands-on care phase of the HPS experience.

Debriefing Phase. During the debriefing phase of the HPS experience, semester six students were the only group that was more anxious than not anxious. Students who played the role of primary nurse or charge nurse were the most anxious during debriefing. There was no statistical difference in anxiety relating

to age or gender in the debriefing phase of the HPS experience. For the students who had experienced HPS three or more times, there were fewer anxious than not anxious students. Table 12 is a summary of these variables as they relate to change in HR during debriefing.

Table 10

Other Factors during Role Assignment

Other Factors	10 bpm or less *n* (%)	Greater than 10 bpm *n* (%)	Total *N*
Student Semester			
Semester 4	1 (8.3)	11 (91.7)	12
Semester 6	3 (33.3)	6 (66.7)	9
Semester 8	1 (7.1)	13 (92.9)	14
Student Role			
Primary Nurse	1 (12.5)	7 (87.5)	8
Secondary Nurse	0	2 (100)	2
Charge Nurse	0	2 (100)	2
Night Nurse	1 (100)	0	1
Family Member	1 (12.5)	7 (87.5)	8
Observer	2 (14.3)	12 (85.7)	14
Student Age			
20 years or younger	1 (20)	4 (80)	5
21-24	3 (13.6)	19 (86.4)	22
25-29	1 (20)	4 (80)	5
30 or over	0	3 (100)	3
Student Gender			
Male	0	3 (100)	3
Female	5 (15.6)	27 (84.4)	32
Number of HPS Experiences			
One or less	1 (20)	4 (80)	5
Two	3 (15.8)	16 (84.2)	19
Three or greater	1 (9)	10 (91)	11

N=35

Table 11

Other Factors during the Hands-on Phase

Other Factors	10 bpm or less *n* (%)	Greater than 10 bpm *n* (%)	Total *N*
Student Semester			
Semester 4	1 (7.1)	13 (92.9)	14
Semester 6	2 (25)	6 (75)	8
Semester 8	6 (37.5)	10 (62.5)	16
Student Role			
Primary Nurse	0	9 (100)	9
Secondary Nurse	0	2 (100)	2
Charge Nurse	0	2 (100)	2
Night Nurse	1 (100)	0	1
Family Member	3 (33.3)	6 (66.7)	9
Observer	5 (33.3)	10 (66.7)	15
Student Age			
20 years or younger	0	5 (100)	5
21-24	5 (21.7)	18 (78.3)	23
25-29	3 (42.9)	4 (57.1)	7
30 or over	1 (33.3)	2 (66.7)	3
Student Gender			
Male	2 (66.7)	1 (33.3)	3
Female	7 (20)	28 (80)	35
Number of HPS Experiences			
One or less	0	5 (100)	5
Two	4 (21)	15 (79)	19
Three or greater	5 (35.7)	9 (64.3)	14

N=38

Table 12

Other Factors during Debriefing

Other Factors	10 bpm or less *n* (%)	Greater than 10 bpm *n* (%)	Total *N*
Student Semester			
Semester 4	7 (50)	7 (50)	14
Semester 6	3 (37.5)	5 (62.5)	8
Semester 8	9 (60)	6 (40)	15
Student Role			
Primary Nurse	3 (33.3)	6 (66.7)	9
Secondary Nurse	2 (100)	0	2
Charge Nurse	0	2 (100)	2
Night Nurse	1 (100)	0	1
Family Member	4 (50)	4 (50)	8
Observer	9 (60)	6 (40)	15
Student Age			
20 years or younger	3 (60)	2 (40)	5
21-24	10 (45.5)	12 (54.5)	22
25-29	4 (57.1)	3 (42.9)	7
30 or over	2 (66.7)	1 (33.3)	3
Student Gender			
Male	1 (50)	1 (50)	2
Female	18 (51.4)	17 (48.6)	35
Number of HPS Experiences			
One or less	2 (40)	3 (60)	5
Two	8 (44.4)	10 (55.6)	18
Three or greater	9 (64.3)	5 (35.7)	14

N=37

Chapter Five: Discussion

The purpose of this study was to gain a better understanding of the student experience during an HPS learning activity, particularly as it relates to anxiety. Specifically, the researcher wanted to gain a clearer understanding of the relationship between student learning style and student anxiety during an HPS experience.

