

Predictors of First-Time Success on NCLEX-RN in One
Baccalaureate Program in Southern Georgia

A Thesis submitted
to the Graduate School
Valdosta State University

in partial fulfillment of requirements
for the degree of

MASTER OF SCIENCE IN NURSING

in the College of Nursing

July 2012

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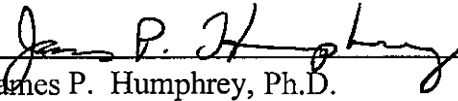
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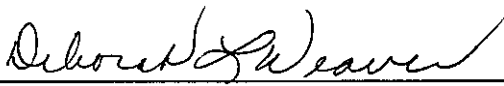
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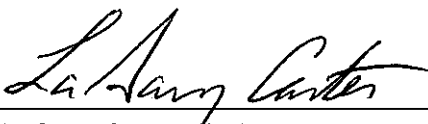
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ABSTRACT

The current nursing shortage and lower than desired pass rates require nurse educators to identify and retain students with the greatest likelihood of success. Nationally, nurse educators seek understanding of predictors of graduates' success or failure. Identifying at-risk students may enable nurse educators to make necessary changes in selection criteria, progression criteria, and in the nursing curriculum. The purpose of this study was to identify predictors of success on National Council Licensure Examination for Registered Nurses (NCLEX-RN) in one southern university college of nursing baccalaureate program.

Numerous studies have identified both academic and non-academic variables as predictors of success. External standardized testing products have gained popularity for establishing progression criteria. This study investigated the Assessment Technologies Institute-Comprehensive Assessment and Review Program® product, science, and core course grades, nursing course grades, and cumulative grade point averages upon graduation. The research approach to this study utilized a quantitative *ex-post facto* design. The participants comprised a deliberate convenience sample of 158 Bachelor of Science in Nursing (BSN) degree-prepared graduates. Data analysis utilized the Statistical Package for Social Sciences (SPSS Student Version 18.0; IBM Cooperation, Armonk, NY) to answer questions and test hypotheses. Relationships among variables were analyzed with the *t* test of independent samples and the correlation coefficient *r*. The results indicated significant correlations between ATI-CARP® test scores, Anatomy and Physiology I, Growth and Development, and grades in five nursing theory courses and the NCLEX-RN first-attempt outcomes ($p < 0.05$).

This study confirms the need for faculty of BSN degree programs to identify variables within their student population that predict success in the nursing curriculum and on NCLEX-RN.

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ACKNOWLEDGEMENTS

Most importantly, I acknowledge my lord and savior, Jesus Christ, who made all of this possible by providing me with the opportunity to obtain an education and by blessing me with the intellect and fortitude needed for this accomplishment.

My gratitude is extended to Dr. James P. Humphrey, Chairperson of the thesis committee for your professional guidance and patience. I have learned so much about the research process from you.

To Dr. Weaver and Dr. Carter, I express sincere thanks for serving on my committee and providing much needed guidance along the way.

A special thank you to Dr. Susan Wold who passed away during the time I spent at VSU. She was an inspiration as a nurse educator, and I valued her instruction and guidance.

To my husband, David, for never complaining about my endeavors or how much time or money they took.

To my children and grandchildren, Kevin, Tory, Adam, Gauge, and Hunter Priest, who have always understood that I had goals to accomplish which would take me away from them at times. Thank you for always being proud of my accomplishments.

To my mother, Ernestine, you have always believed in me, and I could not have done this without your inspiration.

DEDICATION

This work is dedicated to my family, especially my mother, who have believed in me, inspired me, cheered me, and loved me. Thank you for all the joy that each of you bring into my life each day. I love you.

Chapter I

INTRODUCTION

The ultimate goal of a graduate from an accredited school of nursing is passing the National Council Licensure Examination for Registered Nurses (NCLEX-RN). The ultimate goal of nurse educators is that graduates pass the NCLEX-RN. Successful completion of the nursing program and graduation do not ensure a nursing job. The graduate nurse must be licensed to be employed as a registered nurse. How then can nurse educators predict which students will be successful on the NCLEX-RN and provide the necessary interventions for those who are not predicted to be successful?

