RELATIONSHIPS BETWEEN EXPERIENTIAL LEARNING AND EFFECTS ON SENIOR NURSING STUDENTS' SELF-EFFICACY AND KNOWLEDGE: A NON-EXPERIMENTAL PREDICTIVE CORRELATION MULTIPLE REGRESSION ANALYSIS

by

Shanna Whatley Akers

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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APPROVED BY:

Kimberly Little, Ph.D., Committee Chair

Tonia Kennedy, Ed.D., Committee Member

Donna Hood, Ph.D., Committee Member

Scott Watson, PhD, Associate Dean, Advanced Programs

ABSTRACT

Preparing nursing students to transition into the professional registered nurse role is the task of nurse educators. These educators must train students to function in multiple nursing specialties post-graduation, to include critical care. As more nursing graduates enter into areas such as intensive care units and emergency rooms, nurse educators must prepare them to work with critically ill patients. Increased exposure to critical care clinical experiences and simulations may be one method to prepare them for these complex, high-acuity patient situations. In order to determine whether or not a relationship exists between increased hours of experience and effects on self-efficacy and knowledge, the Nursing Student Self-Efficacy Scale (NSSES) and the Basic Knowledge Assessment Test-8 (BKAT-8) was administered to senior nursing students in a Bachelor of Science in Nursing (BSN) pre-licensure program during their final semester. Hierarchical regression analysis evaluated each variable in the regression model. Control variables included age, gender, ethnicity, prior experience, and preferred initial job placement. Predictor variables (independent variables) were clinical hours and simulation hours. Data indicates a positive relationship for each predictive variable to both the NSSES and BKAT-8. Additionally, clinical hours and simulation hours do contribute to the overall predictive model for NSSES and BKAT-8 outcomes. Practical implications and suggestions for future research are addressed.

Key words: Nursing education, nursing simulation, clinical, self-efficacy, knowledge, pre-licensure nurse training

DEDICATION

This manuscript is dedicated to Shawn, my beloved husband, who encourages and supports me in every endeavor. I love you more than words could express. I love living life by your side.

To our children, Shawn David, Abigail, and Alyce. I love you each more than you could imagine. Thank you for your patience throughout this process. May you spend life learning all there is to know about God and His beautiful creation.

To my mother, Donni Whatley, and in memory of my father, Michael Whatley. Thank you for all the love you showed me and for pushing me to succeed. Daddy, I wish you could see this!

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Table of Contents

List of Tables

List of Figures

Chapter One: Introduction

Background

The Department of Health and Human Services (2010) reported in September 2010 that 543,026 United States' nurses work in critical care and emergency nursing. According to the Bureau of Labor Statistics (BLS) released employment projections (January, 2014), the nursing profession must add 526,800 positions, a 19% growth rate, to meet the demand for nursing care (BLS, 2014). Annually, over four million patients are admitted to Intensive Care Units (ICU) which fill nearly 8% of all hospital beds (Joint Commission, 2004). A growing need for critical care nurses is also evidenced by the increased demand for critical care temporary or travel nurses, as well as intensified recruitment marketing trying to attract critical care nurses (American Association of Critical-Care Nurses (AACN) (2013). According to the American Association of Colleges of Nursing (2009), many nursing schools offer "exposure to critical care" (para. 15), but the majority of nurses gain their critical care education from their employer by on the job training. Many hospitals are hiring new graduate nurses into critical care settings and striving to meet their educational needs (AACN, 2013). The Institute of Medicine (IOM) reported that a fundamental change to nursing education must occur to prepare students to practice in the ever-changing healthcare system (IOM, 2011).

A large private, faith-based University on the East Coast of the United States received unsolicited feedback from recent graduates of a Bachelor of Science in Nursing (BSN) program, local Intensive Care Unit (ICU) nurse managers, and hospital-based educators indicating a need for increased education for newly licensed nurse graduates desiring to care for critically ill patients in various ICU settings and emergency departments (ED). As a response to this request, the University's School of Nursing (SON) decided to increase the amount of critical care clinical experience within their pre-licensure program.

Three learning theories were used to guide the development of the new clinical curriculum, which included increased hours in direct patient care and simulation exercises. Benner's Novice to Expert Theory, Bandura's Social Learning Theory, and Kolb's Experiential Learning Theory were all used to guide the formation of the curricular changes. Each of these theories is discussed in depth in Chapter Two.

The SON created three levels of educational opportunities designed to improve knowledge and skills related to care of the critically ill adult patient as well as improve critical thinking skills. The expected improvements in knowledge, skills, and critical thinking were projected to have a positive impact on professional licensure exam results and potentially post-graduation knowledge and confidence levels. In their senior year, all nursing students were required to participate in 45 hours of direct patient care. For those students interested in ICU and ED post-licensure job placement, they had the opportunity to electively attain additional hours in critical care hands-on clinical hours as well as in simulation exercises based on common critical care situations. These students participated in between 40-145 hours of direct hands-on critical care clinical experiences, with the potential to gain between zero and 36 simulation hours. The ability to care for actual patients in these real-life settings offered students further access to observing and learning from expert nurses caring for critically ill patients. Simulation experiences which occurred in a High-Fidelity Simulation (HFS) Lab were designed to improve critical thinking as it related to patients who are experiencing hemodynamic instability. Simulation scenarios were based on concepts taught in the American Heart Association's Advanced Cardiac Life Support courses.

Simulation is an essential part of many educational settings in both nursing and non-nursing professions (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014;.Breaud, et al., 2012; Kaakinen & Arwood, 2009; Muscat & Mollicone, 2012; Ny, Dyne, & Ang, 2009). High Fidelity Simulation (HFS) included the use of manikins with multiple technical functions. In this study, HFS manikins were utilized in simulation exercises including traumatic situations, medical illnesses, and cardiopulmonary arrest. HFS exercises allowed senior nursing students to practice skills in a safe environment without the potential of harming live patients, both actively participating and observing classmates.

Problem Statement

As the nurse shortage continues to grow, more new graduate nurses are anticipated to find their initial job experience in the critical care areas as well as in emergency departments. The AACN (2013) states those nurses are entering this specialty unprepared. Nurse educators must help prepare these students for working in such intense units. In order to improve student preparedness, this study examined the relationship between increased critical care clinical hours and simulation hours and their effects on the self-efficacy and knowledge, as related to critical care concepts and nursing skills, of senior nursing students at a private, faith-based university.

Purpose Statement

The purpose of this non-experimental study was to evaluate the relationship between hours in hands-on critical care clinical and hours of simulation experiences and effects on the self-efficacy and knowledge of senior nursing students as related to critical care concepts and skills.

Significance of the Study

As discovered in the review of literature, the current body of literature is lacking research evidence on the impact of critical care clinical and simulation hours on undergraduate nursing students' self-efficacy and knowledge related to critical care concepts and skills. The two chosen assessment tools (Nursing Student Self-Efficacy Scale and Basic Knowledge Assessment Test-8) have not been compared. This study added information to the body of nursing education literature for teaching the undergraduate nursing student in critical care skills and knowledge and may provide an adjunctive opportunity for schools of nursing to better prepare graduates for the nursing workforce, specific to the critical care arena.

Thirteen percent of new graduate nurses changed jobs within one year of graduating and 37% reported being ready to change positions (Kovner, et al., 2007). New graduate nurses resign employment due to lack of confidence, lack of knowledge, and lack of communications skills (Pfaff, Baxter, Jack, & Ploeg, 2014). New graduate nurse orientation programs have decreased turnover rates in critical care units (Friedman, Cooper, Click, & Fitzpatrick, 2011) and pediatric units (Friedman, Delaney, Schmidt, Quinn, & Macyk, 2013). A potential savings of $1,367,100 was reported from an increased retention rate (Friedman, et al., 2011). Hiring of new graduate nurses who have gained increased experiences, improved knowledge in critical care, and Advanced Cardiac Life Support (ACLS) certifications may create cost savings for hospital organizations, making these new graduates more marketable.

Criterion Variables

Two criterion variables were considered: (a) self-efficacy related to concepts and skills in critical care and (b) basic critical care knowledge.

Self-efficacy's theoretical foundations began with Bandura's Theory of Self-Efficacy (Bandura, 1977). Self-efficacy was defined as one's belief about his or her personal ability to complete a task or attain a goal (Bandura, 1997). The nursing student's self-efficacy was operationalized by the Nursing Student Self-Efficacy Survey (NSSES) (Stump, 2010; Stump, Husman, & Brem, 2012). The NSSES gauged nursing student self-efficacy related to critical care concepts and skills with 26 items, which were measured on a 0-4 point Likert-type scale.

The second criterion of basic knowledge was defined by Toth (2012) as necessary knowledge of critical care nursing concepts and skills that provide a good foundation for patient care. The Basic Knowledge Assessment Test-8 (BKAT-8) evaluated knowledge with the use of a 90 question assessment. Most questions were multiple choice, and four were fill in the blank. This assessment reviewed cardiac rhythms, common laboratory blood tests, and various critical care diagnoses.

Predictor Variables

The predictor variables were (a) direct patient care clinical hours in an ICU or ED setting and (b) simulation experience hours. The use of critical care experiences was based on Kolb's Experiential Learning Theory (Kolb, 1984) and Benner's Novice to Expert Theory (Benner, 2001).

Direct clinical hours included hours participants cared for patients in the ICU or ED setting under the supervision of nurses experienced on the specialty unit and with that patient population. Full patient care was required; examples included assessment, diagnosis, planning, implementation, and evaluation according to the Nursing Process as outlined by the American Nurses Association (2015). Participants also assisted in medication administration, patient and family interactions, communication with other healthcare professionals, and participation in all aspects of patient care.

Simulation hours included time participants spent with critical care nurse educators, who had a clinical background in various critical care settings. Simulation was completed in a high-fidelity simulation lab, which included items such as ICU monitors, electrocardiograms, and defibrillators. Simulations included common ICU situations including life-threatening cardiopulmonary arrest scenarios.

Control Variables

Demographic and experience variables were controlled for through the use of hierarchical regression analysis: (a) gender, (b) age, (c) ethnicity, (d) previous or current experience as a certified nursing assistant, an emergency medical technician, or a licensed practical nurse, (e) internal desire to work in an ICU or ED setting following graduation, and (e) grade point average (GPA). Data was collected as part of the demographic datasheet created by the researcher; however, GPA was gathered via the nursing school's data collection tool.

Gender was defined as either male or female. Kukulu, Korukcu, Ozdemir, Bezci, and Calik (2013) indicated that female nursing students (M = 131.36, SD = 19.40, n = 132) were less self-confident than their male colleagues (M = 136.18, SD = 18.20, n = 39). Nationally, nursing students are 86% female (NLN, 2012). The research site's data was similar to that reported by the NLN.

Age was separated into five categories: (a) 20-25, (b) 26-30, (c) 31-35, (d) 36-40, and (e) >41 years old. According to the National League for Nursing (NLN) (2012), 84% of nursing students are less than 30 years old. This percentage was similar to that of the research site.

Ethnicity was defined as: (a) Asian/Pacific Islander, (b) African American, (c) Caucasian, (d) Latino/Hispanic, and (e) Other. National League for Nursing (2012) statistics found 67% of nursing students were Caucasian and 33% were minority races. This percentage was similar to that of the research institution; however, the percentage of Caucasians was expected to be higher within the SON.

Previous experience was defined as working as or working previously as a certified nursing assistant (CNA), emergency medical technician (EMT), or licensed practical nurse (LPN). Location of experience was not considered.

Internal motivation was assessed by the location (nursing specialty) the participant preferred to work for their first employment as a Registered Nurse. Kukulu, et al. (2013) reported that students who desired to be a nurse reported higher levels of self-confidence in nursing coursework than their classmates who did not aspire to be a nurse personally but were compelled by outside factors to become one. The researcher expected that those participants who preferred the critical care setting to show higher levels of self-efficacy related to critical care specific skills and knowledge than those who preferred other areas of nursing practice.

Grade Point Average (GPA) was based on a 4.0 scale. Nursing courses were graded on a 7 point scale (100-93 A, 92-85 B, 84-77 C, less than 76.9 was considered a course failure) while general education courses were graded on a 10 point scale (100-90 A, 89-80 B, 79-70 C, 69-60 D, 59.9 or less was a course failure) per university policies. Minimal GPA for entrance into the nursing program was 2.90. Nursing students were required to maintain 2.75 or greater while in the nursing program. However, students whose GPA drops below 2.75 were placed on academic probation and had one semester to improve their overall GPA to 2.75 or greater.

Research Questions

RQ1: Do hours in critical care clinical experiences and hours in simulation encounters significantly predict explicit knowledge as measured by the Basic Knowledge Assessment Test-8, while controlling variables for gender, age, ethnicity, grade point average, prior acute care experience, and preferred initial job placement?

RQ2: Do hours in critical care clinical experiences and hours in simulation encounters significantly predict self-efficacy scores as measured by the Nursing Student Self-Efficacy Survey, while controlling variables for gender, age, ethnicity, grade point average, prior acute care experience, and preferred initial job placement?

Research Hypotheses

H_1: Gender, age, and ethnicity do significantly predict knowledge as measured by the Basic Knowledge Assessment Test-8.

$H0_1$: Gender, age, and ethnicity do not significantly predict knowledge as measured by the Basic Knowledge Assessment Test-8.

H_2: Grade point average and prior acute care experiences do significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8.

$H0_2$: Grade point average and prior acute care experiences do not significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8.

H_3: Participant’s preference for initial job placement does significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8.

$H0_3$: Participant’s preference for initial job placement does not significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8.

H_4: Hours of critical care clinical experiences and hours in simulation encounters do significantly contribute to knowledge according to the Basic Knowledge Assessment Test- 8.

$H0_4$: Hours of critical care clinical experiences and hours in simulation encounters do not significantly contribute to knowledge according to the Basic Knowledge Assessment Test- 8.

H_5: The combination of gender, age, ethnicity, grade point average, prior acute care experience, preference for initial job placement, hours in critical care clinical experiences, and hours in simulation encounters does significantly predict knowledge according to the Basic Knowledge Assessment Test-8.

$H0_5$: The combination of gender, age, ethnicity, grade point average, prior acute care experience, preference for initial job placement, hours in critical care clinical experiences, and hours in simulation encounters does not significantly predict knowledge according to the Basic Knowledge Assessment Test-8.

H_6: Gender, age, and ethnicity do significantly predict self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

$H0_6$: Gender, age, and ethnicity do not significantly predict self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

H_7: Grade point average and prior acute care experiences do significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

$H0_7$: Grade point average and prior acute care experiences do not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

H_8: Participant’s preference for initial job placement does significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

$H0_8$: Participant's preference for initial job placement does not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

H_9: Hours of critical care clinical experiences and hours in simulation encounters do significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

$H0_9$: Hours of critical care clinical experiences and hours in simulation encounters do not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

H_{10}: The combination of gender, age, ethnicity, grade point average, prior acute care experience, preference for initial job placement, hours in critical care clinical experiences, and hours in simulation encounters does significantly predict self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

$H0_{10}$: The combination of gender, age, ethnicity, grade point average, prior acute care experience, preference for initial job placement, hours in critical care clinical experiences, and hours in simulation encounters does not significantly predict self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

Assumptions and Limitations

Assumptions

Assumptions for this study included the presence of a linear relationship, multivariate normality, existence of little or no multicollinearity, and independence of observations. A relationship between the predictor (independent) variables and the criterion (dependent) variables was assumed. This linear relationship was assessed with a scatter plot diagram. Additionally, Pearson's Correlation Coefficient was used to determine linear relationship. A Pearson *r* score of +1.00 would indicate a perfect positive relationship, while an *r* of -1.00 would indicate a perfect negative relationship between the variables (Field, 2009). An *r* of 0.00 would signify no relationship (Field, 2009).

Multivariate normality was defined as the assumption that the collective dependent variables have normality (Field, 2009). Multivariate normality was assumed and tested by the univariate normality for each dependent variable independently (Field, 2009). The assumption of normal distribution assumed that the data was normally distributed in a bell-shaped curve with 95% under the curve (Warner, 2013) or 68% within one standard deviation from the mean (Field, 2009). The univariate normal distribution was assessed using a histogram chart for each predictor variable; outliers were considered for potential removal from the study (Warner, 2013). This distribution was further evaluated by the Kolmogorov-Smirnov test for $n > 50$ (Warner, 2013).

This study assumed that multicollinearity, or a strong correlation between the two predictor variables, did not exist. To determine if this assumption was met, the correlation matrix of all predictor variables was reviewed. Correlations between 0.80 and 0.90 were considered to be highly correlated (Field, 2009). The Variance Inflation Factor (VIF) analysis determined the strength of the relationship between the predictor variables (Field, 2009). A VIF of 1 indicated that there is no multicollinearity (Young, n.d.). Moderate multicollinearity exists if the VIF is between 1 and 4, while greater than 5 indicated a strong multicollinearity (Young, n.d.). Tolerance was the inverse of the VIF and was considered troublesome when less than 0.1 (Field, 2009; Young, n.d.).

The assumption of homogeneity of covariance matrices assumes that the outcome variables were evenly distributed between and across all groups (Warner, 2013). This assumption was evaluated using Box's *M* test (Warner, 2013). Should Box's *M* test be significant for a violation, the Pillai's trace test would be conducted. Pillai's trace test was appropriate to further assess the violation, as it was more robust to this violation and was appropriate when there were "unequal *n*s in the groups" (Warner, 2013, p. 786).

The assumption of homoscedasticity was supposed. Homoscedasticity indicated that residuals have comparable variances (Field, 2009). To assess for homoscedasticity a plot residuals and predicted values as well as residuals and independent variables were used (Nau, 2015).

Limitations

Limitations were recognized and attempts were made to control for them. Participants were a sample of convenience and not randomly chosen (Campbell & Stanley, 1963); therefore, generalizability was limited. Additionally, the ability to generalize the results was limited due to the nature of the study (predictive correlational) and its limited data (LoBiondo-Wood & Haber, 2010).

Due to limitations related to faculty influences and clinical and simulation experience differences, a single research site was used in this study. This potential bias further limited the generalizability of the research results in addition to the use of convenience sampling method (Field, 2009).

An additional limitation for this study was the nature of the self-efficacy scale. With self-reporting tests, participants could potentially answer questions based on social desirability response bias (Warner, 2013). The use of multiple operationalizations did aid in overcoming this limitation (Warner, 2013); the use of both the NSSES and the BKAT-8 met this criteria. The identity of the researcher remained confidential in order to assist in the prevention of the social desirability response bias.

Operational Definitions

Basic Knowledge- "Information that is necessary for entry into critical care nursing and represents the foundation for job performance" (Toth, 2012, para. 1).

Critical Care Area- Includes Intensive Care Units (Medical, Surgical, Trauma, Cardiac, Cardiovascular, Burn, and Neurological) as well as Emergency Departments (Trauma Levels I and II).

Critical Care Clinical- hands-on patient care in a critical care area or emergency department under the direct supervision of a clinical partner (registered nurse, at or above the proficient level on Benner's theory, who was familiar the unit and with that specific patient population).

Critical Care Simulation- hands-on High Fidelity Simulation (HFS) experiences focused on common critical care situations (examples include but were not limited to cardiopulmonary arrest, respiratory distress and arrest, stroke- hemorrhagic and ischemic, trauma, and acute myocardial infarction).

Self-efficacy- "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p.3).

Chapter Two: Literature Review

The review of literature explored supporting educational theories in both general education and nursing education. A review of simulation usage in both education and nursing education was conducted. While the purpose of the research study was focused on the education of senior nursing students, the literature review was expanded to include the impact of the educational theories and the use of simulation in a variety of educational fields.

Critical care areas create an environment in which nurses need to quickly become experts in order to provide quality care to the sickest of patients; in these intensive care units, nurses operate with increased authority and autonomy as compared to non-specialized nurses (Fairman & Lynaugh, 1998). Critical care nurses (N = 431) were assessed for their perceived level of professional autonomy; the majority reported a moderate level of autonomy (67.9%), while 28.1% reported higher levels of autonomy (Iliopoulou & While, 2010). The autonomy reported by less experienced nurses was statistically significantly lower than that of more experienced nurses ($p < .001$) (Iliopoulou & While, 2010). Kramer and Schmalenberg (2008) reported that nurses need autonomy for patient safety and to prevent complications.

New graduate nurses are hired into critical care settings in acute care hospitals throughout the nation; however, education related to potential experiences and critical care skills and knowledge is limited (Proulx & Bourcier, 2008). Burnout and increased anxiety were reported by novice nurses in these areas, which were associated with a lack of confidence in their knowledge and skills (Casey, Fink, Krugman, & Propst, 2004). Nursing educators are charged with facilitating learning in the preparation of nursing students to function in the acute care setting as a professional registered nurse, and these settings include critical care units and emergency departments. One potential method for preparing nursing students may be through the increased exposure to critical care concepts and situations as seen in supervised clinical encounters and simulation experiences.

Theoretical Frameworks

The theoretical support for the study was based upon two educational theories and one nursing theory. Bandura's Social Learning Theory and Kolb's Experiential Learning Theory support the use of hands-on experiences as well as the team approach to learning situations. Bandura's and Kolb's theories work together as one's self-efficacy guides one's choice of experiences, and experiences create increased knowledge (Manolis, Nurns, Assudani, & Chinta, 2013). Benner's Novice to Expert Nursing Theory further established the use of repeated exposure to case studies and real life scenarios as beneficial to improving critical thinking, knowledge, and performance. Many nursing research studies related to simulation were completed with the use of these three theories (Kaakinen & Arwood, 2009). These three theories offer a strong foundation for the nursing student to improve knowledge, self-efficacy, technical skills, and critical thinking abilities.