Learning Styles

The majority of nursing students in this study preferred the active (56.4%), sensing (84.6%), visual (66.7%) and sequential (76.9%) learning styles. This, according to Felder and Soloman (1993), means that these students learn best when they are able to discuss, apply or explain concepts, work as part of a team, solve problems, make connections to the real world and follow a step by step learning process. They also retain information better when they can see pictures, diagrams, and demonstrations (Felder & Soloman, 1993). HPS teaching approaches may appeal to this type of learner because of the team work aspect of the hands-on care phase of the HPS event, the reality of the HPS environment and the ability to watch their peers perform during the hands-on care phase. In the debriefing phase, students also have the opportunity to discuss what occurred during the hands-on care phase.

It is important to note that when measuring a students learning style using the ILS, the student can have a mild, moderate or strong preference for a specific style (Felder & Soloman, 1993). Each student can have a preference for active learning at times and a preference for reflective learning at other times (Felder &

Soloman, 1993). In this study, due to the study's sample size, I did not account for this benefit of the ILS as a learning style inventory.

Zhang and Lambert (2008) utilized the ILS when studying bachelor of nursing students in China. They found that most students preferred the reflective, sensing, visual and global learning styles (Zhang & Lambert, 2008). This study, conducted in Canada, also found the majority of students preferred the sensing and visual learning styles. However, the findings of these two studies differ in the active/reflective and global/sequential learning styles, as the majority of nursing students in the current study preferred the active and sequential learning styles. Gunduz and Ozcan (2010) identified that culture can influence student learning style, so the difference between these studies may be explained by the participants' cultural differences.

Heart Rate during HPS Experience

This study supports the belief that students experience a significantly elevated HR during HPS learning events. Other studies have found similar results. Chiffer McKay et al. (2010) studied student nurse anesthetists completing a standard induction and intubation sequence during an HPS event. They measured the HR during the hands-on care of the manikin phase only, and found that there was a significant increase in HR during this phase. Looi Bong et al. (2010) compared the change in HR between HPS based training and tutorial based training and found that the participants engaged in HPS training had a significantly elevated HR in comparison to the tutorial group. Hinchey et al. (2011) studied air medical crewmembers during an HPS event in which a trauma scene was

simulated, and found that participants had a significantly elevated HR during the HPS event.

Cordeau‘s (2010) study of the student experience during an HPS event was based on an evaluative HPS event. The information from her study is used to support the current study because the anxiety that students experience during a non-evaluative HPS event might be similar to what is experienced during an evaluative one. Students can perceive and approach an HPS experience similar to the way that they do a performance test (Beischel, 2013). Part of the anxiety is caused by feeling that they will mess up or fail during the experience even when it is non-evaluative (Beischel, 2013).

Role assignment phase. In the literature, the elevation of HR during role assignment, or prior to the hands-on care phase of the HPS event, is sometimes referred to as anticipatory anxiety (Cordeau, 2010; Hinchey et al., 2010; Looi Bong et al., 2010). Of the three phases of simulation examined in this study, role assignment was the phase where most students experienced anxiety. During this phase, 85.7% of the students experienced anxiety; the mean HR was 99.7, an increase of 29.2 bpm from resting. Cordeau (2010) found that nursing students experienced a subjective sense of anxiety prior to starting the hands-on care of the manikin. The anxiety appears to be caused by students not knowing what to expect or what will be required of them during the HPS experience (Cordeau, 2010). Hinchey et al. (2011) and Looi Bong et al. (2010) also found that students experienced elevated HR prior to engaging in, or in anticipation of, an HPS event. However, differing from the current study, the authors of these studies found that

HR was the highest during the hands-on care of the manikin (Hinchey et al., 2011, Looi Bong et al., 2010). This difference may be due to the timing of the HR being recorded. In the current study, the researcher used the HR recording from two minutes prior to and one minute after role assignment. Thus, the actual assignment of roles could be the most stressful time during the pre-simulation period. Had the researcher recorded the HR during the entire pre-simulation phase, the average HR may have been lower. Additionally, the participants in the other two studies were no longer students and were already established in their profession.