The National Council on State Boards of Nursing (NCSBN) develops two licensure examinations, the NCLEX-RN and the National Council Licensure Examination for Practical Nurses (NCLEX-PN), which are used by state and territorial boards of nursing to assist in making licensure decisions. The impetus for the creation of the NCSBN arose from recognition by the American Nurses Association (ANA) Council on State Boards of Nursing that in order to guard the safety of the public, the regulation process needed to be a separate entity from the organization representing professional nurses. The member boards are comprised by the boards of nursing from each state and territory. These state boards are charged with the responsibility of providing regulatory excellence for public health, safety, and welfare (NCSBN, 2011).

In 1994, the first computerized adaptive test (CAT) was used to test graduate nurses. The test is scored as either pass or fail. Prior to the CAT, the test was a five-part paper and pencil examination that took two days to complete. At the time of the first CAT, the passing standard was -0.4766 logits. The national NCLEX-RN pass rate declined over the years from 1998-2002 with a score of 83.8% in 2002 and a slight increase in 2003 to 87%. In 2004, the passing standard

changed again from -0.35 logits to -0.28 logits, and the pass rates dipped to 85% but rebounded in 2005 to 87%. Once again, the passing standard was increased in 2007 to -0.21 logits, and the scores again dropped to 85% with a rebound in 2008 to 87% and 88% in 2009 (NCSBN, 2010). The NCSBN Board of Directors decided at the December 2009 meeting to raise the NCLEX-RN standard. The NCLEX-RN passing standard was changed from -0.21 to -0.16 logits. This passing standard was implemented April 1, 2010, in conjunction with the *2010 NCLEX-RN Test Plan* (NCSBN, 2011). Though there have been increases in scores, failures translate into graduates who are unable to practice nursing.

The Georgia Board of Nursing (GBN) requires an 80% first-time pass rate on NCLEX-RN be maintained over four years for approval of a nursing program. If this percentage is not maintained, the board may withdraw approval (GBN, 2009). Nursing programs are in jeopardy if they do not maintain this average. Other accrediting agencies, such as the Commission on Collegiate Nursing Education (CCNE), examine board pass rates as a standard for accreditation (American Association of Colleges of Nursing [AACN], 2010). The NCLEX-RN is a high-stakes examination, therefore, for students and educators. The ability to predict those likely to succeed is a critical element for nurse educators.

The nursing shortage is another factor that must be considered by nurse educators. According to the Bureau of Labor Statistics (BLS), more than 2.9 million registered nurses will be employed by the year 2012, up 623,000 from the nearly 2.3 million Registered Nurses (RNs) employed in 2002. However, the total job openings, which include both job growth and the net replacement of nurses, will be more than 1.1 million (BLS, 2010). This growth, coupled with current trends of registered nurses retiring or leaving the profession and fewer new nurses, could lead to a nursing shortage of more than one million nurses by the end of this decade (ANA, 2010). Graduates must be successful on the NCLEX-RN on the first attempt if they are to impact this shortage.

Nurse educators are compelled to prepare students to be successful on licensure examinations. Identifying predictors of success is critical to the process. Numerous studies have been conducted that indicate that multiple variables, such as high Scholastic Aptitude Test (SAT) scores; high grade point averages (GPAs); low rates of repeated nursing courses; high grades in science courses; increased confidence in testing abilities; increased preadmission scores on math and reading assessments; and increased school use of external testing programs, are indicators of likely success on NCLEX-RN (Sayles, Shelton, & Powell, 2003; Haas, Nugent, & Rule, 2004; Beet-Bejos, 2005; Muecke, 2008; Vandenhouten, 2008).