Clinical courses implement all three theories in the use of HFS in training student nurses to care for future patients. While Benner's theory focused on the transition of nurses from novice to expert, the theories of Bandura and Kolb offer additional support to the use of individual and group simulations and clinical experience in which students care for critically ill patients. Each of these theories support and encourage learning technical skills and increasing knowledge through experiential learning opportunities. Research encourages nurse educators to use increased clinical encounters and simulation events to promote student learning, critical thinking, and clinical judgment (Abe, Kawahara, Yamashina, & Tsuboi, 2013; Beddingfield, Davis, Gilmore, & Jenkins, 2011; Miller, 2010).

Benner's Novice to Expert Nursing Theory

Benner's Novice to Expert Theory of Nursing Practice is a commonly employed model for nursing programs and nursing research (Kaakinen & Arwood, 2009). The theory supports the idea that nurses, or student nurses, advance from a novice to an expert through their classroom learning and their clinical and simulation experiences (Benner, Tanner, & Chesla, 2009). Benner's theory is based on the Dreyfus' Model of Skill Acquisition (Benner, 2001). Benner postulated that nurses, including nursing students, transition through five stages: novice, beginner, competent, proficient, and expert (Benner, 2001). Benner's theory supported the use of simulation exercises in nursing education, as HFS creates an environment in which students can transition from the novice stage to the beginner stage and, potentially, the competent stage.

Benner's theory is the basis of education in many nursing educational programs, including both pre-licensure programs as well as the training of experienced nurses. Through the understanding of Benner's theory, nurse educators, clinical faculty, and clinical preceptors assess at which stage a student is practicing both technical skills and critical thinking skills. As they acquire new experiences, both those observed and actively shared, they transition on the continuum from novice and move toward expert. The concept of observed experiences and participated experiences connect Benner's ideas with those of Bandura and Kolb respectively.

Bandura's Social Learning Theory

Bandura's Social Learning Theory states that behavior can be learned through observation (Miller, 2011). A student watching the actions of another learns to mimic those actions which receive praise, and learns to not repeat those that received admonishment (Miller, 2011). The student learns from modeling behaviors of the teacher or of classmates (Knowles, Holton, & Swanson, 2005).

Bandura’s Social Learning Theory presented four aspects of observational learning (Bandura, 1997).Transitioning from modeling behaviors to matching behaviors of observed experts allowed learners to improve in skills (Bandura, 1997). These four sub-functions are attentional processes, retention processes, production processes, and motivational processes (Bandura, 1997). These learning processes assist learners in determining which behaviors to model and which to avoid. Learners transition from an observer role to an active learner role through participation in the experience, and eventually, students gain a holistic understanding of the experience. Exposure to a situation in which a student observes others and compares his or her own performance against that observation can strengthen self-efficacy (Resnick, 2014).

Bandura (1984) indicated that students learn through observations and experiences. Observations lead to conditioned responses. Increased confidence in actions or lack of actions was an additional acknowledgment of the Social Learning Theory. As confidence increased, behavior, objectives, and outcomes altered (Bandura, 1984).

Bandura (1997) postulated that through observations, the cognitive knowledge of the learner was improved and that knowledge and competency in hands-on skills grew. Continued observation allowed the building of skills and the retention of knowledge and learned skill (Bandura, 1997). Once the retention process stage was complete, learners were able to reproduce modeled skills and adjust their actions as necessary to fit the situation (Bandura, 1997). Through intrinsic and extrinsic factors, learners must be motivated through a variety of incentives to continue the modeled behavior (Bandura, 1997). In nursing education, extrinsic incentives can include patient safety, success in the nursing profession, and acceptance within the profession. For nursing students, intrinsic incentives can include the desire to care for an ill individual, improve health in a community, and personal satisfaction for learning a difficult profession.

The Social Learning Theory was recognized in the clinical and simulation encounters as students observe classmates' success in scenarios as well as when they make mistakes. Through their observations, students learned positive behaviors as well as those behaviors to avoid. Bandura's Social Learning Theory supported the usage of simulation and experiences in group learning.

Bandura's Social Learning Theory has been the basis of many nursing studies over the past several years (Resnick, 2014). Social Learning Theory has been applied to patient education, patient behavior modification, and nursing education (Resnick, 2014). In nursing education, the theory has been the basis for teaching concepts such as medication administration competency (Sherriff, Burston, &Wallis, 2011), cardiovascular assessment skills (Jeffries, et al., 2011), and patient education (Darkwah, Ross, Williams, & Madill, 2011). Self-efficacy was shown to increase through direct and observed experiences as well as through the verbal encouragement of teachers (Robb, 2012). Improved academic scores were noted with students who had higher self-confidence (Kukulu, Korukcu, Ozdemir, Bezci, & Calik, 2013).

Kolb's Experiential Learning Theory

Kolb's Experiential Learning Theory extrapolates that learners gain greater understanding through the use of experiences. Experiences that promote learning can be simulated or real-life situations (Kolb, 1984). Critical thinking, knowledge, competence, and skills can be improved through the use of experiential learning (Kolb, 1984). Kolb (1984) stated that learning continues through experiences and is grounded in those experiences.

Experiential Learning Theory is another common model seen in nursing education research (Kaakinen & Arwood, 2009; Cant & Cooper, 2010). Kolb's theory supports simulation learning through the experiences and reflecting, examining, and tailoring the experience to benefit their personal needs (Lisko & O'Dell, 2010). In nursing simulation, students are faced with real-life situations which challenge their clinical judgment, clinical skills, and their confidence levels. The effects of HFS experiences affect the patient care provided in the hospital setting. Preparing in the simulation lab offers a safe environment to practice skills prior to entering the hospital (Cant & Cooper, 2010). Following Kolb's theory, nurse educators plan simulations similar to real-life situations and allow time for reflection and examination of the simulation in a safe location (Cant & Cooper, 2010).

All students can learn from their experiences in the simulation lab. Through their experiences, students at the novice level of any didactic skill can develop that skill in a safe, supportive environment (Luctkar-Flude, Wilson-Keats, & Larocque, 2012). Kolb's learning theory supports this concept. Experiences alter the viewpoint of a student as they learn through experiences both real and simulated (Kolb, 1984). Through experiences, learning is a continuous process that encourages interaction and adaptation leading to improved knowledge (Kolb, 1984).

Kolb's theory was based on the theories of Dewey, Lewin, and Piaget (Kolb, 1984). Kolb's Experiential Learning Theory indicated that learning is a process, which is continuous and allows for adaption to situations as individuals interact with their environment. Learning through simulated experiences allows learners to make use of a safe environment where mistakes will not harm real life outcomes.

Understanding the learning styles of nursing students, faculty enhanced the learning experience through adding simulation and clinical experiences to traditional classroom teaching. The second most preferred learning style among nursing students is the kinesthetic style, only preceded by the read/write style (Alkhasawneh, Mrayyan, Docherty, Alashram, & Yousef, 2008). Using the Kolb Learning Styles Inventory, Molsbee's (2011) study indicated that no one style was significantly favored by nursing students; however, the majority of students preferred the Active Experimentation (AE) learning mode, which is supported by increased exposure to patient scenarios both real and simulated.

Review of Literature for Clinical and Simulation

Current literature was retrieved from both education and nursing education research fields. Nursing education was the focus of clinical experiences; however, both nursing and general education were assessed for simulation based research. Pre-licensure as well as post-licensure education research was considered.

Many state boards of nursing do not indicate the required number of clinical hours for a undergraduate nursing program (MacIntyre, Murray, Teel, & Karshmer, 2009); however, in the state of Virginia, the Board of Nursing (BON) requires a minimum of 500 direct patient care hours (Virginia BON, 2012). Hours spent in direct client care hours must be supervised by qualified faculty (Virginia BON, 2012). Qualifications for faculty include maintaining an unencumbered Virginia Registered Nurse License, retaining licensure within the area practice occurs, and continuing professional competence through continuing education (Virginia BON, 2012). Clinical areas must include medical/surgical nursing, maternal-child nursing, psychiatric nursing, and community based nursing; critical care is not mentioned separately but could be considered as medical/surgical (Virginia BON, 2012).

Of the required 500 direct patient care hours, 20% may be completed in the simulation lab (Virginia BON, 2013). Simulation experiences should be directed by faculty or staff trained in simulation and should include a debriefing session (Virginia BON, 2013). Scenarios should encourage critical thinking and clinical judgment, and experiences should link knowledge or theory to patient care (Virginia BON, 2013).

The National Council of State Boards of Nursing (NCSBN) supported a longitudinal, multiple site study to assess the inclusion of simulation in pre-licensure nursing education and to determine how many hours of traditional clinical experiences could be replaced by simulation. The study completed by Hayden, Smiley, Alexander, Kardong-Edgren, and Jeffries (2014) took place over four year period and assessed ten sites across the United States. Incoming students were randomized into three groups: the control group with traditional clinical hours and little to no simulation, the 25% group which required 25% of clinical hours be replaced by simulation hours, and the 50% group which experienced a 50% replacement of traditional clinical hours by simulation (Hayden, et al., 2014).

Hayden, et al. (2014) assessed students throughout their program in each clinical course. Post-graduation, new graduates completed self-assessments and were assessed by nurse managers at specific intervals (Hayden, et al., 2014). Overall, manager assessments discovered no significant difference at the six month interval among all three group for knowledge and competency, nor was there a statistically significant difference in their readiness for practice (Hayden, et al., 2014). Students of the 50% simulation group did self-assess a statistically significant (p = .033) higher score for readiness for practice at the six month interval (Hayden, et al., 2014). One third of participating new graduating nurses reported working in critical care areas (Hayden, et al., 2014). The study results indicated that up to 50% of traditional clinicals could be replaced by simulation experiences if managed by trained and experienced faculty and laboratory staff (Hayden, et al., 2014).

The combination of direct patient care clinical hours and simulation hours is used in nursing education. Simulation based learning and traditional clinical based learning resulted in growth of knowledge (Schlairet & Pollock, 2010). While all students improved in knowledge, the gain in knowledge learning was shown to be statistically equal between simulation learning and clinical learning (Schlairet & Pollock, 2010). Students who participated in clinical then simulation experiences scored statistically equivalent in knowledge gain to those who participated in simulation then clinical experiences (Schlairet & Pollock, 2010).

Self-efficacy in nursing research has been seen to improve through experiences. Increased self-efficacy affected performance behaviors (Robb, 2012) improved clinical skills (Bambini, Washburn, & Perkins, 2009), and influenced professional development (Gloudemans, Schalk, Reynaert, & Braeken, 2013).

Clinical Experiences

Clinical training for nursing students is a traditional method of teaching technical skills as well as necessary competencies in critical thinking and communication. Clinical experiences in nursing school include exposure to many areas. These educational settings include general nursing units as well as specialty areas, such as pediatrics, maternal areas, and critical care. Nursing education, including clinical, is structured to create a “generalist nurse” (American Association of Colleges of Nursing, 2009, p.2). A generalist nurse is one that can function at a basic level, but he or she is not yet prepared through experience and knowledge to care for patients in a more complex care setting.

Clinical educational experiences can create stress in some students. Changiz, Malekpour, and Zargham-Boroujeni (2012) reported five themes related to clinical experiences stress in their systematic literature review of 15 original research studies. These themes concluded that students’ stress was related to clinical competency, ability to care for patients, faculty expectations, relationships, and the clinical environment (Changiz, et al., 2012).

Carlson, Crawford, and Contrades (1989) used Benner's theory in a pre-licensure nursing course. As student nurses interacted with expert nurses, they often expressed an inability to see their own progression along the Benner continuum (Carlson, et al., 1989). Through self-reflection, nursing students used Benner's stages of proficiency to determine their ranking in various clinical experiences (Carlson, et al.1989). Reflections indicated that students saw increased skills and rankings based on their experiences (Carlson, et al., 1989).

Niederhauser, Schoessler, Gubrud-Howe, Magnussen, and Codier (2012) used Benner's model to create a new educational framework to expand opportunities for learning. Working with essential stakeholders (hospitals, bedside nurses, and nursing faculty and students), the authors created teams to make use of HFS and computer technology to improve several aspects of the student clinical experience (Niederhauser, et al., 2012). The research included 15 Hawaiian hospitals and over 500 individuals who used avatar programs and HFS. Researchers, along with teams of practicing nurses and managers, implemented changes to clinical sites through the encouragement of bedside nurses involvement in the clinical education of students. These changes produced an improvement in the students' technical skills and critical thinking abilities (Niederhauser, et al., 2012). Collaboration between academia and clinical practitioners improved the teamwork between the two, resulting in improved experiences for the student (Niederhauser, et al., 2012).

Clinical experiences can be unstructured, leaving students with uncertainties regarding what material was most important to learn (Gloudemans, et al., 2013). Nursing schools reported a lack of clinical site availability (60.8%) which prevented the acceptance of qualified nursing students (Robert Wood Foundation, 2011). Though clinical experiences in nursing programs are a core component of nursing education, clinical nursing education has many weaknesses, such as poor a relationship between healthcare facilities and nursing programs or faculty members as well as clinical teaching practices not supported by research (MacIntyre, et al., 2009).For these reasons and others, many schools of nursing are incorporating simulation experiences into undergraduate nursing education.

In addition to a lack of available clinical spaces, Stayt and Merriman (2013) reported that the enhancement of some clinical skills may not occur in the acute care setting, and in fact, for many students, clinical skills were never completed in a clinical setting prior to graduation. This may indicate that some graduates are not prepared to work in the acute care setting of hospitals (Stayt & Merriman, 2013). High Fidelity Simulation may one method to better meet the needs of students who are unable to complete tasks and establish competency in the clinical setting.

In some clinical experiences, student nurses' perceptions of the supervisory model affected their learning (Sundler, et al., 2014). Common practice is for clinical faculty and students attend to the care of patients with the oversight and participation of the patient nurse. Students indicated better learning and higher comfort when assigned to a specific preceptor who knows them and serves as an attachment figure (Sundler, et al., 2014). In the current study, participants were assigned to one preceptor in the critical care setting which allows them to learn skills and critical thinking from an expert in that nursing practice area.

Practicing nurses perceived that student nurses are a great benefit to the clinical setting. Lusk, Winne, and DeLeskey (2007) reported that unit nurses believed that the influences of student nurses and their clinical faculty were positive to the work environment. Student nurses encouraged staff nurses to continue learning and motivated them in critical thinking, while clinical faculty members served as a mentor and a resource for knowledge and skills (Lusk, et al., 2007). One challenge mentioned by Lusk, et al. (2007) was the stress placed on bedside staff nurses to teach students and indicated that when high-acuity patient care was needed, nurses' stress and frustration increased when explaining details to the student nurses. If increasing simulation for critical care concepts and skills showed improved knowledge and self-efficacy, bedside nurses' perceptions of student nurses may be improved, increasing the nurses' willingness to work with and teach student nurses.

Nurses serving as coaches in the clinical setting work with nursing students help to close the gap between theory and practice. Nurses in specialty areas were statistically (p = .043-.001) more likely to perceive nursing students as more poorly prepared for their clinical experience than their counterparts in medical/surgical units (Hallin & Danielson, 2009). Simulation related to critical care patient care may assist in improving this perception of students in specialty nursing units.

Students in specialty areas (such as renal dialysis and oncology) expressed a lack of "knowledge and preparation" when entering these highly specialized areas (Coyne & Needham, 2012, p. 100). While students expressed feeling welcome on the specialty units, they also communicated a higher level of stress due to the fast paced nature of the care delivered (Coyne & Needham, 2012). Team work was experienced by both groups (students as well as staff nurses) which led to better learning (Coyne & Needham, 2012). While these specialty areas are not considered critical care or emergency service patient care areas in nature, high-acuity patients with high volume of clinical skills and tasks are required in both settings.

In addition to knowledge and critical thinking, training in an interprofessional team can also increase self-efficacy (Norgaard, et al., 2013). Through clinical learning, self-efficacy was noted to improve (Gloudemans, et al., 2013). The professional identity of the student nurse transforms through the clinical experience (Gloudmans, et al., 2013). Townsend and Scanlan

(2011) identified a relationship between self-efficacy and clinical performance of nursing students.

Simulation Experiences

Simulation, from simple models to high fidelity manikins and sophisticated technology, has been present since the late 1800s (Nehring & Lashley, 2009). As early as 1874, skeletons and basic manikins were recommended for student nurse training, and later in 1919, the Committee of Education of the National League of Nursing Education (presently the National League of Nursing) offered educators a thorough list of necessary equipment for student nurse training (Nehring & Lashley, 2009). These basic tools were used to help with task training, such as bandage placement and removal, care of stomas and wounds, and insertion of urinary catheters as well as intravenous needles (Nehring & Lashley, 2009). Initial manikins or dummies were static and offered little life-like appearance and movement of real patients.

Role playing was introduced in the 1980s and 1990s in diverse clinical settings as an adjunct to faculty lectures over the next decades (Nehring & Lashley, 2009). Various clinical settings used as a basis for role play included the community, the home, and care for families (Nehring & Lashley, 2009). Role playing was basic simulation skills for communication training and could be used to train students in empathy (Nehring & Lashley, 2009). Little outcomes research was published with the use of role playing (Nehring & Lashley, 2009).

Games were introduced into nursing education in order to improve critical thinking and decision making. However, only one study was published to support its use in training student nurses in clinical judgment and decision making (Nehring & Lashley, 2009). While some studies appeared to indicate some benefits, Nehring and Lashley (2009) reported that little research was conducted to support the use of gaming during its early inception. Gaming scenarios lead to computer assisted simulations.

Computer assisted simulations were used in many nursing programs with undergraduate curriculum (Nehring & Lashley, 2009). Giddens (2007) created a computer assisted simulation to help teach family and community care, which offered students learning opportunities in dealing with diverse community situations. In 2002, Ravert published that two thirds of published research on computer based simulation indicated positive outcomes on knowledge or skill for undergraduate nursing students.

As simulation became a common idea for nursing schools, high fidelity simulation (HFS) capabilities became more widespread. The increase in simulation labs and centers created more opportunity for research related to simulation. Katz, Peifer, and Armstrong (2010) reported that 78.9% Baccalaureate nursing programs of the responding 78 schools of nursing indicated the use of simulation in their fundamental clinical nursing courses. Only 31% of responding schools of nursing reported using HFS in more than half their courses (Katz, et al., 2010). During their study, only 18 (23%) reported the replacement of actual clinical hours by simulation (Katz, et al., 2010). As mentioned previously, existing standards in the state of Virginia, where the current study was conducted, up to 20% of clinical hours can be replaced by simulation hours when managed by trained and experienced simulation lab faculty and staff (Virginia BON, 2012).

The role of simulation in nursing education has been assessed in many studies. Confidence and competence were noted to improve as a result of HFS exercises with undergraduate and graduate nursing students (Yuan, Williams, & Fang, 2012). Implementing simulation in nursing education is essential as the population of nurses ages (Miller, 2010) and the shortage of nurse faculty increases (Miller, 2010; MacIntyre, Murray, Teel, & Karshmer, 2009), as well as in the decrease of appropriate clinical sites availability (MacIntyre, et al., 2009; McCallum, 2007; Henneman & Cunningham, 2005). Increased emphasis on patient safety also encouraged the use of simulation in nursing education, where potentially harmful errors can be corrected or prevented (Bambini, Washburn, & Perkins, 2009; Kaddoura, 2010; Henneman & Cunningham, 2005). Simulation should be integrated with the traditional patient care clinical nursing education (Tanner, 2006).

Students can overestimate their knowledge and skills prior to simulated experiences; however, following the experience, their weaknesses can be revealed in their personal assessment (Cardoza & Hood, 2012). Increased exposure to simulated experiences has been shown to improve the self-efficacy of student nurses as well as the transference of knowledge from past experiences to future ones (Cardoza & Hood, 2012). Through additional exposure to simulation, students gain self-efficacy (Roh, Lee, Chung, & Park, 2013) and knowledge (Beddingfield, Davis, Gilmore, & Jenkins, 2011). Simulation experiences also help students and their faculty to determine gaps in knowledge (Corson, 2015).

Simulation in education. Bandura's Theory of Social Learning has been used in a variety of educational settings. The fields of informational technology, business management, and leadership training use simulation, as it is supported by Bandura's theory. Learning through observing the actions of others is effective in improving self-efficacy (Chou & Wang, 2000; Thompson & Doss, 2000; Bandura & Wood, 1989).

In informational technology, Chou and Wang (2000) researched the use of social learning theory on 10^{th} grade students (*N* = 108) who learned how to design web-based homepages. The assessment of various training techniques indicated that behavior modeling through observation improves self-efficacy (Chou & Wang, 2000). This observed learning experience connects to both Kolb and Bandura.

Tompson and Dass (2000) studied the differences between the usage of simulations and the review of case studies on a sample of 252 students and their self-efficacy as related to business strategic management. Prior to the beginning of the semester, senior undergraduate students were given a pretest to assess their self-efficacy (Tompson & Doss, 2000). Students were randomly enrolled in two classes; one class taught using case studies and the other with computer-based simulations (Tompson & Doss, 2000). The differences in teaching methods were significant ($p < .01$), indicating that simulation increased a student's self-efficacy significantly more than case studies (Tompson & Doss, 2000).

In business, Bandura and Wood (1989) assessed self-efficacy as related to the subjects' perceived sense of control over a situation. Through ANOVA testing, controllability did significantly increase self-efficacy [$F(1, 56) = 5.88$, $p < .02$] (Bandura & Wood, 1989). The less subjects perceived controllability, the less their expressed self-efficacy (Bandura & Wood, 1989). Bandura and Wood (1989) concluded that in business settings, when leaders sensed they controlled the situations, they expressed higher self-efficacy scores.