Hands-on care phase. During the hands-on care of the manikin phase, there was a statistically significant change in HR from resting HR. During this phase, 76.3% of the students were anxious. The mean HR during this phase was 91 bpm, which is an increase of 20.4 bpm from resting HR. There was a 9.4% decrease in the number of students who were anxious, however the majority of students were still anxious. Thus, this phase was the second most anxiety provoking phase of the HPS event. Cordeau (2010) stated students experience beginning anxiety, intermittent anxiety as well as continuous anxiety during the hands-on care of the manikin phase of an HPS experience. The anxiety during the hands-on care phase often results from the students' lack of understanding of the situation, feeling like they cannot complete the nursing interventions in the required time, being videotaped and fear of failure (Cordeau, 2010). This anxiety could also be caused by peer and instructor observation (Elfrink, et al., 2009), critiquing of student performance (Rothgeb, 2008), or anticipation of a more

"critical event" (Lasater, 2007). This phase was the most anxiety provoking for participants in some studies (Hinchey et al., 2011, Looi Bong et al., 2010).

Debriefing phase. The last phase of the HPS experience is the debriefing phase. There was a significant change in HR from resting HR during this phase; however, this was the phase where the number of students who were anxious (48.6%) was almost the same as the number who were not (51.4%). There was only a 2.8% difference between the two groups. The mean HR during this phase was 79.5 bpm, which is an increase of 9 bpm from resting HR. Cordeau (2010) indicated that anxiety during this phase is often caused by self-critique, concerns regarding instructor-student interaction, and not knowing what to expect. Looi Bong et al. (2010) also found that students HR remained higher than baseline during debriefing.

Learning Styles and Student Anxiety

There was no statistically significant association between learning style and student anxiety during any of the three phases of the HPS experience. While not statistically significant, the students with the global learning style were the most anxious and the students with the verbal learning style were the least anxious during role assignment. During the hands-on phase of the HPS experience, the students with the intuitive learning style were the least anxious and the students with the verbal learning style were the most anxious. Lastly, during debriefing, learners were almost equally anxious, regardless of learning style preferences.

There are a few studies that have found links between learning style and student anxiety during HPS events. Fountain and Alfred (2009) found that

students who preferred solitary learning or social learning were the most satisfied with an HPS experience. Additionally, Valler-Jones et al. (2011) noted that all forms of simulation activity, including HPS, might be challenging for some individuals, especially those with the learning style of reflector and theorist. Finally, Beischel (2013) found that novice nursing students who had a strong auditory-verbal learning style experienced a greater level of anxiety during the anticipatory phase of an HPS event. The differences in the learning style inventories may account for the different findings.

Alternatively, there may be no relationship between student anxiety and student learning style during an HPS experience. As the students' anxiety level did not depend on learning style, one could argue that learning style does not have an influence on anxiety during HPS experiences. This argument might provide some support for the idea that HPS can be an effective teaching strategy for all students regardless of learning style. There are different phases in an HPS experience; therefore there may be phases in this teaching approach that appeal to a specific learning style. For example, the hands-on care of the manikin may appeal to the active learner whereas the debriefing may appeal to the reflector. Felder (1996) argued that instructors should utilize a variety of methods that appeal to differing learning styles during each lesson. He stated that optimal learning occurs when faculty members utilize a variety of methods in order to ensure that the needs of students with differing learning styles are met (Felder, 2010). Thus, the unique nature of the HPS learning environment may make it an effective teaching approach, meeting the needs of numerous students.

Other Factors That May Influence Student Anxiety

Based on the findings of this study, learning style does not appear to be a factor in student anxiety during an HPS event. As there were statistically significant changes in HR in all phases of the HPS event, the following section of this paper will examine and explore alternative causes of anxiety during an HPS experience. These alternative causes may be of interest and should be researched further with a larger sample size.

Experience with HPS. The number of times an individual has been exposed to HPS events might be a cause of anxiety. Research findings support the theory that individuals who experience a situation for the first time may have higher levels of anxiety. When studying beginner divers, it was found that HR was the highest before the participants went underwater for the first time (Coetzee, 2011). Interestingly, when they entered the water for the second time, they still experienced a significant elevation in HR, but the HR was not as high as it had been prior to entering the water for the first time (Coetzee, 2011). Additionally, Howard et al. (2011) found that as students progressed through their nursing program, they reported a decrease in the anxiety they experienced during HPS events.