Most schools of nursing have adopted progression policies to ensure that school licensure pass rates remain at acceptable levels. This is sometimes based on a single test score on a predictive examination, such as the Health Education Systems, INC Exit Exams® (HESI E2®), The Mosby Assess Test™, or the Assessment Technologies Institute (ATI) Comprehensive Predictor® (Spurlock & Hanks, 2006; Morin, 2006). The evidence has shown that success on NCLEX-RN is multifactorial, and those factors should be considered when establishing progression policies. Spurlock and Hanks (2006) urged nurse educators to institute progression policies that identify at-risk students as early in the program as possible so that remediation can be begun immediately. In some cases students may be identified as unlikely to succeed and be prevented from advancing in the program, which will limit their financial investment and the use of school resources. Progression policies have high-stakes, and nursing faculty are challenged to adopt policies that ensure that students most likely to be successful are admitted to the program and allowed to graduate and sit for the licensure examination. Schools of nursing must evaluate standardized testing products and select the product that will be the best investment for the student and the school.

Statement of the Problem

The current nursing shortage and lower than desired national pass rates on NCLEX-RN continues to require nurse educators to identify students at risk for failure. First time NCLEX-RN

pass rates are the long time gold standard signifying nursing program quality (Giddens, 2009). The national passing average for BSN candidates taking the NCLEX-RN in 2009 was 88% (NCSBN, 2011). The pass rates of a southern university baccalaureate school of nursing selected as the study site for this investigation were 81% in 2009 and 87% in 2010, which were below the 88% national average (GBN, 2011). Some state boards of nursing require evidence of intervention if pass rates fall below the required percentage. The Georgia Board of Nursing requires a minimum pass rate of 80% in any calendar year and an 80% average over the previous four years. Program approval is contingent upon maintaining a certain pass rate, usually 80%. State board approval is important to nursing education programs. For students to be eligible to sit for the NCLEX-RN the state board of nursing must approve the program (Beet-Bejos, 2005); therefore, maintaining board approval is crucial.

Purpose of the Study

This study partially replicated a previous study done in 2005 by Beet-Bejos and

1. compared specific academic variables, such as grades in core science courses and nursing courses, cumulative GPA, and Assessment Technologies Institute Comprehensive Assessment and Review Program® (ATI-CARP®) scores, related to student first-time performance on the NCLEX-RN at one southern university baccalaureate nursing program to those found in the literature; and
2. identified predictors for success on the NCLEX-RN in one southern university baccalaureate nursing program.

There continues to be a need for studies that will generate institutional data to direct the process of determining which students are most likely to be successful on the NCLEX-RN. No single set of predictors has been identified. Therefore, it is necessary for each school of nursing to examine its own data. Identifying predictors that are unique to a program (individual scores), as well as those that transfer across programs (standardized test scores), could benefit students and schools of nursing. Identifying predictors of success may result in changes in selection criteria,

progression criteria, and curriculum changes. Early identification of at-risk students may allow for earlier intervention and increase the likelihood of passing the NCLEX-RN (Stuenkel, 2002). The purpose of this study was to partially replicate a study done in 2005 that compared specific academic variables related to student performance on the NCLEX-RN to those found in the literature, and determined predictors for first-time success rates on NCLEX-RN in one southern Georgia university baccalaureate nursing degree program. This study also sought to determine whether the current external testing product, ATI-CARP®, was a predictor of success for those taking the NCLEX-RN for the first time.

Background and Significance

The United States is in the midst of a shortage of RNs that is expected to intensify as baby boomers age and the need for health care grows. Compounding the problem is the fact that nursing schools across the country are struggling to expand enrollment to meet the rising demands for nursing care (AACN, 2010). The downturn in the economy has eased the nursing shortage in many parts of the country, but most analysts believe that this is temporary. The Tri-Council, made up of the AACN, ANA, and the American Organization of Nurse Executives (AONE), raises serious concerns about slowing the production of RNs given the demand for nursing services (AACN, 2010). The BLS projected that more than 581,500 new RN positions will be created through 2018, which would increase the size of the RN workforce by 22%.