Bandura's theory was the basis for training of global business individuals who sought to improve their cultural intelligence (Ng, Dyne, & Ang, 2009). Noting that individuals with higher self-efficacy initiate tasks promptly, show more perseverance, and higher performance, Ng, et al. (2009) suggested that leaders seeking success in international situations must hold certain cultural intelligences. Higher self-efficacy scores related to intrinsic and extrinsic motivators for cultural intelligence increase opportunities for success (Ng, et al., 2009).

Wong, Lau, and Lee (2012) researched the effects of experiential learning on self-efficacy for 180 Chinese adolescents when exposed to leadership and service training. Quantitative data indicated that the control group's mean score increased 0.26 for self-efficacy; however, the increase was statistically significant among female students at $p = .043$. Though this study indicated statistical significance in self-efficacy improvement, further research was suggested to determine if experiential learning can positively influence self-efficacy in various fields.

Hanna, Crittenden, & Crittenden (2013) related Bandura's theory to learning and modeling ethical behaviors. Collecting data from 115 undergraduate institutions in 36 countries, the researchers determined that the unethical behaviors of leaders increased unethical behaviors reflected in students, across various cultural backgrounds and social drivers (Hanna, et al., 2013). Behaviors of students could be consistently linked to the behaviors of their role models (Hanna, et al., 2013). This result indicated that educators and clinical supervisors can serve as role models allowing students to model their behavior.

Kolb's Learning Theory was applied to many different educational venues. The role of experiential learning has been seen in agricultural education (Baker, Robinson, & Kolb, 2012), accounting (Wilson & Hill, 1994), and mechanical engineering (Muscat & Mollicone, 2012). In healthcare, nursing schools (Kaakinen & Arwood, 2009) and medical schools (Breaud, et al., 2012) use Kolb's theory. The hands-on learning experienced through the use of Kolb's theory is useful in gaining technical skills and knowledge.

Kolb's theory was used in multiple research studies assessing the education of accountants (Wilson & Hill, 1994). Multiple studies conducted supported the use of simulation or learning experiences for the improvement of skill and knowledge (Wilson & Hill, 1994).

Kolb's theory outlined the positive learning effects of a concrete experience as well as observation (Kolb, 1984). Curricula should include a variety of learning experiences to include experience, observation, and reflection (Wilson & Hill, 1994). Simulation incorporates learning strategies which include concrete experiences as well as observation (Beddingfield, et al., 2011).

Abdulwahed and Nagy (2009) created a simulated learning experience in a laboratory setting. Hands-on sessions were created based on Kolb's theory (Abdulwahed & Nagy, 2009). The analysis of the quantitative data indicated that learning outcomes were significantly different from a mean of 40.0 in the control group to a 73.9 in the experimental group ($p < .002$) (Abdulwahed & Nagy, 2009). This study indicated that students who participated in hands-on learning opportunities improved skills.

Mechanical engineering frequently changes due to technological advances, similarly to healthcare. Muscat and Mollicone (2012) indicated that 17.7 % of engineering students reported a preference for active experimentation, and 59.7% favored a concrete learning experience. Though the *n* was not presented in the study, greater than 75% preferred a more hands-on approach to learning that is experienced in a simulation lab.

Breaud, et al. (2012) developed a medical school simulation center supported by Kolb's Experiential Learning Theory. In an attempt to train medical students to perform surgical procedures, faculty implemented simulation of reality-based experiences to improve learning outcomes (Breaud, et al., 2012). The simulation center maintained audio-visual demonstrations, HFS manikins, and simulators for basic and advanced surgical procedures, as well as laparoscopic procedures (Breaud, et al., 2012). The implementation of simulation resulted in successful technical ability and improved team work (Breaud, et al., 2012). The authors also reported that student participants expressed that simulation would positively impact their profession with a score of 8.85 average out of a possible 10 (Breaud, et al., 2012).

Simulation in nursing education. Several aspects of nursing knowledge and self-efficacy have been shown to develop as the result of simulated exercises. Critical thinking and clinical judgment showed improvement as a result of HFS (Kaddoura, 2010; Kaakinen & Arwood, 2009; Bambini, et al., 2009; Cant & Cooper, 2009; Corbridge, et al, 2008) as did confidence (Yuan, Williams, & Fang, 2011). Studies reported enhanced understanding of critical care knowledge (Kaddoura, 2010; Cant & Cooper, 2009) and examination performance (Beddingfield, et al., 2011). Improved clinical skills as well as a decrease in the gap between theory and practice was recognized (Kaddoura, 2010). The growth of leadership (Kaddoura, 2010), communication skills (Bambini, et al., 2009), and delegation skills (Kaddoura, 2010) was linked to highly complex simulation scenarios and the following review of the event. In maternal-newborn simulations, confidence in clinical abilities to assess vital signs ($p < .01$), breasts ($p < .01$), fundus ($p < .001$), and lochia ($p < .001$) were all seen to statistically improve (Bambini, et al., 2009). Hayden et al. (2014) reported that simulation was effective in the training of pre-licensure registered nursing students, and their data indicated that up to 50% of clinical hours could be replaced by quality simulation experiences.

With the growth of technology, nursing educational programs use simulation as an adjunct to traditional teaching. Adding simulation to lecture brought a statistically significant change in students' self-efficacy for post-operative care ($p = .002$), caring for a child with a urinary tract infection ($p = .033$), caring for a patient with a hip replacement ($p = .031$) and caring for a patient with congestive heart failure ($p = .001$) (Sinclair & Ferguson, 2009).

A mixed-method study using Benner's theory supported the use of HFS in the preparation of nursing students in pediatric courses (Mahoney, Hancock, Iorianni-Cimbak, & Curley, 2013). Citing student concerns about working in the pediatric setting, the researchers used HFS to link theoretical concepts with clinical actions and emphasized clinical judgment (Mahoney, et al., 2013). Participants included traditional and non-traditional nursing students in a four-year program during their pediatric course (Mahoney, et al., 2013). Simulation experiences focused on physical examinations, prioritization of care, and communication which resulted in positive qualitative data in which students expressed satisfaction with the process as well as improved critical thinking skills (Mahoney, et al., 2013).

Traynor, Gallagher, Martin, and Smyth (2010) created scenarios based on Benner's theory. Their scenarios were designed for the use of HFS in a laboratory setting (Traynor, et al., 2010). Through the implementation of HFS scenarios followed by faculty debriefing, students reported improvements in self-confidence and competence related to highly skilled nursing tasks (Traynor, et al., 2010). Quantitative data indicated that 85.6% showed improved organizational skills, and 81% of the students agreed that the simulated exercises improved their confidence (Traynor, et al., 2010). The qualitative results also revealed that once the simulation began, students quickly forgot they were in a simulated exercise and began to feel as though they were working with real patients (Traynor et al., 2010). Outcomes showed students improved along the Benner stages based on simulation experiences. Acquired skills transitioned from newly acquired abilities to honed skills through experiences.

Improved competence and knowledge of complex issues was seen in various studies. Corbridge, et al. (2008) tested the use of simulated complex patient scenarios with graduate nursing school students. Using a pretest-post-test method, results indicated that students performance improved statistically significant ($p < .01$) based on the number of hours they were exposed to the various scenarios (Corbridge, et al., 2008). Cant and Cooper (2010) reported a systematic review of simulation which reported that 12 studies showed improvement in student knowledge base when simulation was used. Luctkar-Flude, Wilson-Keates, and Larocque, (2012) reported statistically significant improvement in practice behaviors with the use of HFS. Competency proved to be a positive outcome with hands-on simulation practice (Cholewka & Mohr, 2009). Kaddoura (2010) described advanced communication skills and delegation skills. Competence in these technical skills improved with the use of HFS.

Patient education is essential in the field of nursing; therefore, nursing students must learn how to teach patients about disease processes and potential complications and treatments. In addition to teaching, students must also develop nursing action plans for care based on the effects of a disease process. Simulation and increased clinical hours have been used to improve students' abilities and self-efficacy related to patient teaching. Increased exposure to information related to health promotion and disease prevention improved student self-efficacy (Darkwah, Ross, Williams, & Madill, 2011). Simulation has proven to improve student self-efficacy related to disease specific education for hypertension (Sohn, Ahn, Lee, Park, & Kang, 2013) and education related to sexual dysfunction (Sung &Lin, 2013).

Beddingfield, et al. (2011) studied the importance of HFS on examination outcomes. Their quasi-experimental study used a posttest to compare two groups (traditional laboratory experience with simulated patients and HFS laboratory experience) (Beddingfield, et al., 2011). Nonparametric statistics were used to assess the quantitative data (Beddingfield, et al., 2011). This study showed no significant difference ($p < .01$) between students exposed to HFS and those exposed to actor portrayed simulated patients. Though no difference was noted between

HFS and actor portrayed simulation group examination results, this study indicated that experiences in both methodologies showed statistically significant improvement over students who did not participate in any form of simulation (Beddingfield, et al., 2011).

The use of HFS promoted learning in undergraduate nursing students (Roh, 2014; Cant & Cooper, 2010; Reilly & Spratt, 2007). Reilly and Spratt (2007) reported students perceived enhanced skills and confidence with the use of simulation exercises. In a focus group interview study, students reported that simulation encouraged active learning and improved confidence and competence (Reilly & Spratt, 2007). Cant and Cooper (2010) supported the use of simulated activities stating that simulation improved “knowledge, critical thinking ability, satisfaction or confidence” (p. 3). HFS was determined to be an effective learning tool (Cant & Cooper, 2010). Simulation improves learning, retention, and outcomes (Cant & Cooper, 2010). When HFS was compared to medium fidelity simulation, students in the HFS group reported higher self-efficacy levels in resuscitation training (Roh, 2014). Increased self-efficacy was suggested to be a predictor for student success in the clinical setting (Oetker-Black, Kreye, Underwood, Price, & DeMetro, 2014).

Simulation used in critical care education has shown positive results as well in both confidence and competence. Kaddoura (2010) completed a qualitative research study with participants from a graduate nursing program. Their perception resulted in three main themes: “just-in-time learning of cognitive and psychomotor skills”, “fostering critical thinking and leadership skills through feedback on simulation”, and “safety in nonthreatening learning environment” (Kaddoura, 2010, p. 510). Simulation proved to positively influence learning and developing critical thinking skills.

Corbridge, et al. (2008) completed a pretest-posttest quantitative study which reviewed the use of simulation with graduate nursing students. Students of a Chicago area university (N = 7) in an acute care nurse practitioner program participated in a HFS experience lasting over two hours (Corbridge, et al., 2008). The students were presented with a patient scenario which consisted of a diagnosis pneumonia and shock (Corbridge, et al., 2008). Their study indicated an statistically significant increase in the mean scores for knowledge (p = .019) (Corbridge, et al., 2008).

Quantitative and qualitative research supported increased confidence levels related to managing patient care. Self-perceived confidence levels of students were enhanced after participation in simulation through an interview process (Reilly & Spratt, 2007). Confidence levels in the care of patients who were ventilated were noted to improve statistically significantly at p = .031 when a Likert scale was applied to assess their confidence (Corbridge, et al, 2008). Additionally, participants increased in confidence levels of their ability to manage a patient in circulatory shock (p = .007) (Corbridge, et al, 2008). Supporting student self confidence levels is important in their preparation towards working with patients in the acute care setting (Casey, et al., 2004).

Through coordinated, directed, and interactive simulations, groups learn as a whole and individually (Burke & Mancuso, 2012). As students participated in more experiences, simulations advanced in complexity, which promoted continued learning. Responding to the emotional tone of simulated experiences, students learned when they were actively involved in the simulation as well as when observing simulations performed by others (Burke & Mancuso, 2012). Burke and Mancuso (2012) applied the Social Learning Theory to nursing students of a two-year associate degree program. In all clinical semesters, faculty promoted learning with the use of increasingly difficult clinical simulation experiences (Burke & Mancuso, 2012). Following simulation with a debriefing session improved students' understanding and skills in future simulations (Burke & Mancuso, 2012). Mastery of communication, assessment skills, and technical skills necessary to nursing were accomplished through the implementation of simulation throughout the program (Burke & Mancuso, 2012). Nurse educators and nursing schools choosing to implement a simulation program across all levels of the curricula would expect to see improvement in final outcomes of knowledge, skill, and critical thinking.

While much of the research indicates that confidence and competence is improved with simulation usage, some research results report the opposite. According to Yuan, Williams, and Fang (2012), a review of 24 quantitative research studies does not support the acceptance of HFS nearly as strong as qualitative research results. Quantitative studies did not yield statistically significant difference in self-efficacy and competency (Yuan, et al., 2012). Beddingfield, et al. (2011) also indicated that the support for HFS is not statistically significant at the $p < .05$ level for examination improvement when compared to the use of real patients.

Research reviewed suggested that further research, specifically quantitative research, must be done to determine the significance of HFS on confidence, self-efficacy, and knowledge (Beddingfield, et al., 2011; Cant & Cooper, 2010; Corbridge, et al, 2008; Kaakinen & Arwood, 2009; Kaddoura, 2010; Yuan, et al., 2012). Leigh (2008) and Kaddoura (2010) also suggest that more research is needed in the area of simulation and its impact on student nurses and, eventually, on the larger nursing practice.

Simulation in critical care nursing education. Nurse educators working with nurses at the bedside in acute critical care units also make use of simulation as a training technique. Repeated experiences with simulations were proven to increase technical competency as well as teamwork skills (Abe, Kawahara, Yamashina, & Tsuboi, 2013). Using four critical care based simulations (bleeding, tachycardia, chest pain, and bradycardia) followed by a debrief for each group caused an increase in mean scores approximately 11 points over a six month period (Abe, et al., 2013). Both knowledge and confidence were seen to increase (Abe, et al., 2013). Additionally, this study was conducted with nurses actively working in a hospital setting; the proposed research will be conducted on nursing students. Though outcomes may differ slightly, similar differences would be expected among pre-licensure nursing students.

Delac, Blazier, Daniel, and N-Wilfong (2013) reported improved time to response and improved confidence as a result of in-situ mock code simulations and video debriefing. Practicing nurses at the bedside showed improvements in knowledge and confidence as well as improved patient outcomes through the use of simulation training on cardiopulmonary arrest (Delac, et al., 2013). Nurses who participated in cardiopulmonary resuscitation training in both computer-based and simulation-based scenarios reported satisfaction (Roh, Lee, Chung, & Park, 2013). Self-efficacy levels were shown similar between computer-based simulation and HFS lab simulation methods (Roh, et al., 2013).

As novice nurses are entering into the ICU setting with little to no previous nursing experiences in this area other than that training received in their primary nursing education, hospitals are faced with challenges of training competent nurses who can function well in a high-stress, high-acuity patient care environment. Safe patient care is a common concern of hospitals that employ new graduate nurses in acute care areas (Henneman & Cunningham, 2005). Taking into account the impact of experience on knowledge and confidence, observational experiences (similar to a job shadowing) make use of Bandura's and Kolb's theories as new nurses observe experienced nurses caring for patients (Messmer, Sande, & Taylor, 2004).

Summary

In conclusion, clinical experiences and simulation are commonly seen as a topic of research studies in various nursing education settings. Both undergraduate and graduate nursing education programs and the education of practicing critical care nurses make use of simulation and direct patient care clinical experiences to promote knowledge, competency, and self-efficacy. Simulation and clinical experiences have been shown to enhance teamwork and communication skills; however, a gap has been recognized: teaching undergraduate nursing students critical care skills with HFS simulation in addition to clinical hours spent in direct patient care and the effect of the number of hours spent in these settings.

Though most of the reviewed literature is focused on the practicing nurse or other professions, the researcher hypothesized that the outcomes may be similar in the study population. The proposed research study assessed undergraduate nursing students and their knowledge and self-efficacy of critical care concepts. Participants assisted in direct patient care clinical experiences in a critical care setting they chose and participated in faculty-directed complex, critical care based simulation scenarios.

For this current study, critical care clinical hours were hands-on patient care hours. Clinical hours were supervised by bedside nurses who were proficient or expert nurses in their specialty. Each student was supervised by a single preceptor. Simulation hours were completed in a high fidelity simulation lab dedicated to critical care simulations. Small groups of students were observed by expert critical care nurses, and simulation cases were based on common critical care scenarios. These guidelines were supported by the literature review studies for clinical and simulated experiences.

Chapter Three: Methodology

Introduction

As graduate nurses are entering into the workforce of critical care and emergency departments, nurse educators must work to prepare them for the role transition. While many schools of nursing offer minimal exposure to critical care patient populations, theory indicates that increased experiences (both personal and observed) increase self-efficacy and knowledge. This study sought to examine the predictive correlation of critical care clinical hours and simulation hours on both critical care self-efficacy and knowledge variables through a non-experimental multiple regression analysis with a convenience sample of senior level nursing students at a large, private, faith-based university in central Virginia. Knowledge was assessed by the Basic Knowledge Assessment Test-8 (BKAT-8). Self-efficacy was measured by the Nursing Student Self-Efficacy Scale (NSSES). Both instruments focus on aspects of critical care nursing. Chapter three includes information on term definitions, research questions, hypotheses, participants, research setting, instrumentation, procedures, and data analysis.

Definitions

For the purpose of this study, the following definitions were used. Self-efficacy was defined by Bandura (1997) as “beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (p. 3). Knowledge was defined by Toth (2012) as “information that is necessary for entry into critical care nursing and represents the foundation for job performance” (para. 1).

Critical Care Areas included the Intensive Care Units (ICU) (Medical, Surgical, Trauma, Cardiovascular, Burn, and Neurological) as well Emergency Departments (Trauma Levels I and II). Critical Care Clinical hours were defined as the time spent in hands-on patient care in a critical care area or emergency department under the supervision of a practicing registered nurse familiar with the unit and the patient population. These registered nurses served as a preceptor or clinical coach.

Critical Care Simulation hours included hands-on High Fidelity Simulation (HFS) experiences focused on critical care situations (examples included, but were not limited to, cardiopulmonary arrest, respiratory distress and arrest, stroke- hemorrhagic and ischemic, trauma, and acute myocardial infarction). Simulation scenarios were created by critical care experienced nursing faculty and were used each semester from 2010 to 2015. Critical care faculty assessed the participants based on communication, knowledge, and skills focused on essential elements of the American Heart Association’s (AHA) Advanced Cardiac Life Support (ACLS) classes. During simulation scenarios, groups consisted of between six and eight participants. The faculty-led scenarios were not video recorded, but a focused debriefing following each exercise did take place. At the end of the semester, students participated in an ACLS course proctored by an AHA ACLS instructor who was unknown to the students; no students failed the course indicating that they understood the elements of life-saving skills and knowledge.

Research Design

This study’s design was a non-experimental, predictive correlational design, which sought to understand if a predictive relationship existed between the predictor variables of critical care clinical hours and simulation hours with the criterion variables of knowledge and self-efficacy as related to critical care patient care. As a lack of research exists on these potential relationships, the correlational design was appropriate (Gall, Gall, & Borg, 2009). A hierarchical multiple regression was completed to assess the contribution of each variable as related to knowledge as assessed by the Basic Knowledge Assessment Test-8 (BKAT-8) and as related to self-efficacy as measured by the Nursing Student Self-Efficacy Scale (NSSES).

A review of literature was performed on the Summon Database as well as other databases such as EBSCOhost and Google Scholar. Key words included: self-efficacy, knowledge, critical care, nursing student, simulation, clinical experience, nursing education, pre-licensure nursing, nursing student self-efficacy, nursing student knowledge, high fidelity simulation, critical care nursing, and critical care training. After a thorough review of the literature, the researcher concluded that most research related to pre-licensure nursing education did not include education which pertained to critical care nursing. The literature review also resulted in an inadequate number of studies related to the self-efficacy and knowledge of the pre-licensure nursing student when considering critical care nursing. Additionally, the NSSES and the BKAT-8 have not been utilized together to assess this population. Should a relationship be determined by the data, further research was necessary in order to understand the effects of clinical hours and simulation hours on self-efficacy and knowledge.

Criterion variables included self-efficacy (NSSES score) and knowledge (BKAT-8 score). Predictor variables included critical care clinical hours and simulation hours. To control for confounding variables, covariates included gender, age, ethnicity, grade point average, prior acute care experience, and preferred initial job placement. As little is known of this population as related to critical care nursing education, this data will add additional information. Hierarchical regression was used.

The convenience sample consisted of senior level nursing students at a private university located in Virginia. Due to course structure, alignment of simultaneous clinical and simulation experiences, and requirements of the nursing program, the researcher was unable to separate control for clinical or simulation individual impact.

Research Questions

RQ1: Do hours in critical care clinical experiences and hours in simulation encounters significantly predict explicit knowledge as measured by the Basic Knowledge Assessment Test-8, while controlling variables for gender, age, ethnicity, grade point average, prior acute care experience, and preferred initial job placement?

RQ2: Do hours in critical care clinical experiences and hours in simulation encounters significantly predict self-efficacy scores as measured by the Nursing Student Self-Efficacy Survey, while controlling variables for gender, age, ethnicity, grade point average, prior acute care experience, and preferred initial job placement?

Research Hypotheses

H_1: Gender, age, and ethnicity do significantly contribute to knowledge as measured by the Basic Knowledge Assessment Test-8.

$H0_1$: Gender, age, and ethnicity do not significantly contribute to knowledge as measured by the Basic Knowledge Assessment Test-8.

H_2: Grade point average and prior acute care experiences do significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8.

$H0_2$: Grade point average and prior acute care experiences do not significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8.

H_3: Participant’s preference for initial job placement does significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8.

$H0_3$: Participant's preference for initial job placement does not significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8.