In this study, regardless of the number of HPS experiences, the majority of students (85.7%) were anxious during role assignment. Differing from the current study, Hinchey, et al. (2011) found that HR trended toward a lower anticipatory HR when the participant had more clinical experience, although this was not statistically significant. During the hands-on care phase in this study, as the

number of HPS experiences increased, the percentage of anxious students decreased. All students who had been exposed to one or less HPS events were anxious, 79% of the students who had been exposed to two HPS events were anxious and 64.3% of the students who had been exposed to three or greater HPS events were anxious. Hinchey, et al. (2011) findings were different in that during the hands-on care phase, the change in HR did not appear to be affected by amount of experience. During the debriefing phase of the HPS experience, 60% of the students who had been exposed to one or less HPS events were anxious, 55.6% of the students who had been exposed to two HPS events were anxious, and 35.7% of students who had been exposed to three or more HPS events were anxious. Thus during the debriefing phase of this HPS event, experience did play a minor role in the anxiety that a student experienced.

Student level. Student semester may also have an influence on anxiety, resulting from the amount of experience with HPS. Students in semester four would have had the least amount of experience whereas students in semester eight had the most. During the role assignment phase, there were no significant statistical differences between semester four and semester eight students. Semester six students were the least anxious of the three groups with only 66.7% experiencing anxiety. During the hands-on care phase, the students in semester four were the most anxious with 92.9% of the students experiencing anxiety. This might be due to their limited experience with HPS events, or their confidence levels in providing nursing care for patients. It might also be due to the fact that all participants were involved in active roles during the HPS event. During the

debriefing phase, semester eight students were the least anxious, with only 40% of the student experiencing anxiety. This may be related to having more experience in the HPS environment. The semester six students were the most anxious during debriefing with 62.5% of the students experiencing anxiety. This finding conflicts with the assumption that the more times you have experienced a situation, the less anxious you will be. Thus, the findings of this study provide some support for the theory that more exposure to a situation may equate to less stress, but because of the mixed results, it is weak support at best.

Student role. Student role in the HPS experience could be another cause of anxiety. Lasater (2007) found that students who were assigned the role of primary nurse experienced the most anxiety. During the role assignment phase, role did not play a factor as the students did not know their role yet. However, the findings indicate this phase was the most stressful, possibly due to not knowing the role one would have. During the hands-on care phase, all of the students in the primary nurse role were anxious as were the students who played secondary nurse and charge nurse roles. This occurred whether the students were observed or not. The fact that students in these roles were moving around could have contributed to some of the elevation in HR. In the other roles of observer and family member, the students were primarily seated during this phase. An unanswered question is, how much influence did the activity of the students in the room with the manikin, have on their HR. Of interesting note is that the students who played the role of family member and observer, had a similar anxiety experience based on HR. Also, during the debriefing phase, the observers were the least stressed (40%), and

the participants in the roles of primary nurse (66.7%) and charge nurse (100%) were the most stressed.

Effect of observation. Another cause of anxiety, as identified by students, is being observed by their peers (Elfrink, et al., 2009). In this study, semester four was the only group in which there were no observers. They were also the group that was the most anxious during the hands-on care phase. As movement contributes to an increased HR (Robinson, Epstein, Beiser & Braunwald, 1966), some of the elevation in HR could be attributed to the movement of the students. However, based on the findings of this study, the theory that observation causes student anxiety should be questioned.

Implications for Practice

Currently there is no research describing how nurse educators can help reduce student anxiety during an HPS event. Based on the findings of this study, nurse educators need to focus on strategies to reduce anxiety, particularly anticipatory anxiety. Assigning the student roles earlier, rather than just prior to the HPS experience, should be considered. Educators must also identify ways to provide greater support during the hands-on care of the manikin phase. One way to do this might be to provide the student with a detailed account of what will be required during the HPS event. This could be especially important for novice students who are unfamiliar with the HPS learning environment. Nurse educators may also want to ensure that students are exposed frequently to this teaching strategy. Based on some of the findings from this study and others, it would

appear that the more the students are exposed to this innovative teaching approach, the less anxiety they experience.

Howard et al. (2011) noted that not all students experience anxiety during an HPS event. This study supports those findings. In each phase of the HPS experience, there were a small number of students who did not experience anxiety. More studies should be conducted to determine what the differences are between students who experience anxiety and those who do not.

Chiffer McKay et al. (2010) and Beischel (2013) found that there was no relationship between the anxiety that students experience in the HPS environment and learning outcomes. Therefore, an argument could be made that there is no need for nurse educators to decrease student anxiety because the amount of the anxiety that students experience helps them learn. However, it was noted that the anxiety during an HPS event is greater than the anxiety experienced during a live event (Looi Bong et al, 2010). Therefore, gaining a better understanding of what causes student anxiety and implementing strategies to decrease student anxiety during HPS events is essential.