Employment of RNs is expected to grow much faster than the average when compared to all other professions (BLS, 2011). In the July/August 2009 issue of *Health Affairs*, Buerhaus and coauthors found that despite the current easing of the nursing shortage resulting from the recession, the U.S. nursing shortage is projected to grow to 260,000 RNs by 2025. A shortage of this magnitude would be twice as large as any nursing shortage experienced in this country since the mid-1960s. An aging workforce, according to Buerhaus et al. (2009), is a primary contributor to the projected shortage. Other contributing factors include a shortage of nursing school faculty,

increasing stress levels related to insufficient staffing, and decreased job satisfaction (AACN, 2010).

Passing the NCLEX-RN is the ultimate goal of a student entering a nursing program. Graduates of nursing programs cannot be employed as RNs until they pass the licensure examination. A diploma in nursing from a college or university is of no value to the graduate without a license to practice nursing. The time, money, and emotional investments are too great for the student to complete all requirements and fail the licensure exam. New graduates replenish the pool that is diminished by illness, death, retirement, and self-selected change of profession.

According to Williams and Hodges (2002), the nursing shortage predicted for 2007 actually began in 2000. Though there were many factors affecting the nursing shortage, one in particular was the number of students who failed the NCLEX-RN. To address this issue, it is imperative for nursing education to prepare students for the profession, to identify methods of predicting those students who are likely to be successful on NCLEX-RN, and to establish progression policies that begin early in the program for those who are not expected to be successful.

The quality of an undergraduate nursing program is assessed using multiple indicators, including the National League for Nursing Accrediting Commission, Inc. (NLNAC) and the CCNE. Despite this, the one indicator among all others that draws the most attention is the NCLEX-RN first-time pass rates (Giddens, 2009). Low first-time NCLEX-RN pass rates have the potential for serious adverse effects on a program's continued reputation, as well as recruitment of potential students (Harding, 2010).

Clearly, it is important for nurse educators to evaluate methods of selecting, educating, and retaining students who will be the professionals of tomorrow (Uyehara, Magnussen, Itano, & Zhang, 2007). An increased number of research studies have examined predictors for academic success in nursing schools, and the predictive power of cognitive factors, such as the SAT, GPAs,

(pre-nursing courses, nursing courses, and graduation), as well as nursing and science courses, is well supported in the literature (Beet-Bejos, 2005).

Research Question

One research question was developed for this investigation. What variables are predictors for first-time success on NCLEX-RN for baccalaureate nursing graduates from one southern Georgia university college of nursing?

Hypotheses

The following hypotheses were developed from the review of the literature, as well as implications from the theoretical framework:

1. H1: Higher scores on the ATI-CARP® tests increase the likelihood of passing the NCLEX-RN on the first attempt by baccalaureate degree-prepared nursing students from one southern Georgia university college of nursing.
2. H2: Higher cumulative GPAs for science courses and nursing theory courses increase the likelihood of passing the NCLEX-RN on the first attempt by baccalaureate degree-prepared nursing students from one southern Georgia university college of nursing.
3. H3: Higher cumulative GPAs increase the likelihood of passing the NCLEX-RN on the first attempt by baccalaureate degree-prepared nursing students from one southern Georgia university college of nursing.

Delineation of Variables

The research variables in this study were as follows: graduates' first-time performance on the NCLEX-RN and the predictors used in assessing students' readiness for the NCLEX-RN: ATI testing scores, grades in core science courses, and cumulative GPAs.

Definition of Terms

For the purpose of this study, the definitions of terms were the Assessment Technology Institute (ATI) test definitions from the ATI Web site's faculty resources:

Adult Medical-Surgical Nursing: A test that assesses a student's basic comprehension and mastery of adult medical-surgical nursing principles related to the care of clients with respiratory, cardiovascular, hematologic, fluid and electrolyte, renal and urinary, endocrine, gastrointestinal, integumentary, neurosensory, musculoskeletal, lymph, immune, and infectious disorders.