H_4: Hours of critical care clinical experiences and hours in simulation encounters do significantly contribute to knowledge according to the Basic Knowledge Assessment Test- 8.

$H0_4$: Hours of critical care clinical experiences and hours in simulation encounters do not significantly contribute to knowledge according to the Basic Knowledge Assessment Test- 8.

H_5: The combination of gender, age, ethnicity, grade point average, prior acute care experience, preference for initial job placement, hours in critical care clinical experiences, and hours in simulation encounters does significantly predict knowledge according to the Basic Knowledge Assessment Test-8.

$H0_5$: The combination of gender, age, ethnicity, grade point average, prior acute care experience, preference for initial job placement, hours in critical care clinical experiences, and hours in simulation encounters does not significantly predict knowledge according to the Basic Knowledge Assessment Test-8.

H_6: Gender, age, and ethnicity do significantly predict self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

$H0_6$: Gender, age, and ethnicity do not significantly predict self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

H_7: Grade point average and prior acute care experiences do significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

$H0_7$: Grade point average and prior acute care experiences do not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

H_8: Participant's preference for initial job placement does significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

$H0_8$: Participant's preference for initial job placement does not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

H_9: Hours of critical care clinical experiences and simulation encounters do significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

$H0_9$: Hours of critical care clinical experiences and simulation encounters do not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

H_{10}: The combination of gender, age, ethnicity, grade point average, prior acute care experience, preference for initial job placement, hours in critical care clinical experiences, and hours in simulation encounters does significantly predict self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

$H0_{10}$: The combination of gender, age, ethnicity, grade point average, prior acute care experience, preference for initial job placement, hours in critical care clinical experiences, and hours in simulation encounters does not significantly predict self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

Setting

The study site was a university within the central region of Virginia. The university consisted of 12,600 residential students as well as over 90,000 online students. The Residential Nursing program claimed over 500 accepted nursing students (Personal Communication, D. Britt, Dean). The undergraduate nursing program was accredited by the Commission on Collegiate Nursing Education (CCNE) and approved by the Virginia State Board of Nursing

(Liberty University, 2014). The study site was a Christian university, which required students to participate in religious courses and weekly convocation (Liberty University, 2014).

This site was chosen for several reasons. First, the university's School of Nursing (SON) offered different levels of critical care exposure to students as necessary for this study. Secondly, the influences of external factors, such as faculty diversity in experience, pedagogy, and philosophy, university and departmental philosophy, and clinical and simulation practices, were controlled with the use of one study site. Additionally, students at this university were from every state of the United States as well as 95 international countries (Liberty University, 2014), which increased the ability to consider student diversity and generalizability of data outcomes.

Students in the undergraduate program received between 800 and 900 direct patient care hours (Personal Communication, D. Britt, Dean). This amount was well over the required number of hours set forth by the Virginia State Board of Nursing (BON) of 500 direct patient care hours for a registered nurse undergraduate program (Virginia BON, 2012). Simulation was used to add to the educational experience of the student; the Virginia BON allowed up to 20% of clinical hours to be replaced by simulation experiences supervised by trained faculty and staff (Virginia BON, 2012).

Participants

The participants of this study were senior level nursing students who were in their final semester of their undergraduate nursing education. This sample was one of convenience. Participants electively chose to participate in increased critical care clinical hours; however, participants were required to apply to the Critical Care Certificate Program to increase exposure to critical care clinical hours and simulation hours. Randomization was not possible due to participant preferences for or dislike of critical care nursing as well as availability of clinical placements and simulation space.

Though at different hours, all participants experienced critical care clinical hours, and some participated in simulations. Critical care clinicals included the direct care of critically ill patients; direct patient care was comprised of, but not limited to, the monitoring and treating of hemodynamics, ventilators, and multiple intravenous medications including vasopressors and vasoconstrictors. Critical care clinical hours were defined as those hours gained in an Intensive Care Unit or Emergency Department of a Level I or Level II Trauma Center in Virginia supervised by an experienced nurse familiar with the unit and with that specific patient population.

Simulation included the management of simulated patients in cardiopulmonary compromise and other life threatening situations such as trauma. Simulations included only nursing students and were led by two experienced critical care nurse faculty members, which individually held nearly 20 years of clinical experience in intensive critical care units. Each simulation experience lasted approximately 15 minutes followed by a period of reflection and debriefing lasting between 15-30 minutes depending on the simulation outcomes. Assessed skills included, but were not limited to, chest compressions, rhythm interpretation, airway management and use of bag-mask devices, critical care medications, common treatments for cardiopulmonary arrest, management of a defibrillator with pacing capabilities, and laboratory values. A review of case studies was also incorporated.

All participants completed the basic critical care course that required 40 hours of clinical in critical care areas. Additional hours were obtained in the critical care setting, with a maximum of 145 hours, by those participants who self-selected participation. Simulation exposure ranged from 0 to 36.

Participants electively chose to participate in increased critical care clinical hours; however, participants applied to the Critical Care Certificate Program. This elective opportunity required GPA of at least 3.0 and an A or B in the basic critical care course required by all senior level nursing students as well as recommendation by junior level faculty. The nursing program graded on a seven point scale (85% being a minimal B). The number of participants was limited due to clinical site availability and size of the simulation lab.

Differences in self-efficacy and knowledge as related to hands-on patient care clinical experiences and simulation were assessed using the number of hours each student received at the time of taking the NSSES and BKAT-8. The participants took the survey and assessment test either at the tenth week, twelfth week, or the fifteenth week of the 16 week semester.

Instrumentation

Two instruments were used to assess self-efficacy and knowledge. Acceptable instruments have a reliability of at least 0.70 (Nieswiadomy, 2012). Self-efficacy was measured using the Nursing Student Self-Efficacy Scale (NSSES) created by Stump in 2010. This survey originally consisted of 46-items on a five point Likert scale (0- not at all confident to 4- completely confident) (Stump, Husman, & Brem, 2012). The survey items consisted of three subscales: psychomotor skills (18), communication (8), and knowledge (20) (Stump, 2010). The survey was then decreased to a 26-item scale by Stump, et al. (2012) to lessen repeated data. This final instrument was the assessment tool used in this study. The survey focused on ideas necessary for patient care in the critical care areas. Permission to use the survey was given by Stump (See Appendix A). The survey was new and was used only during its creation; however, validity and reliability were tested repeatedly during its creation (Stump, et al., 2012). Validity and reliability were assessed during its creation by the use of pilot studies as well as the use of expert input and comparison of students in various levels of education (Stump, et al., 2012). Using Cronbach's Alpha (α), reliability was confirmed. The reported α was .94 for psychomotor and .85 for communication subscales (Stump, et al., 2012). Expert insight as well as theoretical support created content validity for the tool (Stump, et al., 2012). Content validity was supported by the use of two independent self-efficacy measurements (Stump, et al., 2012).

Knowledge was assessed using the Basic Knowledge Assessment Test-8 (BKAT-8) updated by Toth in 2008. The BKAT-8 assessed knowledge related to patient care in critical care areas (Toth, 2012). The BKAT-8 was a 90-question test offered in a multiple choice format (Toth, 2012). The BKAT-8 included several areas of knowledge: "cardiovascular, pulmonary, monitoring lines, neurology, endocrine, renal, gastrointestinal, and other…such as infection control, hypothermia, burns, and spiritual care" (Toth, 2012, para. 3). The BKAT-8 and its predecessors have been used for over 30 years in multiple countries (Toth, 2012). Validity was achieved with the use of an expert panel (Toth, 2012). Cronbach's Coefficient Alpha (α) determined reliability; for BKAT-8, the α was recorded at 0.88 (Toth, 2012). The tool's validity and reliability has been demonstrated through many studies (Toth, 2012). Permission to use the test was given by Toth (See Appendix B).

Demographic data included gender, age, and ethnicity. Descriptive data included prior acute care experience (work as a certified nursing assistant, licensed practical nurse, and emergency medical services technician), grade point average (GPA), and preferred employment post-graduation. Additionally, data related to the number of hours in critical care hands-on clinical experiences and number of hours in simulation experiences were considered. Participants were asked to include their student identification number to ensure that correct units and hours were assigned. This number was seen only by the researcher and was deleted in order to help maintain anonymity.

Procedures

After receiving permission from the School of Nursing, School of Education, and the university's Institutional Review Board (IRB), the study began in fall 2014 and concluded in spring 2015. To assess for scores in self-efficacy and knowledge in participants the NSSES and BKAT-8 was administered during the participants' final semester in the pre-licensure nursing program. The test was proctored by a research assistant, and the identity of the primary researcher was kept confidential. The research assistant read a script to lessen potential for bias. The script did not offer full disclosure of the purpose of the test to encourage participants to answer truthfully on the self-efficacy portion of the survey, therefore, helping to decrease the effect of social desirability response bias. Participants did not know the identity of the lead researcher as she is a professor within the school; however, since this site was the only university in Virginia with multiple levels of clinical and simulation hours, this population was required.

This correlational predictive study required an $n > 50 + 8m$ (Green, 1991). For this equation, m is the number of predictor variables (Green, 1991). Additionally, for a population of potentially 160 participants, 113 participants would meet the recommended sample size (Patten, 2009). Of the potential 159 participants, two were excluded as they were required to retake the basic critical care course and would have had the lecture content twice. The final sample size included 135 participants (86.1% of eligible participants) which voluntarily completed the assessments (two participants chose not to complete the NSSES for unknown reasons). This amount is greater than the minimally required n of 66.

After the research was concluded and data was analyzed, the researcher informed all participants of the purpose of the research via email and offered final conclusions per email at their request.

***Ethical Considerations- Participant Risks*.** The study was assessed by the Internal Review Board (IRB) of the university. Minimal risks, such as test anxiety or performance fear, existed. To lessen the effects of these risks, participation was voluntary, and subjects were ensured that their test outcomes did not affect their course grades or graduation outcomes.

***Ethical Considerations- Participant Protection*.** The identity of participants was kept confidential. Student identification numbers were used to verify clinical placement as well as simulation and critical care clinical hours. Identifiers were removed once this data was obtained. All tests were maintained in locked file-cabinets at the home of the researcher. All data were secured in a password protected computer.

Data Analysis

Statistical Package for the Social Science- Version 22.0 (SPSS-22.0) was used to analyze the data. Hierarchical regression analyses were used to explore the research questions and hypotheses. In order to establish a relationship between the predictor variables of critical care clinical hours and simulation hours with the criterion variables of self-efficacy and knowledge when controlling gender, age, ethnicity, grade point average (GPA), prior acute care experience, and preference of initial employment, the predictive, correlational study format was the most appropriate (Gall, Gall, & Borg, 2009). Multiple regression is appropriate when studying the relationship of one criterion variable with two or more predictive variables (Nieswiadomy, 2012; LoBiondo-Wood & Haber, 2010). The hierarchical regression analysis allowed entry of each predictor variable to determine potential changes with each criterion variable (Cohen, Cohen, West, & Aiken, 2003).

Variables, both predictors and criterion, were entered into the SPSS hierarchical regression analysis in a total of four blocks. Basic demographic data were in block one; this data included gender, age, and ethnicity. Block two consisted of prior acute care experience (work as a certified nursing assistant, licensed practical nurse, or emergency medical services technician) and GPA, and block three included initial job preference. The fourth block contained the predictor variables of clinical hours and simulation hours (See Table 1).

Table 1
Hierarchical Data Blocks

Hierarchical Regression Blocks	Included Variables
Block 1	Demographic Data Age, Gender, Ethnicity
Block 2	Experience GPA, Prior Acute Care Experience
Block 3	Preference of Initial Employment Location
Block 4	Predictor Variables Critical Care Clinical Hours, Critical Care Simulation Hours

Pearson *R* was used to determine the strength of the for interval data (Nieswiadomy, 2012). The predictor variables as well as the criterion variables were interval data. The ability of changes in one variable to affect or predict changes in another variable was indicated by the correlation coefficient (*R*) (Nieswiadomy, 2012). An *R* value of -1.00 indicated a perfect negative relationship, and an *R* value of +1.00 indicated a perfect positive relationship (Nieswiadomy, 2012; Patten, 2009). An *R* of 0 would signify no relationship (Nieswiadomy, 2012; Patten, 2009). To determine the percentage of change, the coefficient of determination, R^2 was used (Patten, 2009). Changes to R^2 as each block was entered into the model indicate the level of variance of each variable to predict changes in the criterion variables. The R^2 multiplied by 100% shows the percent of relationship related to that specific variable (Patten, 2009).

For effect size in a correlational predictive study, the *R* and R^2 were used to determine the effect of the variable on the relationship between the predictor and criterion variables (Patten, 2009). The percent for R^2 of 1.0% indicated a small effect, 13.8 signifies a large effect, and 50.0% implied an extremely large effect (Patten, 2009). The significance level of alpha (α) was used at the $p < 0.05$ to reject the null hypotheses in each analysis (Field, 2009). A probability was assessed at the value of (*p*) of 0.05 or less which is the practice standard (Patten, 2009).

Data was assessed for accuracy with a secondary review of each participant data during entry into SPSS. Missing data was reviewed; two participants failed to complete the NSSES portion of the data. Due to the adequate number of participants as discussed previously in this chapter, the data fields were left blank (Gall, Gall, & Borg, 2009).

Assumptions tested included independence of observations, linearity, normality, outliers, homoscedasticity, and multicollinearity. The Durbin-Watson statistic was used to determine independence of observations (Field, 2009). A bivariate scatterplot was used to assess for linearity and homoscedasticity (Field, 2009; Abrams, 2007). A scatterplot of residuals was used to assess normality, outliers, and homoscedasticity (Field, 2009). A histogram chart and P-P plots were used to assess tenability for normality and review any skewness associated with the data (Gall, Gall, & Borg, 2009). Additionally, skewness and kurtosis statistics were assessed to verify normality (Abrams, 2007). Outliers with a departure of three or more above or below the standard deviation were considered for removal from the study (Field, 2009; Abrams, 2007). Cook's Distance was evaluated to determine the influence of potential outliers; a Cook's Distance >1.0 was cause for concern (Field, 2009). The assumption of homoscedasticity was assessed using a bivariate scatterplot and residual scatterplot, which allowed the researcher to conclude that residuals are equally dispersed (Field, 2009; Abrams, 2007).

Multicollinearity is the result of highly correlated predictor variables, indicating that the predictor variables create the same variance in the criterion variable (Field, 2009). The assumption of no multicollinearity was assessed by testing for correlations among the predictor variables (Abrams, 2007). To assess multicollenarity, tolerance was tested. The tolerance score indicated the influence of one predictor variable on another (Field, 2009). Tolerance levels are acceptable when greater than 0.1 (Abrams, 2007). Variance inflation factors (VIF) was assessed for the influence of each factor; the preferred value for individual VIFs is less than 10 to deem this assumption tenable, and the VIF average should be near 1.0 (Field, 2009).

Summary

The statistical tests determined:

(a) Do critical care clinical hours and simulation hours contribute to knowledge as assessed by the BKAT-8?

(b) Do critical care clinical hours and simulation hours contribute to self-efficacy as measured by the NSSES?

Using Multiple Regression Analysis indicated a positive or negative relationship between knowledge and self-efficacy with clinical hours and simulation hours while controlling for gender, age, ethnicity, prior experience, GPA, and preferred job placement.

Chapter Four: Findings

The purpose of this study was to identify the predictive relationship among critical care clinical hours and simulation hours with the criterion variables (knowledge and self-efficacy) while controlling for gender, age, ethnicity, grade point average (GPA), prior acute care experience, and initial job placement preferences. The Basic Knowledge Assessment Test-8 (BKAT-8) was used to examine participant knowledge of critical care nursing skills and concepts. Knowledge was defined by Toth (2012) as “information that is necessary for entry into critical care nursing and represents the foundation for job performance” (para. 1). The Nursing Student Self-Efficacy Scale (NSSES) was used to assess self-efficacy of participants as related to critical care nursing concepts. Self-efficacy was defined as “beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (Bandura, 1997, p. 3).This chapter reviews the data analysis conducted using the IBM Statistical Package for the Social Sciences for Windows, Version-22.0 (SPSS-22.0) (2013) and hierarchical multiple regression analysis for this predictive correlation study.

Research Questions

This study was guided by the following questions:

RQ1: Do hours in critical care clinical experiences and hours in simulation encounters significantly predict explicit knowledge as measured by the Basic Knowledge Assessment Test-8, while controlling variables for gender, age, ethnicity, grade point average, prior acute care experience, and preferred initial job placement?

RQ2: Do hours in critical care clinical experiences and hours in simulation encounters significantly predict self-efficacy scores as measured by the Nursing Student Self-Efficacy

Survey, while controlling variables for gender, age, ethnicity, grade point average, prior acute care experience, and preferred initial job placement?

Research Hypotheses for Research Question 1

H_1: Gender, age, and ethnicity do significantly predict knowledge as measured by the Basic Knowledge Assessment Test-8.

$H0_1$: Gender, age, and ethnicity do not significantly predict knowledge as measured by the Basic Knowledge Assessment Test-8.

H_2: Grade point average and prior acute care experiences do significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8.

$H0_2$: Grade point average and prior acute care experiences do not significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8.

H_3: Participant's preference for initial job placement does significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8.

$H0_3$: Participant's preference for initial job placement does not significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8.

H_4: Hours of critical care clinical experiences and hours of simulation encounters do significantly contribute to knowledge according to the Basic Knowledge Assessment Test- 8.

$H0_4$: Hours of critical care clinical experiences and hours of simulation encounters do not significantly contribute to knowledge according to the Basic Knowledge Assessment Test- 8.

H_5: The combination of gender, age, ethnicity, grade point average, prior acute care experience, preference for initial job placement, hours in critical care clinical experiences, and hours in simulation encounters does significantly predict knowledge according to the Basic Knowledge Assessment Test-8.

$H0_5$: The combination of gender, age, ethnicity, grade point average, prior acute care experience, preference for initial job placement, hours in critical care clinical experiences, and hours in simulation encounters does not significantly predict knowledge according to the Basic Knowledge Assessment Test-8.

Research Hypotheses for Research Question 2

H_6: Gender, age, and ethnicity do significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

$H0_6$: Gender, age, and ethnicity do not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

H_7: Grade point average and prior acute care experiences do significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

$H0_7$: Grade point average and prior acute care experiences do not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

H_8: Participant’s preference for initial job placement does significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

$H0_8$: Participant’s preference for initial job placement does not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

H_9: Hours of critical care clinical experiences and hours of simulation encounters do significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

$H0_9$: Hours of critical care clinical experiences and hours of simulation encounters do not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

H_{10}: The combination of gender, age, ethnicity, grade point average, prior acute care experience, preference for initial job placement, hours in critical care clinical experiences, and hours in simulation encounters does significantly predict self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

$H0_{10}$: The combination of gender, age, ethnicity, grade point average, prior acute care experience, preference for initial job placement, hours in critical care clinical experiences, and hours in simulation encounters does not significantly predict self-efficacy as measured by the Nursing Student Self-Efficacy Scale.

Demographic Statistics

Participants who completed the survey totaled 135; however, two participants did not complete data for the NSSES survey. These two participants were not included in the self-efficacy data as measured by the NSSES (*N* = 133) but were included in the assessment of knowledge with the measurement tool BKAT-8 (*N* = 135) results. Demographic data for participants was separated into two sections based on the BKAT-8 participants and the NSSES participants.

Demographic Statistics for BKAT-8 (*N* = 135)

Demographic data included gender, age, and ethnicity. The majority of students were female (*n* = 120, 88.9%) while male students were fewer (*n* = 15, 11.1%) which is consistent with national statistics of nursing students (NLN, 2012). Most participants were between the ages of 20 and 25 years old (*n* = 123, 91.1%), with 11 participants ranging between 26 and 35 (*n* = 11, 8.1%) and only one participant greater than 36 years of age (*n* = 1, 0.7%). Most participants were Caucasian (*n* = 125, 92.6%) with the next largest group being African American (*n* = 4, 3.0%). Participants also indicated ethnicity of Hispanic (*n* = 2, 1.5%), Other (*n* = 2, 1.5%), and non-American (*n* = 2, 1.5%). These students indicated they were from African Countries or were biracial (See Table 2).

Table 2

Demographic Statistics for Participants BKAT-8 (N = 135)

Variable	Category	*n*	%
Age	20-25	123	91.1
	26-30	9	6.7
	31-35	2	1.5
	36-40	1	0.7
Gender	Female	120	88.9
	Male	15	11.1
Ethnicity	Caucasian	125	92.6
	African-American	4	3.0
	Hispanic	2	1.5
	Other	2	1.5
	Non-American Born	2	1.5

Demographic Statistics for NSSES (*N* = 133)

Demographic data included gender, age, and ethnicity. The majority of participants were female (*n* = 118, 88.7%) while male students were fewer (*n* = 15, 11.3%) which is consistent with national statistics of nursing students (NLN, 2012). Most participants were between the ages of 20 and 25 years old (*n* = 121, 91.0%), with 9 participants ranging between 26 and 35 (*n* = 9, 6.8%). Two participants were in the age group of 31 to 35 years old (*n* = 2, 1.5%), and only one participant greater than 36 years of age (*n* = 1, 0.8%). Most participants were Caucasian (*n* = 124, 93.2%) with the next largest group being African American (*n* = 3, 2.3%). Participants also indicated ethnicity of Hispanic (*n* = 2, 1.5%), Other (*n* = 2, 1.5%), and non-American (*n* = 2, 1.5%). These students indicated they were from African Countries (non- American) or were biracial (Other) (See Table 3).