Limitations

There are several limitations to this study. The primary one is the sample size. When there is a small sample size, there is the risk that the intervention may have worked, but because of the small sample size, a false null hypothesis might be accepted (Morgan, Gliner & Harmon, 2006). Due to the small sample size, there may be a relationship between learning style and student anxiety during an

HPS event. Repeating this study with a larger sample size will help address the question.

Another limitation is the research design. When utilizing a correlation design, the researcher must remember that the findings cannot guarantee that one variable caused a change in the other variable (Loiselle & Profetto-McGrath, 2010). Therefore, the ability to state that learning style causes elevated student anxiety, or does not cause anxiety, during an HPS experiences is not possible. With the findings from this study, one may only predict that there is a relationship or lack of relationship between these variables or that learning style might be associated or not associated with elevated student anxiety.

A further limitation was the use of the on-line survey for the collection of the learning style data. A limitation of utilizing an online survey as the data collection tool for learning style is that it is self-reported data. When data are collected through self- report there is the chance that "people are telling us what they believe to be true or, perhaps, what they think we want to hear" (Leedy & Ormrod, 2010, p. 188). The answers to the ILS questions were also reported on the spot and individuals may not have thought about the concept prior to being asked the question, therefore, their answers could be "colored by recent events or the current context" (Leedy & Ormrod, 2010, p. 188). Additionally, when utilizing checklists and rating scales to quantify behaviors, valuable information which clarifies people's responses is often lost (Leedy & Ormrod, 2010).

Accounting for other factors that could have affected HR, is an additional limitation of this study. One factor was the influence of movement on HR.

During the role assignment phase of this study, it is important to note that the students were sitting. During the hands-on care phase, students in the role of primary nurse and secondary nurse moved about the room as they carried out their nursing interventions. Students in the role of charge nurse had to run from the debriefing room to the HPS room to get instructions from the faculty member, so they were also physically moving. The family member and the observers remained seated during this phase. During the debriefing phase all students were seated. It is well known that movement will elevate ones HR therefore, when interpreting the HR results this should be taken into consideration (Robinson, et al., 1966).

The students reported their own resting HR. As the resting HR's were not taken at the same time under similar resting conditions, the HR data could be slightly skewed. Additionally the use of caffeine or medications that alter HR was not accounted for.

Lastly, findings from this study could be affected by other factors that influence student anxiety. It would be impossible to control all variables that impact student anxiety. These variables might include having other exams or assignments, personal issues, and disagreements between fellow students or the instructor. Additionally, it is difficult to measure how previous HPS experiences have affected student anxiety either positively or negatively.

Future Studies

Resulting from the findings of this study, there is a need for additional studies in order to gain a better understanding of the student experience during an

HPS learning event, particularly as it relates to anxiety. As noted earlier, due to the study sample size, this study should be repeated to gain a better understanding of the influence of learning style on student anxiety during HPS events. Additionally, few researchers have used the ILS to determine undergraduate nursing students' learning style; therefore, gaining a better understanding of the learning styles most common in undergraduate nursing students would be beneficial. Further, more studies should be conducted to determine if anxiety can be attributed to participants being students or professionals, or to the precise phases in HPS learning events. Finally, a study that investigates the roles within an HPS experience would be valuable in determining whether there is an association between student anxiety as it relates to roles.

Conclusion

This study adds to the growing body of knowledge on the student's experience during an HPS event. It provides support to the theories that students experience anxiety, as identified by an elevated HR, during the different phases of the HPS event, that the roles of the primary nurse and secondary nurse might be the most anxiety provoking, and that some students do not experience anxiety during an HPS event. The results of this study also show that there is no statistically significant association between student anxiety and student learning style during an HPS experience. However, due to the small sample size, the findings of this study have primarily given an understanding of what might be. Further research, with a larger sample, should be conducted to either support or negate these findings.