Community Health Nursing: A test that assesses a student's knowledge of foundations of principles of community health.

Comprehensive Predictor® Assessments: proctored assessments comprised of multiple-choice questions in all areas studied throughout the program to help determine a student's preparedness for the NCLEX-RN.

Fundamentals: A test to assess a student's basic comprehension and mastery of the fundamental principles for nursing practice.

Leadership: A test to assess a student's basic comprehension and mastery of leadership and management principles.

Maternal Newborn Nursing: A test that assesses a student's basic comprehension and mastery of maternal newborn nursing principles.

Mental Health Nursing: A test to assess a student's basic comprehension and mastery of mental health nursing principles.

Nursing Care of Children: A test to assess a student's basic comprehension and mastery of the principles of nursing care of children.

Nutrition: A test to assess a student's basic comprehension and mastery of nutrition for nursing principles.

Pharmacology: A test to assess a student's basic comprehension and mastery of pharmacologic principles and knowledge of prototype drugs.

Test of Essential Academic Skills (TEAS®): A multiple-choice assessment of basic academic knowledge in reading, mathematics, science, and English language usage. The objectives

assessed on the TEAS® examination are those which nurse educators deemed most appropriate and relevant to measure entry-level skills and abilities of nursing program applicants.

Conceptual Framework

This study was based on the concepts of Rothman's Action Evaluation (Rothman, 1997; Rothman & Friedman, 1999) which focused on defining, monitoring, and assessing success and Futch's model (Futch, 2003) which can be used to predict outcomes based on student and program contributions. Both models suggest that progressive evaluation is essential to successful outcomes.

Action Evaluation (AE) is intended to help all key project stakeholders interactively define their shared goals from the outset and as the work of the project or organization evolves, continuously monitor the congruence between their goals and their actions. AE helps organizations or projects achieve success by deriving goals in a reflective and participatory manner. In contrast to more traditional methods of evaluation, AE is seamlessly integrated with program development and implementation and is designed to be used in a wide range of settings by professional staff. Evaluation should be integrated into program development itself to help an organization define, assess, and ultimately successfully achieve its goals. Such evaluation, integrated into each step of a program, can significantly enhance program design and effectiveness. AE incorporates goal setting, monitoring, and evaluation into an organization's life rather than seeing these as distinct activities to be conducted independently and at different points in time (Rothman, 1997).

AE promotes project success by helping participants define and then formatively redefine success, to forge effective action, and make success a self-fulfilling prophecy. Too often, the criteria of success are imposed upon a conflict-resolution initiative from the outside, without seeking meaningful and sustained input of the various groups involved in the conflict or intervention. AE gathers and organizes input and ownership by those involved, by assisting them to create their own criteria for success. Thus, by defining and seeking success in a continuous,

integrative way, AE is both an evaluation and an intervention tool (Rothman, 1997; Rothman & Friedman, 1999).

The stages of AE are:

1. Establishing a baseline for undertaking an assessment that includes a systemic process for cooperative goal setting, team building, and participatory decision making within and between various stakeholder groups. This stage focuses on clarifying definitions of success and by making a program's theory of action tacit by clarifying what are the stakeholders' relevant goals, and how the goals are to be achieved. Data related to these questions are collected, analyzed, and fed back to the program stakeholders. The output of the baseline explains the program theory and gives an action plan to which the theory can be applied (Rothman, 1997; Rothman & Friedman, 1999).
2. A formative stage during which participants refine their goals and develop strategies for overcoming obstacles to achieving them. An underlying assumption of action evaluation is that goal setting is a process that continues throughout the life of a project. No matter how well participants articulate and agree upon goals at the baseline, they may discover new goals and opportunities as they go along. As resistance and other obstacles to implementation are encountered, goals need to be reconsidered. Project participants may discover that there is a gap between what they say they want (espoused goals) and what they are actually doing in practice (implicit goals). The formative stage uses the awareness of discoveries, gaps, and contradictions as opportunities for reshaping and fine-tuning project design. During the formative stage, project stakeholders function as reflective practitioners by standing outside the situation, becoming aware of their actual goals and strategies for action, and experimenting with new ones (Rothman, 1997; Rothman & Friedman, 1999).