Table 3
Demographic Statistics for Participants NSSES (N = 133)

Variable	Category	*n*	%
Age	20-25	121	91.0
	26-30	9	6.8
	31-35	2	1.5
	36-40	1	.8
Gender	Female	118	88.7
	Male	15	11.3
Ethnicity	Caucasian	124	93.2
	African-American	3	2.3
	Hispanic	2	1.5
	Other	2	1.5
	Non-American Born	2	1.5

Descriptive Statistics

The descriptive statistics portion is separated into two sections. The knowledge assessed by the BKAT-8 was completed by 135 participants, and the self-efficacy as measured by the NSSES was completed by 133 participants. The differences are outlined below.

Descriptive Statistics for BKAT-8 (*N* = 135)

The majority of participants did not have any prior acute care experience (*n* = 95, 70.4%). Those participants with experience indicated that jobs included CNA (*n* = 32, 23.7%), LPN (*n* = 2, 1.5%), and EMS (*n* = 3, 2.2%). Additionally, participants who specified Other (*n* = 3, 2.2%) were medication technicians or did not indicate in their experience (See Table 4).

The majority of participants hoped to work in and ER or ICU setting post-graduation (*n* = 80, 59.2%). Some participants were unsure where they would like for their first nursing position to be (*n* = 39, 28.9%), and others preferred to begin their nursing career in Medical/Surgical areas (*n* = 16, 11.9%) (See Table 4).

Table 4

Descriptive Statistics for Participants, BKAT-8 (N = 135)

Variable	Category	*n*	%
Acute Care Experience	None	95	70.4
	CNA	32	23.7
	LPN	2	1.5
	EMS	3	2.2
	Other	3	2.2
Preference of Initial Employment	Unknown	39	28.9
	Med-Surg	16	11.9
	ER/ICU	80	59.2

Participants' GPAs ranged from 2.690 to 4.000. The mean was 3.464 and standard deviation of 0.276 (*N* = 135). The range was 1.310. Skewness was -.288 indicating GPAs were skewed to the right (higher end of the graph), and Kurtosis was -.315, indicating that the distribution was relatively normal (Field, 2009) (See Table 5; See Figure 1).

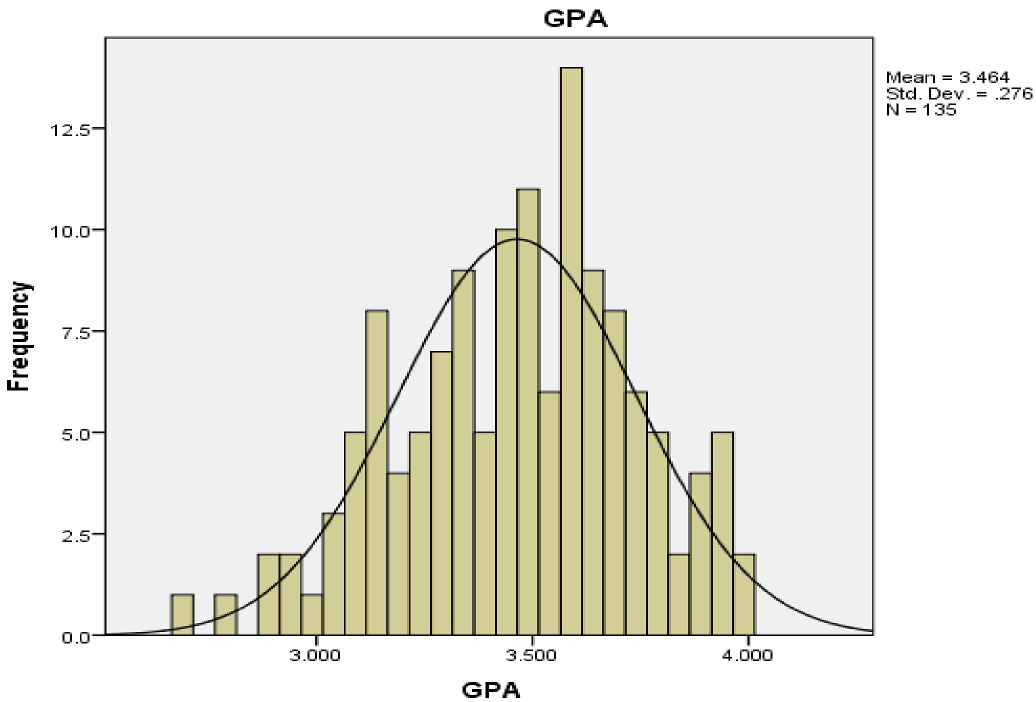
Table 5

GPA Descriptive Statistics, BKAT-8 (N = 135)

N	135
Mean	3.464
Standard Deviation	0.276
Skewness	-0.288
Kurtosis	-0.315
Low	2.69
High	4.00
Range	1.31

Figure 1

Histogram for Grade Point Average



Participants completed hands on clinical hours in critical care and emergency departments ranging from 40 hours to 145 hours. These hours were supervised by experienced registered nurses familiar with the unit and the patient population (See Table 6).

Table 6

Frequencies for Clinical Hours, BKAT-8 (N = 135)

		Frequency	Percent	Cumulative Percent
Hours	40.0	52	38.5	38.5
	70.0	26	19.3	57.8
	85.0	3	2.2	60.0
	110.0	36	26.7	86.7
	145.0	18	13.3	100.0
	Total	137	100.0	

Simulations of common critical care experiences were conducted during their final senior semester. Since participation in critical care simulation was based on self-determined interest in critical care nursing as well as involvement in the advanced critical care course, most participants did not participate in any critical care based simulations (*n* = 83, 61.5%) (See Table 7 and Table 8).

Table 7
Frequencies for Simulation Hours, BKAT-8 (N = 135)

		Frequency	Percent	Cumulative Percent
Valid	0	83	61.5	61.5
	5	15	11.1	72.6
	20	22	16.3	88.9
	36	15	11.1	100.0
	Total	137	100.0	

Hands-on clinical hours ranged from 40 to 145 hours (*N* = 135, *M* = 79.44, *SD* = 38.08). Hands-on clinical hours in critical care vary across the state of Virginia. The Board of Nursing requires clinical experiences in "adult medical/surgical nursing, geriatric nursing, maternal/infant (obstetrics, gynecology, neonatal) nursing, mental health/psychiatric nursing, nursing fundamentals, and pediatric nursing" (Virginia BON, 2012, para. 1). Critical care clinical experiences are not specifically mentioned. Participants who were not interested in critical care nursing were only required by the SON to participate in a basic critical care course and obtain 40 hours of hands-on clinical in critical care areas; these hours were supervised by a registered nurse familiar with the unit and patient population. A critical care trained faculty member or clinical teaching assistant was available and involved with the experience. For participants who were interested in critical care, they elected to add clinical experiences increasing their time in the critical care clinical setting or to increase critical care clinical hours and simulation hours.

These additional hours were supervised by a preceptor, a nurse experienced in that unit and with that specific patient population. Clinical hours are skewed to the left (lower number of hours) at .396 with a Kurtosis of -1.250 indicating a relatively flat distribution (Field, 2009) (See Table 8).

Critical care simulation hours as described in Chapter Three ranged from 0 to 36 (*N* = 135, *M* = 7.81, *SD* = 12.33).Simulation hours are more skewed to the left (as the majority of participants did not experience simulation hours because the simulation hours were self-elected) at 1.357 with a Kurtosis of .397 indicating a rather peaked distribution (Field, 2009). As the majority of participants did not take part in simulation hours and increased clinical experiences, this skewness was expected (See Table 8).

Table 8
Descriptive Statistics for Clinical Hours and Simulation Hours, BKAT-8 (N = 135)

		Critical Care Clinical Hours	Simulation hours
N	Valid	135	135
	Missing	0	0
Mean		79.444	7.81
Std. Deviation		38.0772	12.330
Skewness		.396	1.357
Std. Error of Skewness		.209	.209
Kurtosis		-1.250	.397
Std. Error of Kurtosis		.414	.414
Range		105.0	36
Minimum		40.0	0
Maximum		145.0	36

The descriptive statistics for the BKAT-8, which measured knowledge, (*N* = 135, *M* = 64.41, *SD* = 7.049) are below on Table 9. The BKAT-8 test has a total of 90 questions (highest possible score); participants scored a maximum of 81 and a minimal score of 46, with a range of

35. Skewness was -.278 with a Kurtosis of -.280, which indicates a flat distribution with a skew to the right (higher scores) (See Table 9).

Table 9
Descriptive Statistics for BKAT-8 (N = 135)

			Statistic	Std. Error
BKATtotal	Mean		64.5407	0.59913
	95% Confidence Interval for Mean	Lower Bound	63.3558	
		Upper Bound	65.7257	
	5% Trimmed Mean		64.751	
	Median		64	
	Variance		48.459	
	Std. Deviation		6.96126	
	Minimum		46	
	Maximum		81	
	Range		35	
	Interquartile Range		10	
	Skewness		-0.299	0.209
	Kurtosis		-0.198	0.414

For internal reliability, Cronbach's alpha coefficient was completed on the BKAT-8. The BKAT-8 α was 0.720, which indicated an acceptable reliability for this study (Field, 2009) (See Table 10).

Table 10
Psychometric Statistics for BKAT-8

Scale	Number of Items	*N*	α
BKAT-8	90	135	0.720

Descriptive Statistics for NSSES (*N* = 133)

Descriptive statistical data for those participants who took part in the self-efficacy survey with the NSSES tool is listed below. The largest portion of participants did not have any prior acute care experience (*n* = 94, 70.7%). Those participants with experience indicated that jobs included CNA (*n* = 32, 24.1%), LPN (*n* = 2, 1.5%), and EMS (*n* = 3, 2.3%). Additionally, participants who specified Other (*n* = 2, 1.5%) were either a medication technician or did not indicate in what type of experience (See Table 11).

Most participants indicated a desire to work in the ER or ICU setting post-graduation (*n* = 78, 58.6%). Some participants were unsure of their preference (*n* = 38, 28.6%), and others preferred initial job placement in Medical/Surgical areas (*n* = 16, 12.0%) (See Table 11).

Table 11

Descriptive Statistics for Participants, NSSES (N = 133)

Variable	Category	*n*	%
Acute Care Experience	None	95	70.4
	CNA	32	23.7
	LPN	2	1.5
	EMS	3	2.2
	Other	3	2.2
Preference of Initial Employment	Unknown	39	28.9
	Med-Surg	16	11.9
	ER/ICU	80	59.2

Grade Point Average data is listed below in Table 12.

Table 12

GPA Descriptive Statistics NSSES (N = 133)

N	133
Mean	3.467
Standard Deviation	0.275
Skewness	-0.290
Kurtosis	-0.283
Low	2.69
High	4.00
Range	1.31

Table 13 reviews the frequency data for clinical hours in ICU or ER settings caring directly for critically ill patient populations. They worked with and alongside experienced registered nurses who were familiar with the unit and the patient population. As stated previously, the Virginia BON does not require a specific amount of clinical experience to be in the critical care nursing areas (Virginia BON, 2012). Clinical hours ranged from 40 to 145 hours (*N* = 133, *M* = 80.038, *SD* = 38.052).Most participants completed 40 hours of clinical (*n* = 50, 37.6%) (See Table 13 and Table 15).

Table 13
Frequencies for Clinical Hours NSSES (N = 133)

		Frequency	Percent	Cumulative Percent
Hours	40.0	50	37.6	37.6
	70.0	26	19.5	57.1
	85.0	3	2.3	59.4
	110.0	36	27.1	86.5
	145.0	18	13.5	100.0
	Total	137	100.0	

Simulation experiences were optional for the participants. The range of simulation hours was from zero hours to 36 hours (*N* = 133, *M* = 7.93, *SD* = 12.385). Simulation experiences were facilitated by experienced critical care trained nurse educators. Scenarios were based on common life-threatening situations experienced in the critical care areas. Assessment of participants were based on American Heart Association Advanced Cardiac Life Support courses. The majority of participants (*n* = 81, 60.9%) did not participate in optional simulation experiences (See Table 14 and Table 15).

Table 14
Frequencies for Simulation Hours, NSSES (N = 133)

		Frequency	Percent	Cumulative Percent
Hours	0	81	60.9	60.9
	5	15	11.3	72.2
	20	22	16.5	88.7
	36	15	11.3	100.0
	Total	133	100.0	

Table 15
Descriptive Statistics for Clinical Hours and Simulation Hours, NSSES (N = 133)

		Critical Care Clinical Hours	Simulation hours
N	Valid	133	133
	Missing	0	0
Mean		80.038	7.93
Std. Deviation		38.052	12.385
Skewness		.372	1.334
Std. Error of Skewness		.210	.210
Kurtosis		-1.261	.333
Std. Error of Kurtosis		.417	.417
Range		105.0	36
Minimum		40.0	0
Maximum		145.0	36

The NSSES, which measured self-efficacy, (*N* = 135, *M* = 2.719, *SD* = 0.515) descriptive statistics are indicated below on Table 16. The NSSES survey had 26 statements on which participants chose their confidence level on a 5-point Likert scale (0 - not confident at all to 4 – completely confident). The scores were the average of each participant's individual responses. The minimal score was 0.88, and the maximum score was 3.77. Skewness was -.450 with a Kurtosis of .780, which indicated a skew to the left (lower scores) with a peaked distribution (See Table 16).

Table 16
Descriptive Statistics for NSSES (N = 133)

NSSEStotal	Mean		2.7279	0.04625
	95% Confidence Interval for Mean	Lower Bound	2.6364	
		Upper Bound	2.8193	
	5% Trimmed Mean		2.7377	
	Median		2.7308	
	Variance		0.289	
	Std. Deviation		0.53734	
	Minimum		0.88	
	Maximum		4.27	
	Range		3.38	
	Interquartile Range		0.69	
	Skewness		-0.293	0.209
	Kurtosis		0.781	0.414

The Cronbach's α for the NSSES was .930, which signified strong internal reliability for this study (Field, 2009) (See Table 12).

Table 17
Psychometric Statistics for NSSES

Scale	Number of Items	*N*	α
NSSES	26	133	0.930

Correlation Analysis

In an effort to better understand the relationships between criterion variables (knowledge and self-efficacy) and predictor variables (critical care clinical hours and simulations hours) while controlling variables for gender, age, ethnicity, GPA, prior experiences in acute care, and initial job placement preference, Pearson's correlation coefficient was completed on each criterion variable. Statistics were evaluated using SPSS-22.0.

The Pearson correlation coefficient statistic (*R*) was performed to determine relationship between BKAT-8 scores and hands-on clinical hours and simulation hours related to critical care experiences. The relationship between clinical hours and the BKAT-8 score was statistically significant at the $p < .05$ and positive with a small effect size ($R = .220$, $p = .011$). The relationship between simulation hours and the BKAT-8 was also significant at the $p < .01$ with a small effect size ($R = .287$, $p = .001$). Simulation hours and experiences had a positive relationship to BKAT-8 scores (See Table 18).

Table 18
Intercorrelations for Critical Care Experiences and BKAT-8 (N = 135)

Experiences	*R*	*p*	R^2
Clinical Hours	0.220	0.011	0.048
Simulation Hours	0.287	0.001	0.082

To determine the relationship between the NSSES and critical care experiences, Pearson correlation coefficient statistic (*R*) was performed. The relationship between clinical hours and the NSSES score was statistically significant at the $p < .01$ and positive with a medium effect size ($R = .308$, $p < .001$). The relationship between simulation hours and NSSES was statistically significant with a medium affect ($R = .326$, $p < .001$). These results demonstrated that critical care based simulation experiences had the largest association with an increase in NSSES scores (See Table 19).

Table 19
Intercorrelations for Critical Care Experiences and NSSES (N = 133)

Experiences	*R*	*p*	R^2
Clinical Hours	0.308	<0.001	0.095
Simulation Hours	0.326	<0.001	0.106

Intercorrelations for control variables for the BKAT-8 and NSSES are displayed in Table 20. For the BKAT- 8, gender, age, and ethnicity were negatively associated while prior experience, Grade Point Average (GPA), and initial employment preference were positively associated. Male participants (*n* = 15, *M* = 64.533, *SD* = 1.823) scored slightly higher than female participants (*n* = 120, *M* = 64.392, *SD* = .646) on the knowledge assessment test. The highest scoring age group was 20-25 years old (*n* = 123, *M* = 64.764, *SD* = .636). Caucasian participants scored highest among all ethnic groups (*n* = 125, *M* = 64.808, *SD* = .629). Participants who would prefer to work on a medical/surgical unit following graduation scored the highest (*n* = 16, *M* = 66.000, *SD* = 1.749), and those with EMT experience scored greater than those without or with other prior experience in acute care settings (*n* = 3, *M* = 72.333, *SD* = 3.480). Participants who completed 110 hours in critical care nursing clinicals scored highest (*n* = 36, *M* = 67.167, *SD*= .940), while those completing 20 simulation hours scored the highest (*n* = 22, *M* = 68.182, *SD* = 1.304). The strongest control variable relationship with the BKAT-8 was GPA, which was statistically significant at $p < .01$ (R= .407, R^2 = .167, $p < .001$). Ethnicity was a significant at $p < .05$ with a small effect size at R = .213 and R^2 = .045 (p = .013).

For the NSSES scores, gender, age, GPA, and initial employment preference were negatively related, while ethnicity and prior experience were positively associated. Male participants (*n* = 15, *M* = 3.149, *SD* = .121) scored higher on the NSSES than their female counterparts (*n* = 118, *M* = 2.665, *SD* = .046). The 20-25 year old age group scored the highest in self-efficacy (*n* = 121, *M* = 2.728, *SD* = .045). Non-American born participants scored the highest on the NSSES (*n* = 2, *M* = 3.481, *SD* = .212). Those participant who would prefer to work in ER and ICU settings following graduation scored the highest on self-efficacy (*n* = 80, *M* = 2.820, *SD* = .061), and those with prior EMT experience scored the highest (*n* = 3, *M* = 3.103, *SD* = .324). Those who completed 145 hours in critical care nursing clinical hours attained higher scores (*n* = 18, *M* = 2.996, *SD* = .107) than their counterparts, and those who completed 20 hours of simulation achieved the highest self-efficacy scores (*n* = 22, *M* = 3.056, *SD* = .088). The strongest relation with NSSES was gender (*R* = -.298, $p < .001$), and the second strongest relationship was prior employment preference (*R* = .191, *p* = .028). Both were significant at the *p* = .01 and *p* = .05 respectively; however, only a small percentage of change was related to these control variables (R^2 = .089 – gender; R^2 = .036 – employment preference) (See Table 20).

Table 20
Intercorrelations for Control Variables and BKAT-8 (N = 135) and NSSES (N = 133)

	BKAT-8			NSSES		
	R	*p*	R^2	*R*	*p*	R^2
Gender	-0.006	0.942	0.000	-0.298	<0.001	0.089
Age	-0.146	0.091	0.021	-0.044	0.614	0.002
Ethnicity	-0.213	0.013	0.045	0.074	0.399	0.005
GPA	0.407	<0.001	0.167	-0.144	0.098	0.021
Prior Experience	0.100	0.249	0.010	0.069	0.430	0.005
Employment Preference	0.020	0.817	0.04	-0.191	0.028	0.036

The correlation matrix for the BKAT-8 (*N* = 135) is below in Table 21. This Matrix represents the relationship between each variable.

Table 21

Variable Correlation Matrix for BKAT-8 (N = 135)

			1	2	3	4	5	6	7	8	9
1	BKAT Total	*r*									
		p									
2	Gender	*r*	-0.006								
		p	0.942								
3	Age	*r*	-0.146	-0.124							
		p	0.091	0.152							
4	Ethnicity	*r*	-.213*	-.199*	.197*						
		p	0.013	0.021	0.022						
5	GPA	*r*	.407**	.184*	-.187*	-0.148					
		p	<.001	0.033	0.03	0.087					
6	Preference	*r*	-0.02	-0.14	-0.019	0.065	-0.043				
		p	0.817	0.105	0.826	0.456	0.621				
7	Experience	*r*	0.1	-0.048	.347**	0.01	-0.027	-0.088			
		p	0.249	0.581	<.001	0.911	0.757	0.312			
8	Critical Care Clinical Hours	*r*	.220*	-0.092	-0.109	-0.039	.172*	.563**	-.179*		
		p	0.011	0.288	0.208	0.65	0.046	<.001	0.038		
9	Simulation hours	*r*	.287**	-0.128	-0.099	-0.015	.171*	.404**	-0.085	.821**	
		p	0.001	0.139	0.256	0.867	0.047	<.001	0.328	<.001	

* $p < 0.05$ level ** $p < 0.01$ level

The variable correlation matrix for the NSSES (*N* = 133) is below.

Table 22

Variable Correlation Matrix for NSSES (N = 133)

			1	2	3	4	5	6	7	8	9
1	NSSES Total	*r*									
		p									
2	Gender	*r*	-.298**								
		p	<.001								
3	Age	*r*	-0.044	-0.123							
		p	0.614	0.16							
4	Ethnicity	*r*	0.074	-.203*	.201*						
		p	0.399	0.019	0.021						
5	GPA	*r*	-0.144	.189*	-.192*	-0.134					
		p	0.098	0.029	0.027	0.125					
6	Preference	*r*	.191*	-0.14	-0.021	0.056	-0.03				
		p	0.028	0.109	0.812	0.524	0.732				
7	Experience	*r*	0.069	-0.063	.384**	-0.035	0.031	-0.129			
		p	0.43	0.473	<.001	0.686	0.724	0.14			
8	Critical Care Clinical Hours	*r*	.308**	-0.087	-0.114	-0.032	0.165	.568**	-0.163		
		p	<.001	0.317	0.189	0.716	0.058	<.001	0.062		
9	Simulation hours	*r*	.326**	-0.125	-0.102	-0.01	0.167	.406**	-0.072	.820**	
		p	<.001	0.151	0.245	0.911	0.054	<.001	0.41	<.001	

* p < 0.05 level ** p < 0.01 level

Regression Assumptions

Prior to testing the multiple regression analysis, the assumptions of independence of observations, linearity, normality, outliers, homoscedasticity, and multicollinearity were completed for the primary null hypotheses. Null hypothesis one ($H0_5$) stated that knowledge scores as measured by Basic Knowledge Assessment Test-8 is not significantly predicted by increased hours in critical care clinical experiences and increased exposure to critical care simulations with control variables of gender, age, ethnicity, grade point average, prior acute care experience, and preferred initial job placement. Null hypothesis two ($H0_{10}$) asserted that self-efficacy scores according to the Nursing Student Self-Efficacy Survey is not significantly predict by increased hours in critical care clinical experiences and increased exposure to critical care simulations with control variables of gender, age, ethnicity, grade point average, prior acute care experience, and preferred initial job placement.