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Appendix A: Demographic Survey

Participant ID _____

1. What semester are you currently enrolled in?
   - ☐ Semester 4
   - ☐ Semester 6
   - ☐ Semester 8

2. Which program are you currently enrolled in?
   - ☐ 3-year/Fast track option
   - ☐ 3-year/LPN access
   - ☐ 4-year/Regular track option

3. What is your age, in years?
   - ☐ 20 or under
   - ☐ 21-24
   - ☐ 25-29
   - ☐ 30-34
   - ☐ 35-39
   - ☐ 40-44
   - ☐ 45 or over

4. What is your gender?
   - ☐ Male
   - ☐ Female

5. What is your ethnic background?
   - ☐ Aboriginal
   - ☐ Black or Afro-Canadian
   - ☐ Caucasian
   - ☐ East Asian
   - ☐ South Asian
   - ☐ West Asian
   - ☐ Other _____

6. Is English your second language?

- ☐ Yes
- ☐ No

7. Have you been employed in any of the following positions? (Mark all that apply)

- ☐ Care aid or nursing assistant
- ☐ Employed student nurse
- ☐ Licensed Practical Nurse (LPN)

8. How many human patient simulation (HPS) experiences have you been involved in?

- ☐ One
- ☐ Two
- ☐ Three
- ☐ Four
- ☐ Five
- ☐ Six
- ☐ Seven
- ☐ Eight
- ☐ Nine
- ☐ Ten or more

9. How many times have you been a primary nurse during a HPS experience?

- ☐ Zero
- ☐ One
- ☐ Two
- ☐ Three
- ☐ Four
- ☐ Five or more

10. How many times have you been a secondary nurse during a HPS experience?

- ☐ Zero
- ☐ One
- ☐ Two
- ☐ Three
- ☐ Four
- ☐ Five or more

11. How many times have you been a family member during a HPS experience?

- ☐ Zero

- ☐ One
- ☐ Two
- ☐ Three
- ☐ Four
- ☐ Five or more

12. How many times have you been an observer during a HPS experience?

- ☐ Zero
- ☐ One
- ☐ Two
- ☐ Three
- ☐ Four
- ☐ Five or more

13. How many times have you been the charge nurse during a HPS experience?

- ☐ Zero
- ☐ One
- ☐ Two
- ☐ Three
- ☐ Four
- ☐ Five or more

Appendix B – Index of Learning Styles

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 solution 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 the details of 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 (fact, 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

Richard M. Felder and Barbara A. Soloman, *Index of Learning Styles*, <http://www.ncsu.edu/felder-public/ILSpage.html>, accessed July 11, 2012

Appendix C: Ethics Approval from Athabasca University

MEMORANDUM

DATE: November 26, 2012

TO: Lee-Anne Jackson

COPY: Mariann Rich (Supervisor)
Janice Green, Secretary, Athabasca University Research Ethics Board
Dr. Sharon Moore, Chair, CNHS Review Committee

FROM: Dr. Sharon Moore, Chair, CNHS Research Ethics Review Committee

SUBJECT: **Ethics Proposal #CNHS-12-05-Jackson L "***Does student learning style influence student anxiety during a human patient simulation experience?***"**

Thank you for providing the additional information requested by the Centre for Nursing & Health Studies (CNHS) Research Ethics Review Committee.

I am pleased to advise that the above-noted project has now been awarded **APPROVAL TO PROCEED**. **You may begin your research immediately.**

This approval of your application will be reported to the Athabasca University Research Ethics Board (REB) at their next monthly meeting. The REB retains the right to request further information, or to revoke the interim approval, at any time.

As implementation of the proposal progresses, if you need to make any significant changes or modifications prior to receipt of a final approval memo from the AU Research Ethics Board, please forward this information immediately to the CNHS Research Ethics Review Committee via Dr. Sharon Moore sharon.moore@athabascau.ca for further review.

If you have any questions, please do not hesitate to contact sharon.moore@athabascau.ca .

Best wishes with your research.

Appendix D: Ethics Approval from the University of the Fraser Valley

UNIVERSITY OF THE FRASER VALLEY

Certificate of Human Research Ethics Board Approval

Contact Person	Department	Protocol #
Lee-Anne Jackson	Nursing	520

Co-investigators
Mariann Rich

Title of Project
Does student learning style influence student anxiety during a human patient simulation (HPS) experience?

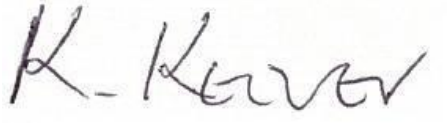
Sponsoring/Funding Agency
Athabasca University

Institution(s) where research will be carried out
University Of The Fraser Valley; Athabasca University

Review Date:	Approval Date:	Approval Term:
29-Oct-12	16-Nov-12	16-Nov-12 - 15-Nov-13

Certification:

The protocol describing the above-named project has been reviewed by the UFV Human Research Ethics Board and the procedures were found to be in compliance with accepted guidelines for ethical research.