3. A summative stage that focuses on making judgments about the overall merit of a project and on generalizing from the program's cumulative experience to other similar situations—in the sense of building a repertoire of exemplars that enable planners and practitioners to recognize the similarities and the uniqueness of related problem situations. In the summative stage, stakeholders examine whether they have reached specified goals, and ask themselves, “why?” or “why not?” Stakeholders ask themselves how and what can be done differently or better (Rothman, 1997; Rothman & Friedman, 1999).

The Futch model (2003) is used to predict outcomes based on student and program contributions and to understand the testing experience. This model predicts a positive relationship between scores on the NCLEX-RN examination and selected variables, such as high scores on the SAT; high GPAs; minimal repeated nursing courses; minimal repeated science courses; increased confidence in testing abilities; increased school use of external testing plans; increased student participation in student support groups; demographic factors; and the relationship between graduation and testing with enough time for remediation. Program and student contributions are predicted to result in a student's success or failure in passing the NCLEX-RN examination on the first attempt because each variable acts synergistically (Futch, 2003).

Assumptions

Assumptions identified for this study include:

1. Students who score higher on ATI-CARP® tests are more likely to pass NCLEX-RN on the first attempt;
2. External evaluation, such as the ATI-CARP®, can enhance a nursing curriculum and strengthen the NCLEX-RN pass rate; and
3. Students who consistently score higher in nursing courses and science courses are more likely to pass NCLEX-RN on the first-attempt.

Limitations

The limitations of this study included:

1. This study was limited to archival data at the southern university that was the focus of this research, and
2. The findings of the study cannot be generalized to other colleges of nursing.

Summary

Passing the NCLEX-RN on the first attempt is of crucial importance to the graduate and the nursing program. The graduate must pass this high-stakes examination to be licensed and start to work as a RN. The time, money, and emotions invested into the nursing program are of no value to the graduate who is unsuccessful on the NCLEX-RN. The nursing program is critiqued by the number of first-time test takers passing the examination and is required to maintain an 80% pass-rate every calendar year and an 80% average over the previous four years to maintain GBN approval (GBN, 2009). Candidates for licensure must graduate from a board-approved program to be eligible to sit for the NCLEX-RN. Accrediting agencies also examine first-time pass rates as a standard for accreditation for schools of nursing.

The current nursing shortage and lower than desired pass rates on NCLEX-RN continues to require nurse educators to identify students at risk for failure. The pass rates of this southern university college of nursing were less than the national average 2007-2010 (GBN 2010). This indicates a continued need to examine institutional data for the purpose of identifying variables that will predict those students who are most likely to be successful on the NCLEX-RN.

Nationally, nurse educators continue to seek understanding of predictors of graduates' success or failure. Identifying predictors of success may enable nurse educators to make necessary changes in selection criteria, progression criteria, and in the curriculum (Stuenkel, 2002). Early identification of at-risk students will promote timely intervention to optimize students' success on the NCLEX-RN (Beet-Bejos, 2005). The AE (Rothman, 1997) and Futch (2003) models suggest that progressive evaluations in a program are essential to successful outcomes. Based on the use of reliable data, individualized plans for at-risk students can be

developed to strengthen cognitive areas needing further development (Haas, Nugent, & Rule, 2004). This study partially replicated a study done by Beet-Bejos (2005) that compared specific variables related to student performance on the NCLEX-RN examination to those found in the literature, determined predictors for first-time success rates on NCLEX-RN examinations, and made recommendations for student first-time success on the NCLEX-RN.