Independence of observation was tested using the Durbin-Watson statistic for each primary null hypothesis. For $H0_5$, the Durbin-Watson statistic was 1.937, and for $H0_{10}$, the Durbin-Watson statistic was 2.251. Both are in the acceptable range to suggest that independence of observations was met (Field, 2009).

Linearity and homoscedasticity were assessed using bivariate scatterplots. These assumptions were met for the BKAT-8 (Figure 2) and NSSES (Figure 3). The scatterplot for the BKAT-8 and NSSES appeared randomized with no recognizable curve. Therefore, assumptions for linearity and homoscedasticity were tenable.

Figure 2

Bivariate Scatterplot for BKAT-8

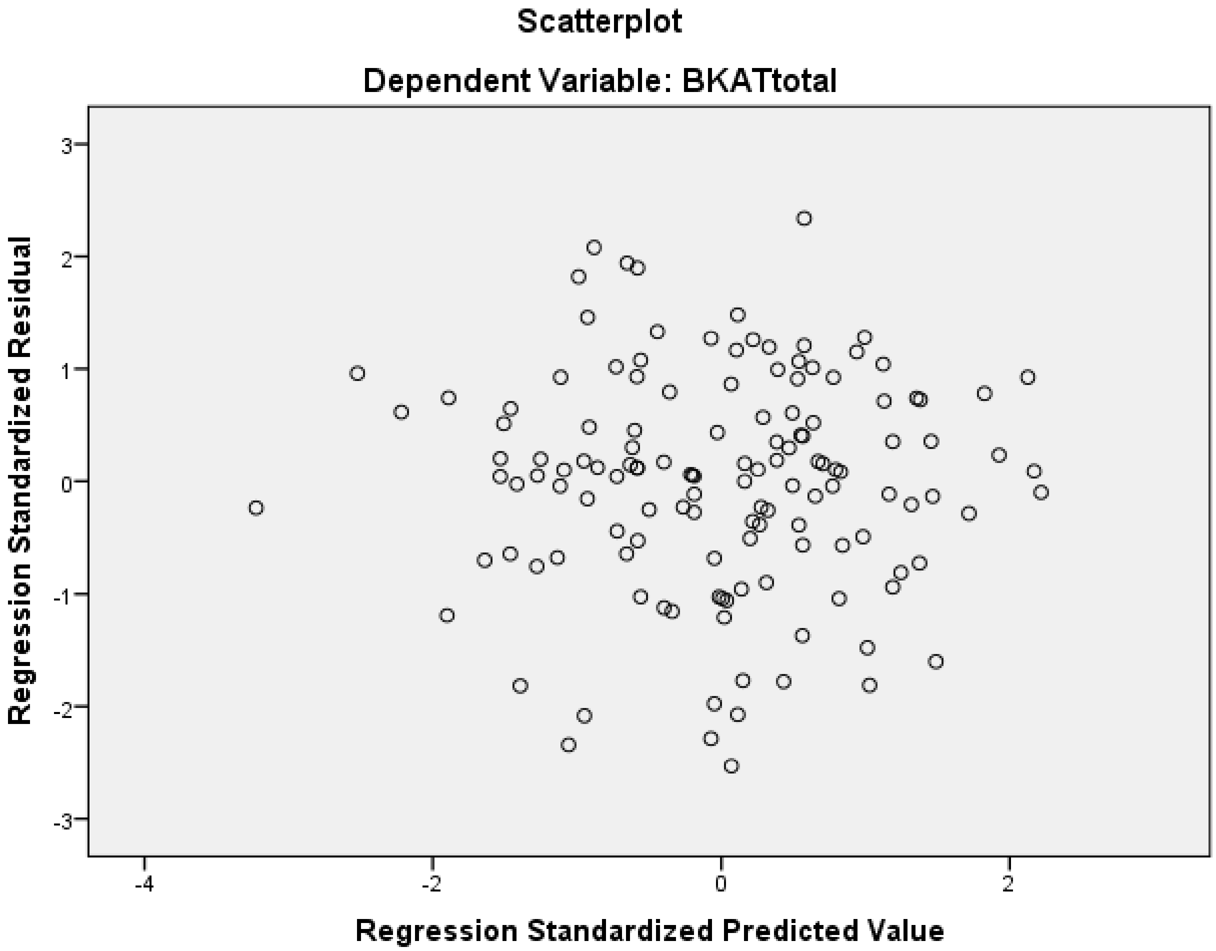
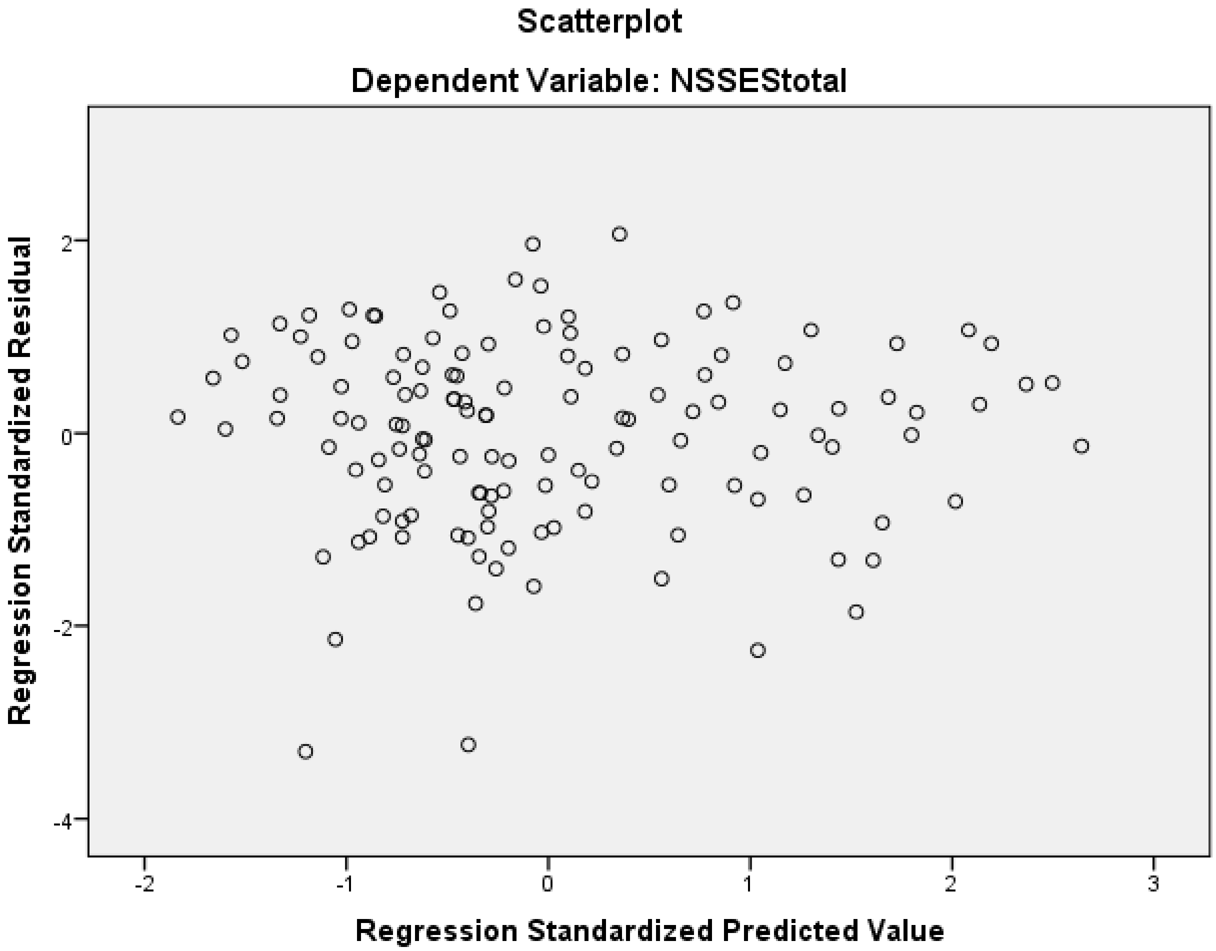


Figure 3
Bivariate Scatterplot for NSSES



Normality was assessed using histograms and P-P plots for both BKAT-8 and NSSES. For the BKAT-8, normality was deemed tenable based on both the histogram and the plot (See Figures 4 and 5). Normality for the NSSES was also tenable on both the chart and plot (See Figures 6 and 7).

Figure 4
Histogram for BKAT-8

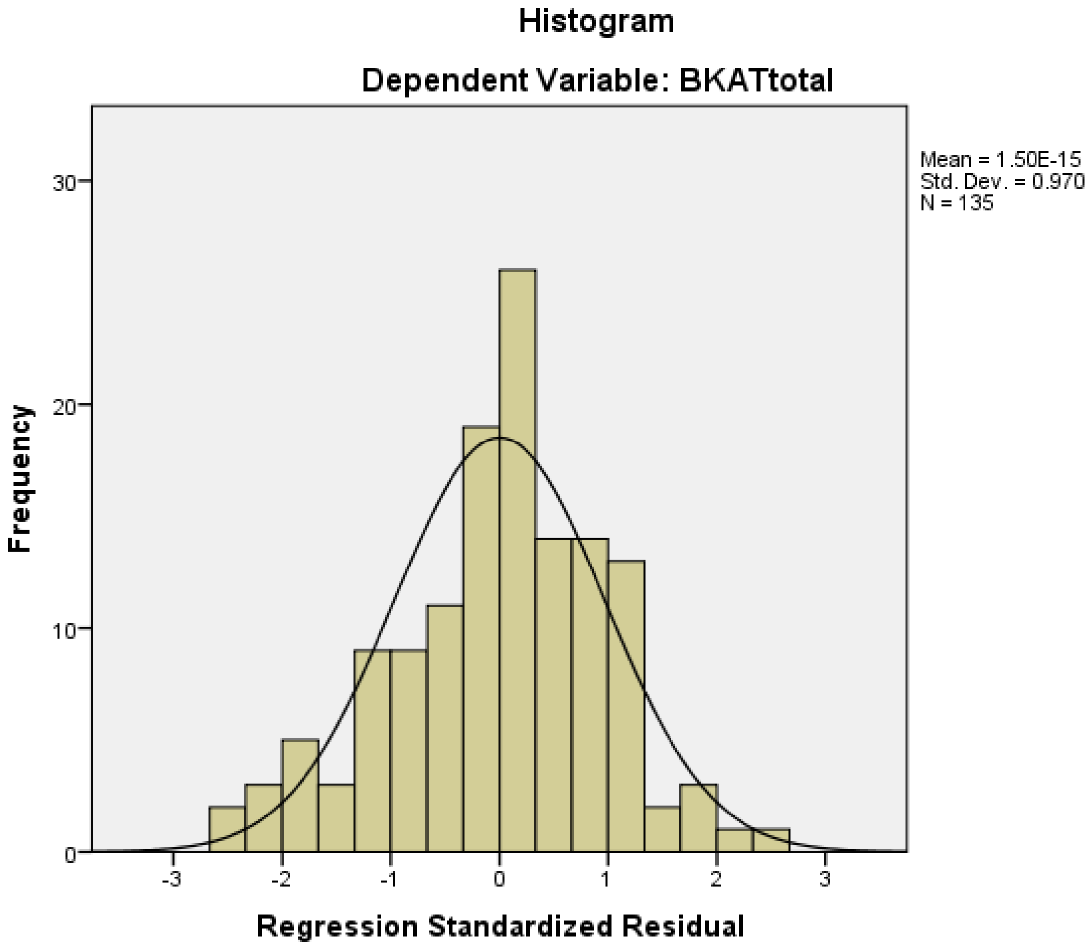


Figure 5

Normal P-P Plot for BKAT-8

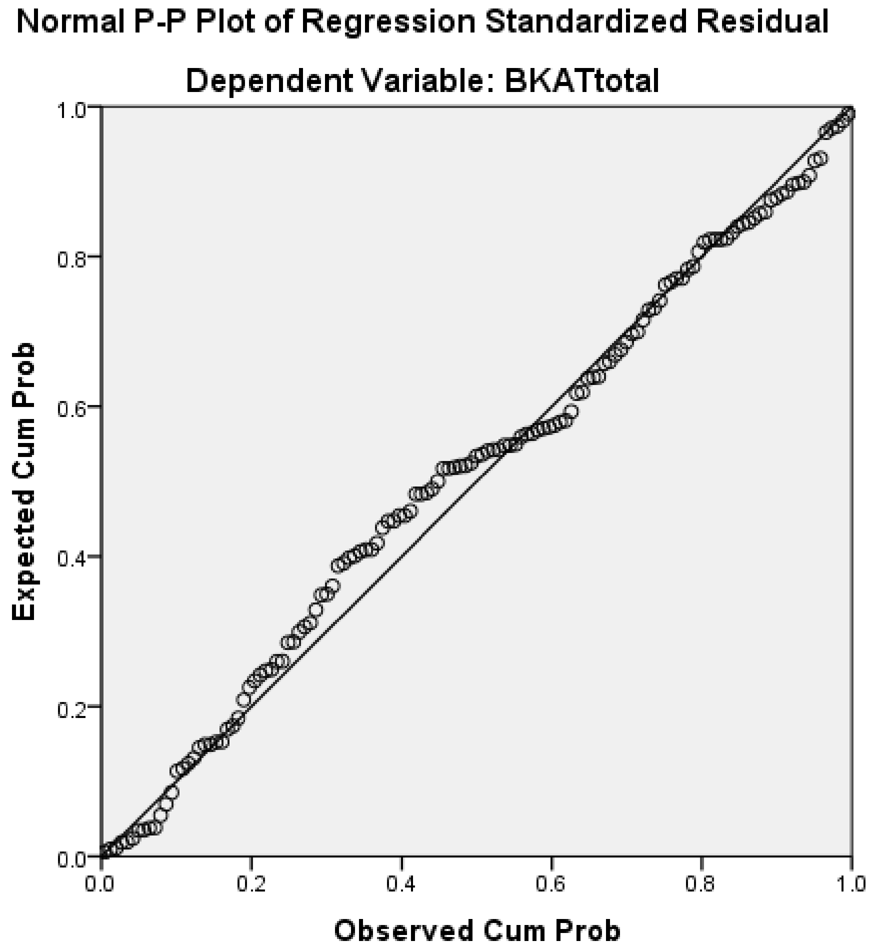


Figure 6

Histogram for NSSES

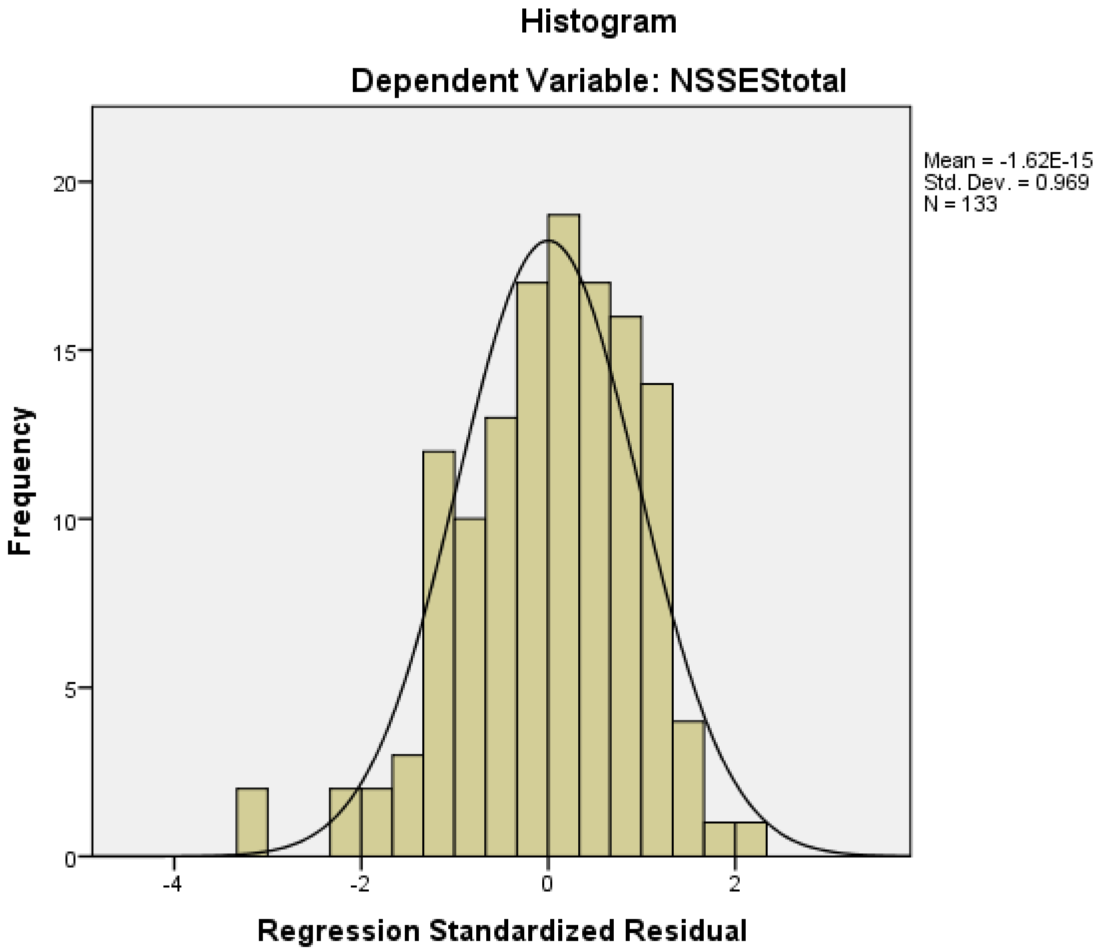
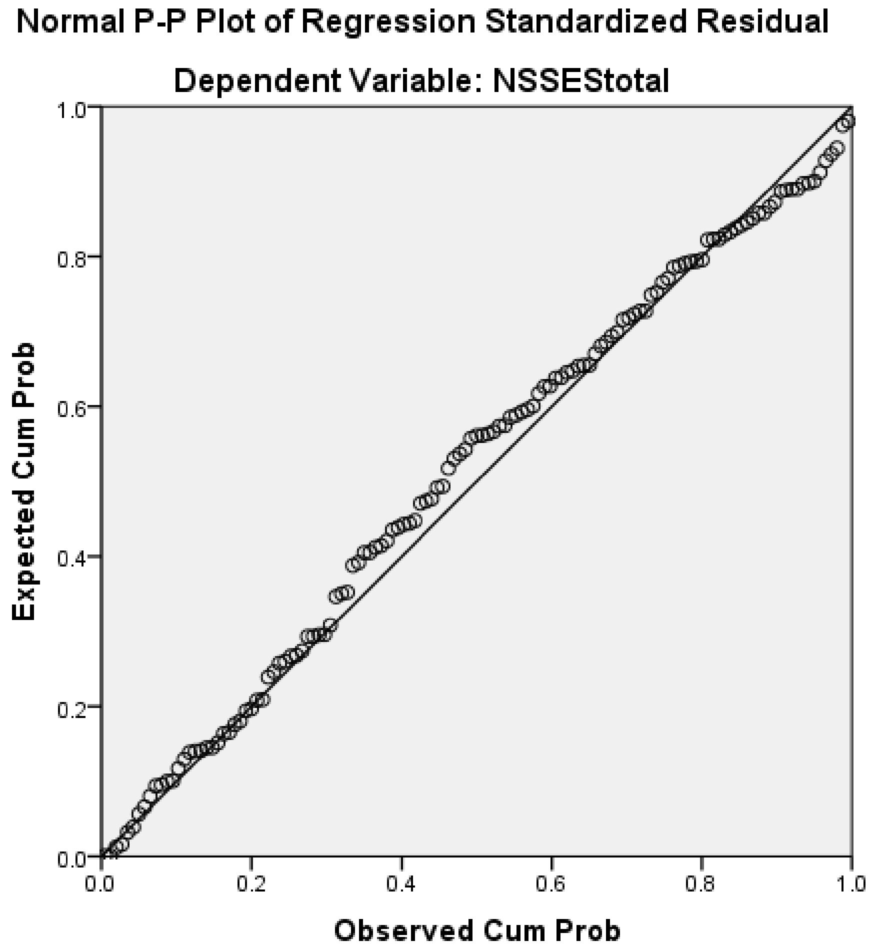


Figure 7
Normal P-P Plot for NSSES



The presence of potential outliers in each variable was assessed with the use of Cook's distance. Results of both the BKAT-8 and the NSSES were evaluated, and no data indicated a Cook's distance >1.0. Cook's distance of >1.0 would indicate concern (Field, 2009); therefore, no outliers were ascertained.