Kathy Keiver, Chair, Human Research Ethics Board

NOTE: This Certificate of Approval is valid for the above noted term, provided there is no change in the procedures or criteria given.

If the project will go beyond the approval term noted above, an extension of approval must be requested.

33844 King Rd., Abbotsford, BC V2S 7M8 • Tel: 604-504-7441 • Fax: 604-855-7614 • Toll-free (in Canada): 1-888-504-7441 • **www.ufv.ca**

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Appendix E: Information Letter

Title of Project: Does student learning style influence student anxiety during a human patient simulator experience?

Investigator:	Supervisor:
Lee-Anne Jackson, BN, RN	Mariann Rich, PhD (candidate)
MN Student	Assistant Professor & Supervisor
Athabasca University	Centre for Nursing & Health Studies
Ph: 604-845-4581	Athabasca University
Email: llj@shaw.ca	Ph: 1-866-751-2431

Purpose

The purpose of this study is to gain an understanding of the relationship between student learning style and student anxiety during a human patient simulation (HPS) experience. Results from this research study may provide nurse educators with information on how to best support students when HPS is used as a teaching and learning strategy.

Study Design and Data Collection Procedure

If you agree to participate in this study, you will be asked to provide your email on the consent form. Prior to the HPS learning experience, the researcher will send you a link to the online learning styles inventory and a URL so that you can complete the demographic survey. Once you have received this e-mail you should complete the online learning styles inventory and the demographic survey within a week. It will take you approximately 15 minutes to complete the two surveys. Once the on-line learning style inventory is completed, you will e-mail the results, along with your resting heart rate to me, the researcher. During the HPS experience you will wear a portable heart rate monitor in order to measure your heart rate. The information collected will be used to compare the changes in your heart rate in relation to the different parts of the HPS experience, such as taking care of the patient and debriefing. Arriving at the simulation laboratory 5 minutes prior to your scheduled HPS experience will give you enough time to put on the heart rate monitor and get used to it. You will wear the heart rate monitor for 10 minutes after your simulation experience is over so that any changes in heart rate can be recorded.

Possible Benefits & Risks

A possible benefit for participating in the study is knowledge of your learning style. There are no foreseeable risks whether you participate in the study or not.

Should you choose not to participate or choose to withdraw from the study there will be no negative effect on your academic results or progress in the program. Your professors will not know if you were a participant or not.

Confidentiality

All data collected in this study including the demographic survey, the learning styles inventory and the heart rate data will be kept confidential. The surveys and heart rate data will be assigned an identification code. The researcher will be the only person who has access to this information. In order to maintain confidentiality, all students who are involved in the HPS learning experience will be invited to wear a portable heart rate monitor therefore, no one will know whether you are participating in the study or not.

Voluntary Participation

Participation in this study is voluntary. If you would like to participate in this study, you will need to sign the attached consent form. You will receive a copy of this signed form. You may withdraw from the study at any time up until the analysis of results has begun. If you choose to withdraw, please e-mail or call the primary investigator listed below as soon as possible. Once I have received your withdrawal notification, any data collected from you will be destroyed.

Study Results

The results of this study may be presented at nursing conferences and a paper will be submitted for publication to a relevant refereed journal. If you would like a copy of the results of this study you can contact me, using the contact information below, after November 2013.

Contact Names and Telephone Numbers

If you have any questions or concerns about this research project please contact me at 604-845-4581, or my supervisor, Mariann Rich at 1-866-751-2431. This study has been reviewed by the Athabasca University Research Ethics Board and the University of the Fraser Valley Research Ethics Board. If you have any questions concerning your rights as a possible participant in this research, please contact Athabasca University Research Ethics Board at 1 (780) 675 6718 or rebsec@athabascau.ca; and the Acting AVP of Research & Graduate studies at UFV, Adrienne Chan, at Adrienne.Chan@ufv.ca or 604-557-4074.

Thank you for your consideration to participate in this study.