Chapter II

REVIEW OF THE LITERATURE

This chapter will provide a review of the literature related to the predictors of readiness for NCLEX-RN, as well as the standardized testing products of ATI-CARP®. Predicting success on the NCLEX-RN continues to be an important endeavor for colleges of nursing. For decades, nurse educators have searched for the variables that predict which students are likely to pass the NCLEX-RN. The current nursing shortage, changing demographics, and the use of first-time NCLEX-RN pass rates as a critical benchmark indicating program success reinforces the need to be proactive in predicting student success on the NCLEX-RN (Beet-Bejos, 2005).

Review of Relevant Literature

Numerous studies have been conducted over the past two decades in search of predictors of success in nursing school and on the NCLEX-RN. The predictive power of the traditional cognitive factors, such as the SAT, GPA (pre-nursing, nursing, and graduation), as well as nursing and science courses, is well supported in the literature as valid predictors of success on the NCLEX-RN (Lengacher & Keller, 1990; Alexander & Brophy, 1997; Endres, 1997; Briscoe & Anema, 1999; Sayles, Shelton, & Powell, 2003; Waterhouse & Beeman, 2003; Haas, Nugent, & Rule, 2004; Beet-Bejos, 2005; Harris, 2006; Uyehara et al., 2007; Humphreys, 2008). Table 1 summarizes traditional cognitive predictors.

Table 1 *Research on Traditional Cognitive Predictors*

Researchers	Program	Participants	Significant Predictors
Alexander & Brophy (1997)	BSN	188	Nursing course grades
Beet-Bejos (2005)	BSN	155	Nursing course grades, ERI NET
Briscoe & Anema (1999)	ADN	38	Standardized tests, age, & race
Haas, Nugent, & Rule (2003)	BSN	317	Existing student data; cumulative GPA
Humphreys (2008)	AD/BSN	337	Nursing & science course grades, cumulative GPA, pharmacology grades, ACT scores, and HESI-E2 and ATI comprehensive.
Endres (1997)	BSN	150	Nursing course grades
Lengacher & Keller (1990)	ADN	146	Exit GPA, ACT composite, NLN Basics I & II, nursing course grades
Tipton, Pulliam, Beckworth, Illich, Griggin, & Tibbitt (2008)	ADN	385	Cumulative nursing grades
Uyehara, Magnussen, Itano, & Zhang (2007)	BSN	288	Exit GPA, nursing course grades

Note. ADN = Associate Degree in Nursing; ERI Net = Educational Resources, Inc. Nurse Entrance Test®; ACT = American College Testing; NLN = National League for Nursing

Lengacher & Keller (1990) conducted a study to examine relationships between selected variables and performance on NCLEX-RN. Data were attained from records of 146 associate degree graduates who were admitted to an associate degree program in nursing. For graduates who wrote the NCLEX-RN examination in July 1987 and July 1988, Pearson product moment correlations and stepwise multiple regression analyses were used to identify the relationship between the predictor variables (admission criteria, age, perception of role strain, achievement in clinical and nursing courses), achievement on NLN examinations, exit GPA, and the criterion variable (scores on the NCLEX-RN examination). The best predictor for performance on the

NCLEX-RN of the selected admission variables, age, perception of role strain, exit GPA, and ACT were, exit GPA, and ACT composite scores. The ACT math, ACT English scores, entrance GPA, age, and perception of role strain had no predictive value. The best predictor for performance on the NCLEX-RN of nursing theory course and clinical course grades were two theory courses in the second year of the program. The best predictor for performance on the NCLEX-RN of National League for Nursing (NLN) examinations were the Basics Two Examination and the Psychiatric Nursing Examination. The NLN Basic One and Basic Three Examinations had no predictive value. These findings indicated that nurse educators could identify students early in the student's nursing program who would be successful on the NCLEX-RN or those who would be at risk for failure (Lengacher, 1990).