The assumption of no multicollinearity between predictor variables was assessed with the assessment of tolerance and VIF. For $H0_{5,}$ tolerance levels remained above scores which would indicate concern at .20 (Field, 2009). Tolerance scored the lowest at .247 (clinical hours) and the highest at .912 (ethnicity). The largest VIF score was 4.05 (clinical hours), which is below the level of concern (Field, 2009; Cohen, et al., 2003). The average of the variance inflation factor (VIF) scores was not significantly above one (1.82) and, therefore, no indication of collinearity was noted (Field, 2009; Cohen, et al., 2003). The assumption of no multicollinearity for $H0_5$ was deemed tenable.

$H0_{10}$ was assessed for multicollinearity using tolerance and VIF. Tolerance was above the .20 level; the lowest score was .25 for clinical hours. The largest VIF score was clinical hours at 3.998, and the average for VIF was 1.83. As both tolerance and VIF scores were within standard values, the assumption of no multicollinearity was determined to be tenable for $H0_{10}$.

Hierarchical Multiple Regression Analysis

For this study, a four-block hierarchical regression analysis was performed to test the hypotheses. The four blocks were discussed previously and are charted with results in this section (See Table 23). Each hypotheses is reviewed.

Table 23
Hierarchical Data Blocks

Hierarchical Regression Blocks	Included Variables
Block 1	Demographic Data
	Gender, Age, Ethnicity
Block 2	Experience
	GPA, Prior Acute Care Experience
Block 3	Preference of Initial Employment Location
Block 4	Predictor Variables
	Critical Care Clinical Hours,
	Critical Care Simulation Hours

Research Question One Data Analysis

Research Question One asked “Do hours in critical care clinical experiences and hours in simulation encounters significantly predict knowledge according to the Basic Knowledge Assessment Test-8, with control variables of gender, age, ethnicity, grade point average, prior acute care experience, and preferred initial job placement?” In this hierarchical regression analysis, Model 1 included demographic data, comprised of gender, age, and ethnicity, which allowed the testing for $H0_1$ which stated "Gender, age, and ethnicity do not significantly predict knowledge as measured by the Basic Knowledge Assessment Test-8." Gender, age, and ethnicity did significantly predict the BKAT-8 score at the $p < .05$ level (R^2 change = .060, $F(3, 131) = 2.799$, $p = .043$). Results indicated that male students scored the highest on the BKAT-8 assessment tool. The age group of 20-25 year olds scored the highest on the BKAT-8, and Caucasian student scored the highest on the BKAT-8 tool. $H0_1$ was rejected. Table 24 indicates individual variable contribution to the model, showing that ethnicity individually significantly contributed at $p = .022$.

Table 24

Block One of Contributions of Variables (N=135)

Variable	Zero-Order *r*	Partial *r*	Sig.	*B*	*SE*	*β*	*t*
Gender	-.006	-.061	.485	-1.359	1.939	-.061	-.701
Age	-.146	-.114	.192	-1.889	1.441	-.114	-1.310
Ethnicity	-.213	-.198	.022*	-2.166	.938	-.203	-2.311

Note. $*p < .05$, $**p = < .01$

$H0_2$ stated "Grade point average and prior acute care experiences do not significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8". Model 2 did statistically predict BKAT-8 results (R^2 change = .162, $F(2, 129) = 13.448$, $p < .001$). The addition of GPA and prior experience did statistically significantly contribute to the model at the p = <.01 level ($R = .472$, $R^2 = .222$, $F(2, 129) = 13.448$, $p < .001$). The data indicated that the relationship between GPA and BKAT-8 scores was positive: the higher the GPA, the higher the

BKAT-8 score. Participants with prior acute care experience, as defined previously, scored higher on the BKAT-8 than their colleagues. The variance explained in the criterion variable, knowledge, by the overall model was 22.2%. Significant data existed to reject the null hypothesis. Table 25 indicates individual variable contribution.

Table 25

Block Two Contributions of Variables (BKAT-8) (N = 135)

Variable	Zero-Order *r*	Partial *r*	*Sig.*	*B*	*SE*	*β*	*t*
Gender	-.006	-.126	.153	-2.584	1.797	-.116	-1.438
Age	-.146	-.108	.219	-1.761	1.428	-.106	-1.234
Ethnicity	-.213	-.171	.051	-1.701	.865	-.159	-1.967
Experience	.100	.150	.087	1.225	.710	.143	1.725
GPA	.407	.391	<.001**	9.930	2.059	.388	4.823

Note. *p < .05, **p = < .01

H0$_3$, which stated "Participant's preference for initial job placement does not significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8", was assessed by Model 3. The participants' initial employment placement did not significantly contribute to the model (R^2 change = .000, $F(1, 128) = .000$, $p = .987$); less than 1% change resulted with the addition of these variables. Therefore, data results failed to reject H0$_3$. It was, however, significant to note that the entire model was significant ($R = .472$, $R^2 = .222$ $F(6, 128) = 6.101$, $p < .001$) explaining 22.2% of the variance. Table 26 represents the individual contribution of each variable to the model for Model 3.

Table 26
Block Three Contributions of Variables (BKAT-8) (N = 135)

Variable	Zero-Order *r*	Partial *r*	*Sig.*	*B*	*SE*	*β*	*t*
Gender	-.006	-.124	.159	-2.581	1.820	-.115	-1.418
Age	-.146	-.108	.221	-1.761	1.433	-.106	-1.229
Ethnicity	-.213	-.171	.052	-1.701	.869	-.159	-1.959
Experience	.100	.150	.089	1.226	.716	.143	1.713
GPA	.407	.391	<.001**	9.931	2.067	.388	4.804
Preference	-.020	.001	.987	.010	.619	.001	.016

Note. *p < .05, **p = < .01

Model 4, which added the variables of hours in critical care clinical experiences and hours in simulation encounters to the variable list, tested $H0_4$. $H0_4$ stated "Hours of critical care clinical experiences and simulation encounters do not significantly contribute to knowledge according to the Basic Knowledge Assessment Test- 8." The contribution of these variables to the overall model was significant (R^2 change = .054, $F(2, 126) = 4.656$, $p = .011$). The individual contribution of hours in critical care clinical experiences and simulation encounters was not significant ($p = .853$ and $p = .082$, respectively), however, the overall model was significant (R = .525, $R^2 = .276$, $F(8, 126) = 6.001$, $p < .001$) in the prediction of the BKAT-8 results. $H0_4$ was rejected. The most significant contributor to this model was GPA at $p < .001$, which indicated that higher GPAs were associated with higher BKAT-8 scores. Table 27 shows individual variable contribution.

Table 27

Block Four Contributions of Variables (BKAT-8) (N=135)

Variable	Zero-Order *r*	Partial *r*	*Sig.*	*B*	*SE*	*β*	*t*
Gender	-.006	-.093	.295	-1.880	1.787	-.084	-1.052
Age	-.146	-.098	.273	-1.540	1.397	-.093	-1.102
Ethnicity	-.213	-.168	.058	-1.620	.847	-.152	-1.912
Experience	.100	.164	.064	1.325	.709	.155	1.870
GPA	.407	.347	<.001**	8.577	2.068	.335	4.147
Preference	-.020	-.103	.245	-.861	.738	-.110	-1.168
Clinical Hours	.220	.019	.835	.006	.028	.032	.209
Simulation Hours	.287	.155	.082	.136	.078	.239	1.756

Note. *p < .05, **p = < .01

Model Analysis for Question One

This hierarchical regression analysis assessed each model for predictive ability using SPSS-22.0. Each model is reviewed in this section. An overall summary of null hypotheses for Research Question one is presented in Table 28.

Table 28
Summary of Null Hypotheses for Research Question One (BKAT-8) (N = 135)

Hypothesis	Statement	Overall Model R^2	Added Variance (ΔR^2)	Result
$H0_1$	Gender, age, and ethnicity do not significantly predict knowledge as measured by the Basic Knowledge Assessment Test-8.	.060	.060	Reject
$H0_2$	Grade point average and prior acute care experiences do not significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8.	.222	.162	Reject
$H0_3$	Participant's preference for initial job placement does not significantly contribute to knowledge according to the Basic Knowledge Assessment Test-8.	.222	.000	Fail to Reject
$H0_4$	Hours of critical care clinical experiences and simulation encounters do not significantly contribute to knowledge according to the Basic Knowledge Assessment Test- 8.	.276	.054	Reject

Model 1 was deemed significant at the $p < .05$ level. The overall combination of gender, age, and ethnicity did statistically predict knowledge as measured by the BKAT-8 ($F(3, 131) = 2.799$, $p = .043$). All models are summarized in Table 29.

Model 2 was significant at the $p = .01$ level, indicating that the combination of gender, age, ethnicity, GPA, and prior experience did statistically predict knowledge. Data results were $F(5, 129) = 7.378$, $p < .001$.

Model 3 was statistically significant ($F(6, 128) = 6.101$, $p < .001$). This data indicates that the combination of gender, age, ethnicity, GPA, prior work experience, and preference for initial employment placement did predict knowledge as measured by the BKAT-8.

Model 4 was statistically significant at the $p < .01$ level. The overall combination of gender, age, ethnicity, GPA, prior work experience, preference for initial employment, hours in critical care clinical experiences, and hours in simulation encounters did predict knowledge ($F(8, 126) = 6.001$, $p < .001$).

Table 29
Summary of Models (BKAT-8)

Model	F	*Sig*
1	2.799	.043
2	7.378	<.001
3	6.101	<.001
4	6.001	<.001

$H0_5$ stated "The combination of gender, age, ethnicity, grade point average, prior acute care experience, preference for initial job placement, hours in critical care clinical experiences, and hours in simulation encounters does not significantly predict knowledge according to the Basic Knowledge Assessment Test-8." This null hypothesis was rejected as the data indicated that the combination of all variables did predict knowledge as measured by the BKAT-8, and this combination was statistically significant at the $p < .01$ level ($F(8, 126) = 6.001$, $p < .001$).

Research Question Two Data Analysis

Research Question Two asked "Do hours in critical care clinical experiences and hours in simulation encounters significantly predict self-efficacy as measured by the Nursing Student Self-Efficacy Scale, with control variables of gender, age, ethnicity, grade point average, prior acute care experience, and preferred initial job placement?" In this hierarchical regression analysis, Model 1 included demographic data, comprised of gender, age, and ethnicity, which allowed the testing for $H0_6$ which stated "Gender, age, and ethnicity do not significantly contribute to self- efficacy as measured by the Nursing Student Self-Efficacy Scale." Gender was significant at the p = .001 level, but age and ethnicity did not individually statistically contribute to the model (p = .331 and p = .733 respectively). The overall combination of the demographic data did significantly contribute to the model (R = .311, R^2 = .076, F(3, 129) = 4.594, p = .004). $H0_6$ was rejected. Table 30 offers the individual contributions for this model.

Table 30

Block One Contributions of Variables (NSSES) (N = 133)

Variable	Zero-Order *r*	Partial *r*	*Sig.*	*B*	*SE*	*β*	*t*
Gender	-.298	-.297	.001**	-.491	.139	-.303	-3.534
Age	-.044	-.089	.311	-.105	.103	-.087	-1.018
Ethnicity	.074	.030	.733	.023	.068	.030	.342

Note. *p < .05, **p = < .01

Model 2 tested $H0_7$, which stated "Grade point average and prior acute care experiences do not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale." Grade Point Average and prior experience did not individually significantly contribute to the model (R^2 change = .022, F(2, 127) = 1.552, p = .216). However, with the addition of GPA and prior experience to the variable list, the overall model remained significant at the $p < .01$ level and led to a 11.8% change ($R = .344$, $R^2 = .118$, $F(5, 127) = 3.401$, $p = .006$). Individual variable contribution is presented in Table 31. The data failed to reject $H0_7$.

Table 31

Block Two Contributions of Variables (NSSES) (N= 133)

Variable	Zero-Order *r*	Partial *r*	*Sig.*	*B*	*SE*	*β*	*t*
Gender	-.298	-.276	.002**	-.454	.140	-.280	-3.235
Age	-.044	-.142	.109	-.184	.114	-.153	-1.612
Ethnicity	.074	.036	.685	.028	.068	.036	.407
Experience	.069	.111	.212	.077	.061	.115	1.254
GPA	-.144	-.121	.173	-.223	.163	-.119	-1.370

Note. *p < .05, **p = < .01

$H0_8$, which stated “Participant’s preference for initial job placement does not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale,” was tested by Model 3. The participants’ initial employment placement preferences did not significantly contribute to the model (R^2 change = .026, $F(1, 126) = 3.820$, $p = .053$). A 2.6% change in the NSSES score was the result of the participants’ preferences. Data results did not offer statistically significant evidence; therefore, data failed to reject $H0_8$. However, the overall model was significant to predict NSSES scores ($R = .380$, $R^2 = .144$, $F(6, 126) = 3.533$, $p = .003$). The overall model explained 14.4% of the variance in self-efficacy as a result of those included variables. Table 32 presents the individual data contributions.

Table 32
Block Three Contributions of Variables (NSSES) (N = 133)

Variable	Zero-Order *r*	Partial *r*	*Sig.*	*B*	*SE*	*β*	*t*
Gender	-.298	-.255	.004**	-.416	.140	-.256	-2.964
Age	-.044	-.146	.101	-.187	.113	-.155	-1.654
Ethnicity	.074	.033	.709	.025	.067	.032	.375
Experience	.069	.134	.133	.093	.061	.138	1.514
GPA	-.144	-.124	.164	-.225	.161	-.120	-1.398
Preference	.191	.172	.053	.094	.048	.164	1.954

Note. *p < .05, **p = < .01

$H0_9$ stated “Hours of critical care clinical experiences and simulation encounters do not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.” Model 4 tested $H0_9$. Neither clinical hours nor simulation hours made a significant contribution individually (p = .206 and p = .235, respectively) to the model; however, the overall linear combination of the variables was statistically significant (R^2 change = .084, $F(2, 124) = 6.789$, $p = .002$). The overall model was significant and predicted the NSSES scores ($R = .478$, $R^2 = .229$, $F(8, 124) = 4.591$, $p < .001$). The model explained 22.9% of the variance in the NSSES scores. This statistical evidence led to the rejection of $H0_9$. See Table 33 for the individual contribution of each variable to the model.

Table 33
Block Four Contributions of Variables (NSSES) (N = 133)

Variable	Zero-Order *r*	Partial *r*	*Sig.*	*B*	*SE*	*β*	*t*
Gender	-.006	-.093	.295	-.363	.135	-.224	-2.680
Age	-.146	-.098	.273	-.166	.108	-.138	-1.535
Ethnicity	-.213	-.168	.058	.035	.065	.045	.543
Experience	.100	.164	.064	.106	.059	.158	1.790
GPA	.407	.347	<.001**	-.353	.158	.189	2.236
Preference	-.020	-.103	.245	-.007	.056	-.013	-.133
Clinical Hours	.220	.019	.835	.003	.002	.201	1.272
Simulation Hours	.287	.155	.082	.007	.006	.168	1.193

Note. *p < .05, **p = < .01

Model Analysis for Question Two

This hierarchical regression analysis assessed each model for predictive ability using SPSS-22.0. Each model is reviewed in this section. An overall summary of null hypotheses for Research Question Two is presented in Table 34.

Table 34
Summary of Null Hypotheses for Research Question Two (NSSES) (N = 133)

Hypothesis	Statement	Overall Model (R^2)	Added Variance (ΔR^2)	Result
$H0_6$	Gender, age, and ethnicity do not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.	.097	.097	Reject
$H0_7$	Grade point average and prior acute care experiences do not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.	.118	.022	Fail to Reject
$H0_8$	Participant's preference for initial job placement does not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.	.144	.026	Fail to Reject
$H0_9$	Hours of critical care clinical experiences and simulation encounters do not significantly contribute to self-efficacy as measured by the Nursing Student Self-Efficacy Scale.	.229	.084	Reject

Model 1 was deemed significant at the $p < .01$ level. The overall combination of gender, age, and ethnicity did statistically predict self-efficacy as measured by the NSSES ($F(3, 129) = 4.594$, $p = .004$). All models are summarized in Table 35.

Model 2 was significant at the $p < .01$ level, indicating that the combination of gender, age, ethnicity, GPA, and prior experience did statistically predict self-efficacy according to the NSSES ($F(5, 127) = 3.401$, $p = .006$).

Model 3 was statistically significant ($F(6, 126) = 3.533$, $p = .003$). This data indicated that the combination of gender, age, ethnicity, GPA, prior work experience, and preference for initial employment placement did predict self-efficacy as measured by the NSSES.

Model 4 was statistically significant at the $p < .001$ level. The overall combination of gender, age, ethnicity, GPA, prior work experience, preference for initial employment, and hours in critical care clinical experiences and hours in simulation encounters did predict knowledge ($F(8, 124) = 4.591$, $p < .001$).

Table 35
Summary of Models (NSSES)

Model	F	*Sig*
1	4.594	.004
2	3.401	.006
3	3.533	.003
4	4.591	<.001

$H0_{10}$ stated "The combination of gender, age, ethnicity, grade point average, prior acute care experience, preference for initial job placement, hours in critical care clinical experiences, and hours in simulation encounters does not significantly predict self-efficacy as measured by the Nursing Student Self-Efficacy Scale." This hypothesis was rejected as the data indicated that the combination of all variables did predict self-efficacy as measured by the NSSES, and this combination was statistically significant at the $p < .001$ level ($F(8, 124) = 4.591$, $p < .001$).

Conclusion

The contributions of each variable were assessed as stated in the above sections. The overall models were also outlined. Research Question One stated “Do hours in critical care clinical experiences and hours in simulation encounters significantly predict knowledge according to the Basic Knowledge Assessment Test-8, with control variables of gender, age, ethnicity, grade point average, prior acute care experience, and preferred initial job placement?” A positive, statistically significant relationship with BKAT-8 scores was noted with both critical care clinical hours and simulation hours. Though the contribution of clinical hours and simulation hours were not individually significant, Model 4 which included the contribution of clinical and simulation hours was significant and was able to predict BKAT-8 scores.

Research Question Two asked “Do hours in critical care clinical experiences and hours in simulation encounters significantly predict self-efficacy scores according to the Nursing Student Self-Efficacy Survey, with control variables of gender, age, ethnicity, grade point average, prior acute care experience, and preferred initial job placement?” Data indicated that a positive, statistically significant relationship was noted between NSSES scores and clinical hours and simulation hours. Their contribution, while independently insignificant, was significant to the overall model, which indicated a statistically significant predictive ability.

Chapter 5: Discussion

Introduction

This hierarchical multiple regression non-experimental study examined the relationship of the predictor variables of critical care clinical hours and simulation hours with criterion variables (knowledge and self-efficacy) while controlling for gender, age, ethnicity, grade point average (GPA), prior acute care experience, and initial job placement preferences. Senior level nursing students at a large, faith-based university in Virginia completed the Basic Knowledge Assessment Test-8 (BKAT-8) (*N* = 135) to measure knowledge and the Nursing Student Self-Efficacy Scale (NSSES) (*N* = 133) to measure self-efficacy as related to critical care nursing concepts and skills. This chapter will provide a summary of the final results, implications for theory and practice, noted limitations, and recommendations for future research.

Summary of Results

The results of this study will be summarized in this portion of the paper. Control variables and predictor variables will be reviewed independently for their relationship to the criterion variables (knowledge and self-efficacy).

Control Variables

Control variables were chosen for their potential influence on the scores of the BKAT-8 and the NSSES. The correlation of the variable to both instruments will be discussed along with a review of their contribution to the predictive models.

Gender. Gender distribution for this research study was 88.9% female (*n* = 120) and 11.1% male (*n* = 15). Overall, male participants scored higher in both knowledge (*M* = 64.533, *SD* = 1.823) and self-efficacy (*M*= 3.149, *SD* = .121). In Model 4, which includes all control and predictive variables, gender was not statistically significant for knowledge ($p = .295$); however, gender was statistically significant for self-efficacy at the $p < .01$ ($p = .008$) with a β of -.224, indicating that gender was strongest unique contributor to explaining the variable (22.4%).

Age. The distribution of age was as follows: 91.1% were 20-25 years (*n* = 123), 6.7% 26-were 30 years (*n* = 9), 1.5% were 31-35 years (*n* = 2), and .7% were 36-40 years (*n* = 1). The 20-25 year age group did score the highest for knowledge (*M* = 64.764, *SD* = .636) and for self-efficacy (*M* = 2.728, *SD* = .045); however, age did not prove to be statistically significant for either knowledge ($p = .273$) or self-efficacy ($p = .127$) in this study's population.

Ethnicity. In this study, the majority of participants were Caucasian (92.6%, *n* = 125), with 3% identifying as African American (*n* = 4). The remainder of participants identified as Hispanic (1.5%, *n* = 2), Non-American born (1.5%, *n* = 2), and Other (1.5%, *n* = 2). Participants indicated in writing on the demographic portion of the survey that Non- American born participants were from two African countries and Other was described as participants who considered themselves as biracial. Caucasian participants achieved the highest score for knowledge (*M* = 64.808, *SD* = .629), and non-American born participants scored the highest for self-efficacy (*M* = 3.481, *SD* = .212). For this study, ethnicity was not statistically significant for either knowledge ($p = .058$) or self-efficacy ($p = .588$).

Grade point average. The Grade Point Average (GPA) of participants was received from university reports at the beginning of their senior year. The GPA values ranged from 2.69 to 4.00 on a 4-point scale (*M* = 3.464, *SD* = .2756). The GPA was statistically significant at the $p < .01$ level ($p = <.001$) with a $\beta = .335$. Grade Point Average was the strongest individual contributor to knowledge. GPA was statistically significant for self-efficacy at the $p < .05$ ($p = .027$) with a $\beta = -.189$, making it the second strongest contributing variable for self-efficacy, just behind gender. Participants with higher GPAs entering their senior year courses achieved higher scores in knowledge on the BKAT-8 and lower scores in self-efficacy on the NSSES.