Lee-Anne Jackson, BN, RN
llj@shaw.ca
604-845-4581

Appendix F: Introduction Script

Hello. My name is Lee-Anne Jackson and I would like to tell you about a research project that I am working on for my Masters in Nursing degree at Athabasca University. The purpose of the research project is to learn more about student anxiety during a simulation experience. Specifically, I want to know if there is a link between learning style and anxiety during the simulation experience. This study has two parts: an on-line survey part to complete, and then the regular scheduled simulation lab experience. What I plan to do is assess the learning style of the individuals that wish to participate by having them complete an on-line learning style inventory. This inventory will take about 10 minutes to complete on-line, then the participant will e-mail me the results. The participants will also fill out an on-line demographic survey which will provide me with information about their age, gender, ethnicity, what semester they are enrolled in, their program track, health care employment, number of times involved in a simulation, and roles played in the simulation. That survey will take about 5 minutes to complete. Participants will also take their own resting heart rate and e-mail this data to me. Then, during the simulation experience participants will wear a portable heart rate monitor to measure their heart rate because when someone is anxious their heart rate increases. I will then download the data from the heart rate monitors onto a computer to see if there is a relationship between specific learning styles and increased or decreased anxiety during simulation learning experiences.

I would like to invite you to be a participant in this study. If you decide you would like to take part in the research project, you will be required to fill out a

consent form. Once you have submitted the consent form, I will send you an e-mail with the URL for the on-line learning styles inventory, a URL for completing the demographic survey, and a participant code number. This ID code is how your data will be identified so that your name is not used. It is also the code you will use when completing the demographic survey. I can access the results of the demographic survey on-line; however I will need you to e-mail the results of the learning styles inventory to me. When you finish the learning style inventory, it will provide you with a print out of the results which you can copy and paste into a word document and then e-mail it to me along with your ID code and resting heart rate.

For the second part, you will attend your normally scheduled simulation experience. The only difference is that you will arrive 5 minutes early so that you can put on the heart rate monitor before your simulation experience starts. Even if you choose to not participate in this study you can choose to wear a portable heart rate monitor. You will wear the monitor during your simulation experience as well as during the debriefing part of the simulation experience. You will also need to wear if for 10 minutes after debriefing ends. After this time you will return the heart rate monitor to me and then the data collection is complete.

It is important that you know I am also a faculty member here at UFV. This can potentially affect the relationship between you, the participants, and me, the researcher, as you may perceive me as an authority over you. To the best of my knowledge, I will not be teaching you in future courses for the duration of your program, therefore I will not be in a position of authority or have an ability to

determine your course grades. I also will reinforce the fact that participation in the study is completely voluntary and choosing to participate or not participate will in no way influence your academic achievements, past or future. Whether you decide to be a part of this research project is completely up to you. If you decide not to it will not affect your grades at UFV. I will keep your choice to participate or not to participate in this study in strict confidence and your decision will not affect your relationship with me. Your fellow classmate and your clinical instructor will not know if you are part of the study unless you choose to tell them because all students can wear the heart rate monitors during the simulated event. Thank you for your time and for considering taking part in this research project.

Appendix G: Consent Form

Title of Project: Does student learning style influence student anxiety during a human patient simulator experience?

Investigator: Lee-Anne Jackson, BN, RN
MN Student
Athabasca University
Ph: 604-845-4581
Email: llj@shaw.ca

Mariann Rich, PhD(c)
Assistant Professor & Supervisor
Centre for Nursing & Health Studies
Athabasca University
Ph: 1-866-751-2431

To be completed by the study participant:

	Yes	No
Do you understand that you have been asked to be part of a research study?	☐	☐
Have you read and received a copy of the attached Information Letter?	☐	☐
Do you understand the benefits and risks involved in taking part in this research study?	☐	☐
Have you had an opportunity to ask questions and discuss this study with the researcher?	☐	☐
Do you understand that you are free to withdraw from the study at any time, without having to give a reason and without affecting your future as a student?	☐	☐
Has the issue of confidentiality been explained to you?	☐	☐
Do you consent to receiving e-mail correspondence from the researcher?	☐	☐
Do you consent to wearing a portable heart rate monitor during your simulation lab?	☐	☐
Do you understand who will have access to the study records?	☐	☐

Who explained this study to you? _____

I agree to take part in this study: ☐ ☐

_____ _____ _____
Print Participant's Name Signature of Participant Date

Participant e-mail address
_____

I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.

_____ _____ _____
Print Investigator's Name Signature of Investigator Date

THE INFORMATION SHEET MUST BE ATTACHED TO THIS CONSENT FORM AND A COPY GIVEN TO THE PARTICIPANT