Prior experience. The majority of participants stated they had no prior acute care clinical experience (70.4%, $n = 95$). Those participants with experience claimed working as a Certified Nursing Assistant (CNA) (23.7%, $n = 32$), a Licensed Practical Nurse (LPN) (1.5%, $n = 2$), an Emergency Medical Service Technician (EMS) (2.2%, $n = 3$), and other (2.2%, $n = 3$). Other was described as medication technician. Those with EMS experience achieved higher scores in both knowledge (*M* = 72.333, *SD* = 3.480) and self-efficacy (*M* = 3.103, *SD* = .324). Prior experience in the acute care setting was not statistically significant for either knowledge ($p = .064$) or self-efficacy ($p = .076$).

Preferred initial employment. Overall, more than half of the participants preferred to have their initial employment placement in the emergency room (ER) or in the intensive care units (ICU) (59.2%, $n = 80$). A smaller percentage of participants, 11.9 %, ($n = 16$) chose medical-surgical floors for initial placement, and 28.9% ($n = 39$) participants were unsure which nursing specialty they would like to start their careers as nurses. Those participants with a desire to work in the ER or ICU setting scored highest on the NSSES ($M = 2.820$, $SD = .061$); however, those who chose the medical-surgical units achieved the highest scores in knowledge ($M = 66.000$, $SD = 1.749$). Participants' preference for job location was not statistically significant for knowledge ($p = .245$) or self-efficacy ($p = .894$).

Predictor Variable Critical Care Clinical Hours

Clinical hours in critical care areas, such as the emergency room or various intensive care units, required hands-on patient care experiences. The distribution of clinical hours was reported in Chapter Four. The highest scoring group in the knowledge ($N = 135$) assessment was those with 110 hours in critical care nursing clinical hours ($M = 67.167$, $SD = .940$), and those with the highest NSSES ($N = 133$) score was found in the group with 145 hours in the clinical setting ($M = 2.996$, $SD = .107$). The number of clinical hours was not individually statistically significant for knowledge ($p = .835$) nor for self-efficacy ($p = .206$); however, the overall model was statistically significant for its predictive ability.

Predictor Variable Critical Care Simulation Hours

Simulation experiences took place in a dedicated critical care simulation lab complete with high fidelity manikins, crash carts, and live defibrillators. Simulation scenarios included, but were not limited to, cardiac compromise, acute coronary infarctions, pulmonary failure, stroke, and trauma or burn situations. Most participants did not partake in the optional simulation experiences (61.5%, *n* = 83). The full explanation of simulation hours was explained in Chapter Four. Those participants completing 20 hours in simulation scored the highest BKAT-8 (*N* = 135) scores (*M* = 8.182, *SD* = 1.165) and NSSES (*N* = 133) scores (*M* = 3.056, *SD* = .088). Simulation was not individually statistically significant for knowledge (*p* = .082) nor for self-efficacy (*p* = .235). However, the addition of its contribution to the model was statistically significant for its predictive ability.

Theoretical Implications

The results of this study did appear to support all three theories used as a foundation for this study. Benner's Novice to Expert Theory states that through increased experiences in a specific nursing specialty, nurses gain knowledge and comfort (Benner, 2001). The more frequently a nurse works with that particular patient population the more he or she becomes an expert in the care of that patient population (Benner, 2001). This current study supported that with increased hands-on experiences in the critical care setting and in critical care based simulations, participants increased scores for both knowledge and self-efficacy.

Bandura's Social Learning Theory extrapolates that individuals can learn through the process of observation (Bandura, 1977). Through observing others in particular situations, individuals can acquire new knowledge as well as support previously learned behaviors, and these experiences improve self-efficacy. Increased hours in simulation where participants actively participated as well as observed the actions of others did increase self-efficacy and knowledge; the completion of 20 hours of simulation created the biggest impact on both criterion variables which was less than those who completed 36 hours of simulation. The 20 hours of simulation mean (*M*) for self-efficacy as measured by the NSSES (*N* = 133) was 3.056, while those with 36 hours of simulation had a mean score of 2.972.

This current study offered further support for Kolb's Experiential Learning Theory. Kolb's theory concludes that through experiences individuals learn knowledge, critical thinking, and other skills (Kolb, 1984). In this current study, nursing students were coupled with an experienced nurse in a specific clinical setting. Completing 40 to 145 clinical hours with the same preceptor did impact both knowledge and self-efficacy. In this study, knowledge as assessed by the BKAT-8 (N = 135) did increase with increased experiences. For critical care clinical hours, 110 completed hours created the highest BKAT-8 score and 20 hours of simulation created the highest BKAT-8 score. Interestingly, the mean score of those participants with 145 hours of critical care clinical and 36 hours of simulation (M = .278) was less than the mean score of those participants with 110 hours in critical care clinical and 20 in simulation (M = .915).

Practical Implications

An increase in clinical hours and in simulation hours did show a positive correlation to knowledge and self-efficacy. The addition of their contribution to the overall predictive model was significant. These results suggest that adding increased critical care clinical hours under the supervision of a preceptor (a nurse experienced within the unit and with the patient population) and increased critical care simulation hours can predict a positive change in knowledge as measured by the BKAT-8 and in self-efficacy as assessed by the NSSES.

These results are supported by a recently published study by the National Council of State Boards of Nursing (NCSBN). Hayden, et al. (2014) discovered that simulation could be used to support traditional clinical experiences in pre-licensure programs. Though their study did not fully explore the comparison of critical care clinical hours and simulation hours in this specific nursing care setting, this study does support that the combination of clinical hours and simulation hours could be used to predict the pre-licensure nursing students' knowledge and self-efficacy. Hayden, et al. (2014) suggest that up to 50% of clinical hours could be substituted with simulation when structured by experienced and trained faculty. With the need for increased nurse graduates and the limitations of clinical sites, nurse educators should consider adding simulation experiences for critical care courses to better prepare new graduates entering into the ER and ICU settings following graduation.

Limitations

Limitations for this current study were related to single-site testing, participant pool, and lack of randomization. A single site was necessary to ensure similar university and school of nursing philosophies, nursing faculty interactions and pedagogy, and variations in clinical and simulation options. However, the use of one site did limit generalizability to other nursing students and schools of nursing throughout the United States.

Also, limiting generalizability was the sample group, which was one of convenience; the lack of randomization may impact generalizability of the data results. As members of the sample group self-selected participation in increased hands-on critical care clinicals and critical care simulation experiences, generalizability may not be applicable to other senior nursing students. The participant group was mostly female Caucasians between the ages of 20-25. This limited the study's generalizability to older students and second degree students, as well as male or non-Caucasian students. As previously stated, the National League for Nursing (2012) reported that the nursing student population enrolled in baccalaureate programs was 86% female, 84% less than 30 years old, and 67% Caucasian; this current study population, which only considered senior level nursing students, was much less diverse at 88.9% female, 97.8% less than 30 years old, and 92.6% Caucasian.

The nature of a self-reporting survey, such as the NSSES, offered some limitations as well. The participants may have created an unintentional social desirability bias, trying to please nursing faculty. Processes were followed to attempt prevention of this potential bias. The primary researcher was not identified prior to or during the data collection phase.

While participation was voluntary, the survey was administered during a senior level nursing course. Due to this, participants may have believed that they needed to participate, and, therefore, they may have been biased in their agreement to participate. The script read by the research assistant indicated that the survey was voluntary and participants did not have to participate if they wished.

Researcher anonymity and offering participation to the entire senior nursing class made an attempt to prevent or minimize the effects of these stated limitations. Some of these limitations could be corrected through future research opportunities.

Recommendations for Future Research

Further research is recommended to assess the relationship and impact of critical care clinical hours and simulation hours on the knowledge and self-efficacy of nursing students and new graduate nurses. Increasing the number of study sites in a continuation of this study would increase the ability to generalize data across a more diverse population.

This was the first study to compare data assessed by the BKAT-8 and the NSSES. This study recommends further research be conducted that would assess for a possible relationship between knowledge, as assessed by the BKAT-8, and self-efficacy, as measured by the NSSES. The small-to-moderate relationship between clinical hours and simulation hours in relation to the outcomes of the BKAT-8 and NSSES was determined in this study; however, the question remains whether or not there is a relationship between the two instrument outcomes. Further tests related to the correlation between the BKAT-8 and the NSSES would add value to the body of research for nurse educators.

As previously reviewed, past studies have evaluated student self-efficacy and knowledge; however, these topics not have not been researched as related to critical care nursing concepts and skills. Future studies should consider researching the best combination of clinical and simulation hours to offer the greatest positive outcomes of the BKAT-8 and NSSES. The results of this study showed statistically significant relationships between the number of hours completed in critical care clinical experiences and simulation encounters to both the BKAT-8 and the NSSES. As the mean score of those participants with a greater number of simulation hours (36 hours) was less than the mean of those with 20 hours of simulation, further research should be completed to assess the best number of simulation hours to achieve the best knowledge and self-efficacy scores. This relationship requires further evaluation.

Following the completion of this study, the newest version of the BKAT, BKAT-9r, was released. Due to survey updates, a replicated study is recommended. As critical care practices change, knowledge must be re-examined.

Conclusion

Though limitations existed for this research study, the collected data did lay a foundation for future research. The critical care nursing specialty requires knowledgeable nurse graduates who are prepared to work in a fast-paced, high-acuity setting with patients who have complex, life-threatening disease processes such as those seen in the intensive care units and emergency rooms. This study suggests a relationship exists among critical care clinical hours and simulation with regards to knowledge and self-efficacy. In order to best prepare nursing students to practice in such environments, nurse educators must consider the contribution of clinical and simulation experiences on knowledge and self-efficacy.

As nursing education increases the use of simulation in the training of pre-licensure nursing students, more research should be performed. Simulation has been validated as an alternate option to traditional clinical experiences (Hayden, et al., 2014). The value of simulation in addition to hands-on clinical experiences for student nurses who may potentially enter the profession as bedside nurses in critical care and emergency rooms has yet to be determined. Further research is recommended to ensure students are graduating and entering the workforce with necessary knowledge and self-efficacy to improve patient outcomes.

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APPENDIX A: Permission for NSSES

From: Glenda S Stump
To: Akers, Shanna K (Nursing)
Subject: RE: NSSES permission to use request
Date: Saturday, September 28, 2013 10:32:14 AM
Dear Shanna,
You are welcome to use the Nursing Student Self-Efficacy Scale that I developed as part of my doctoral work. Please let me know if you have any further questions about it. Good luck with your
research!
Kind Regards,
Glenda
Glenda S. Stump, Ph.D.
Associate Director of Assessment & Evaluation
Teaching & Learning Laboratory
Massachusetts Institute of Technology
http://web.mit.edu/tll/

From: Akers, Shanna K (Nursing)
Sent: Saturday, September 28, 2013 9:38 AM
To: Glenda S Stump
Subject: NSSES permission to use request
Dr. Stump,
I am Shanna Akers, and I am beginning the process of my dissertation in my EdD program. I currently teach senior level critical care nursing students in an advanced program. I would like to assess their self-efficacy changes related to increased simulation and experiences in critical care areas. I will also be using tools to assess knowledge and competency differences. After reading your dissertation, I believe that your Nursing Student Self-Efficacy Scale would be a great tool for me to assess changes in self-efficacy.
The advanced program consists of several aspects such as 260+ hours of direct patient care in ICU and ER settings, multiple observations (CVOR, Flight Nursing, etc.), and obtaining ACLS certification. I believe that these students are well-prepared for these settings post-graduation. Hospital managers and educators consistently give high praise for these graduates.
Please let me know if you have any questions. Thank you for your consideration.
Shanna Akers, RN, EdS, MSN/MBA-HC, CNE
Assistant Professor/Online Chair RN-BSN Program
Department of Nursing
Liberty University | Training Champions for Christ since 1971

APPENDIX B: Permission for BKAT-8

From: Jean Toth
To: Akers, Shanna K (Nursing)
Subject: Re: Request to use BKAT-8 ORDERING INFORMATION
Date: Thursday, July 18, 2013 9:23:18 PM
Shalom Shanna:
Yes, research is an appropriate use of the BKATs. The BKAT-8 is being revised to the BKAT-9. It will be completed in 2014, spring.
There is no charge for students. Free is the Lord's provision for you. Fill out the Agreement Form, state you are a student and mail it in. See below for more information on ordering.
When you receive your copy of the BKAT, you automatically receive permission to make copies for your own use.
We want to thank you for your interest in the BKATs. I am attaching to this email, ordering information, and a list of which BKATs are available. The critical care BKATs are only available to educators and nurses currently working in critical care. The MED-SURG BKAT-8is available to medical-surgical and critical care RNs.
Please note the email address and mailing address below. The wait time to receive your BKAT(s) is 3 to 4 weeks after we receive your signed Agreement Form and check.
BKATs are not available to nurse agencies. The BKATs are copyrighted and permission must be obtained to use them.
Check out our ***website*** with three sample questions for each BKAT at www.BKAT-toth.org
Regards,
Jean C Toth, PhD, RN, MSN, CV-CNS, BCCC
Author of the BKATs
Thy Word is a lamp unto my feet (Psalm 119:105)
JT 5/24/13
Jean Toth, PhD, RN
THE BASIC KNOWLEDGE ASSESSMENT TOOL (BKAT)
Thank you for your inquiry regarding one of the Basic Knowledge Assessment Tools (BKATs) for Critical Care Nursing. **The BKATsÓare copyrighted and permission to copy and use** any of them in your professional practice can be obtained by filling out the following *Agreement Form* and sending the **original** Agreement Form. Med-surg and Critical Care RNs may order the MED-SURG BKAT. **ONLY CRITICAL CARE RNS ARE ELIGIBLE TO ORDER**
CRITICAL CARE BKATS. When you receive your BKAT, you automatically have permission to copy and use it. See below.
BKATs are not available to nurses preparing to take a BKAT, nor to staffing agencies, nor to travel nurses unless currently working in a critical care unit. No BKAT-8may be placed on any computer, including any intranet, for any purpose.
A payment of $15.00 for each test, **made out to BKAT**,is requested to cover photocopying,

postage, handling, and continued validity and reliability testing. (***If you use a personal check, make sure the address on the check is where you are currently living).*** You will receive a copy of the BKAT, the Answer Sheet, a Score Sheet, and information related to the validity and reliability, uses, and scoring of the BKAT, along with selected references. If you have any questions, please feel free to write or e-mail me. The waiting time to receive your BKAT-8is 3 to 4 weeks **after** we receive your completed Agreement Form and check.

The following BKATs are available now:

The Basic Knowledge Assessment Tool for
(Adult) Critical Care Nursing
(BKAT-8), 2009: Cost $15.00

The Basic Knowledge Assessment Tool for
Pediatric Intensive Care Nursing
(PEDS-BKAT5), 2006: Cost $15.00

The Basic Knowledge Assessment Tool for
Progressive Critical Care Nursing
(BKAT-8S), 2010: Cost $15.00

The Basic Knowledge Assessment Tool for
Neonatal Intensive Care Nursing
(NICU-BKAT4), 2009: Cost $15.00

The Basic Knowledge Assessment Tool for the
Emergency Department
(ED-BKAT2), 2012: Cost $15.00

The Basic Knowledge Assessment Tool for
Medical-Surgical Nursing
(MED-SURG BKAT), 2010: Cost $15.00

The Basic Knowledge Assessment Tool for
Pediatric-ED Nursing
(PEDS-ED BKAT), 2011: Cost $15.00

Sincerely,
Jean Toth, PhD, RN, CV-CNS, BCCC
Author of the BKATs

AGREEMENT FORM

The Med-Surg or the CRITICAL CARE RN giving and scoring the BKAT-8must sign the following Agreement Form and return it with the check for $15.00/ BKAT ordered. *Do* **not** *send by Certified Mail or Express Mail.* ***If the form is not filled out completely, it will be returned to you. You must submit an Agreement Form if you want to administer any BKAT.***

I work in Med-surg or I work in critical care and I want to order a copy of the Basic Knowledge Assessment Tool (BKAT) for critical care nursing to use in my professional practice. I agree that any copies made of the BKAT-8will **only be used by me** in my professional practice. ***I understand that I may make copies***. I understand that the BKAT-8is copyrighted and that no BKAT-8may be changed in any way. I also understand that the BKAT-8is only one measure of

basic knowledge in critical care nursing.
I agree that ***I will NOT use the BKAT(s)in screening, hiring, or firing including travelers. Also, I will not place any BKAT-8on any computer, including any intranet, for any purpose.(*****Make check out to BKAT.*****)***
____
Signature Date
Name (Printed)____
PLEASE PRINT OUT THIS PAGE [Control P], FILL IN THE INFORMATION, AND MAIL IT IN:
Highest Degree Obtained____
Are you a RN? (yes/no) Do you work in critical care? (yes/no)
Are you a critical care educator? (yes/no) Are you a critical care nurse? (yes/no)
Are you a Med-Surg Educator? (yes/no) Are you a Med-Surg nurse? (yes/no)
Are you a CCRN? (yes/no) Other Certification(s)? _______________________
Position/title____
Name of employer____
Street____
City, State, Zip code____Country______________
E-mail address____
CARE RNS MAY ORDER 1-I6 want to order the: **(Check all that apply) ONLY CRITICAL**
1. BKAT-8 Adult ICU _____
2. BKAT-8S Progressive Care _____
3. PEDS-BKAT5 Pediatric ICU _____
4. NICU-BKAT4 Neonatal ICU _____
5. ED-BKAT2 Emergency Care _____
______6_._ __P_E_D_S_-_E__D_ BKAT-8Emergency Care _____
7. MED-SURG BKAT-8Med-Surg Units _____ **[non-critical care BKAT]**
RNS WITH MED-SURG EXPERIENCE AND CRITICAL CARE NURSES MAY ORDER 7
Warm regards from BKAT,
Jean Toth, PhD, RN, CV-CNS, BCCC
Author of the BKATs
JT 5/25/13

From: "Akers, Shanna K (Nursing)"
To:
Sent: Tuesday, July 16, 2013 10:32 PM
Subject: Request to use BKAT-8
Dr. Toth,

I am currently a EdD student and a nursing professor who specialized in critical care. I teach both the critical care class and the advanced critical care program. In the program, students obtain extra hours in critical care clinicals, simulations, and several other opportunities.
As part of my dissertation, I would like to use the BKAT-8 to test all of our graduating students knowledge to help determine if the program actually improves their knowledge as we feel that it does. I expect about 180 participants.
I appreciate your consideration of this request.

Shanna Akers, RN, EdS, MSN/MBA-HC
Assistant Professor/Director RN-BSN Program
Department of Nursing
Liberty University | Training Champions for Christ since 1971

APPENDIX C: Consent

Consent to Participate

You are being asked to participate in a research study looking at nursing education, specifically related to senior level nursing education.

What is the study about?

The purpose of this study is to examine the experiences and educational outcomes for senior level nursing students.

What will you are asked to do?

During the first part of the research process, you will be asked to complete a survey that will take approximately 120 minutes to complete. Prior to graduation, you will be asked to take a second survey lasting 120 minutes.

Risks and benefits:

Risks to this study are minimal and are no more than you would encounter frequently as a student. If you experience test anxiety, please note that this survey does not impact your grade in any way.

There are no direct benefits to participation . A benefit to this study is a better understanding senior level nursing education, and this is a benefit to society.

Compensation:

No compensation for participation

Confidentiality:

Survey results will be kept confidential. Identifying data on electronic sources will be destroyed once pre and post surveys are connected. All data will be in a secure, locked file and/or password protected document.

Taking part is voluntary:

Participation in the study is strictly voluntary. You may fully participate or withdraw at any time with no concerns. You may also choose not to answer questions from the survey.

Questions:

If you have any questions, please contact the nursing department secretary. After data collection is complete and analyzed, you may request a copy of the overall results.

If you have any questions or concerns regarding this study and would like to talk to someone other than the nursing department secretary, you are encouraged to contact the Institutional Review Board, 1971 University Blvd, Suite 1837, Lynchburg, VA 24515 or email at irb@liberty.edu.

You can request a copy of this form to keep for your records. By signing below you agree to participate in the study.

(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS IRB APPROVAL INFORMATION WITH CURRENT DATES HAS BEEN ADDED TO THIS DOCUMENT.)

Your signature: __________________________Date: ____________________________

Your name (printed): ____

If you would like a copy of the overall results, include your email address:_________________

The Liberty University Institutional Review Board has approved this document for use from 8/21/14 to ______
Protocol # 1949.082114

APPENDIX D: Demographic Data

Demographic Data

LU ID number: ____________________

Is this your 1st or 2nd Semester of Senior year? 1st 2nd

Have you worked in health care as an: LPN CNA EMS Other ___________

Gender: M F

Age: 20-25 26-30 31-35 36-40 >41

What is your ethnicity? Asian/Pacific Islander African American

Caucasian Latino/Hispanic Other___________

State or Nation of Birth ______________________

Is English your primary language? Yes No If no, what is your primary language

____

What specialty of nursing would you like to start in? _________________ In five years?

____

Area of Clinical for Critical Care: STICU MICU NICU CTICU

Area of Clinical for Leadership:

Centra: STICU MICU NICU CTICU ER PCU Med-Surg Other________

Carilion: NTICU CVRU MICU ER PCU Other__________

UVA: STBICU CVRU CCU ER NICU MICU Other_________

Richmond: ICU ER Other________

Did you or will you participate in the Adult CCCP? ___________ M-C CCCP?_________