A five-year study of graduates' performance on NCLEX-RN was conducted by Alexander and Brophy (1997) using data from July 1988-February 1994 related to the "new test plan" with pass/fail results for NCLEX-RN. A quota sampling technique was used to obtain 188 baccalaureate graduates of a university school of nursing from this significant time period. Selected admission, progression, and exit variables were studied retrospectively, concluding that SAT verbal test scores, nursing course GPA, and NLN Comprehensive Achievement test scores were the strongest predictors. Alexander and Brophy (1997) noted, as do other researchers, that the pass/fail results limit statistical analysis.

Endres (1997) conducted a retrospective study concerned with identifying the strongest predictors of success for African American and foreign-born baccalaureate graduates. Three random samples of 50 African American graduates, foreign-born graduates, and Caucasian graduates were obtained from a total population of 1,206 from 1987-1992. Nine variables were studied, including: cumulative GPA, nursing course grades, numbers of Ds and Fs obtained, and percentile rank on the Mosby Assess Test™, and found when compared to Caucasian graduates' results that (a) ethnicity had no relation to NCLEX-RN scores; (b) students making Ds or Fs in nursing courses were more likely to fail NCLEX-RN; (c) students with percentile ranks lower

than 21% on the Mosby Assess Test™ were more likely to fail NCLEX-RN; and (d) graduates who passed NCLEX-RN had higher previous and cumulative GPAs.

Briscoe and Anema (1999) conducted a similar study on a convenience sample of 38 associate degree graduates from a public urban university using variables that were studied in previous studies on baccalaureate graduates. There were fewer studies done on the associate degree graduates, and the purpose of this study was to compare the results for the baccalaureate and associate degree programs. Study variables included pre-admission GPA, failing a clinical or nursing theory course, two NLN test scores, age, and race. Four variables were found to be significant predictors: NLN tests I and II, age, and race. Older students had higher pass rates on NCLEX-RN in this study with the mean age being 35 years. This study included white non-Hispanic, Black non-Hispanic, Hispanic, and African descent (international studies students from Africa) and found that all of the African descent students were unsuccessful. This indicates that the special needs of international students need closer assessment.

In a qualitative study, Eddy and Epeneter (2002) evaluated non-academic, qualitative predictors that examined the student's point of view regarding NCLEX-RN outcomes. The study was conducted at a private college in Oregon. Nineteen baccalaureate nursing students were selected randomly from the 1998 graduating class. Ten of the students were successful on the NCLEX-RN and nine were unsuccessful. The criteria included activities and feelings during the weeks around the examination, including time elapsed between graduation and testing, student preparation for the NCLEX-RN, students' feelings during the examination, environmental influences, and perceived difficulty of the examination. The second set of questions included criteria related to their nursing education, including self-perceived test-taking abilities, helpfulness of classroom activities, salience of clinical activities, needed changes in the program, needed individual change, and feelings about the outcome of the examination. These data provided a unique view of the NCLEX-RN experience with three distinct but overlapping areas of interest identified: internal learner specific issues, programmatic issues, and examination issues.

The few studies on these types of predictors have shown them to be weaker than the more robust academic predictors but provide valuable insight into declining first-time pass rates.

The purpose of a study by Haas, Nugent, and Rule (2003) was to predict student success on the NCLEX-RN. Selected variables were tested to determine their relationship with students' NCLEX-RN performance. The study variables of gender, race, age, nursing cumulative GPA (defined as the GPA for all school of nursing courses), transfer undergraduate GPA (defined as the cumulative GPA of all undergraduate courses taken prior to admission into the school of nursing), cumulative undergraduate GPA, verbal and quantitative SAT scores, and group membership according to campus location were selected because these data were collected on all students during the admission process. The nursing program is an upper-division program, with students being admitted after completing two years of general education courses and supporting pre-nursing courses. The sample population consisted of 368 students who graduated from the program between the years of 1991 and 2001. The sample was predominantly composed of Caucasian women, who were between the ages of 22 and 50 at the time of graduation. Results included the following: men are more likely to fail than women, African Americans have a higher failure rate than Caucasians, and existing student data (cumulative GPA, verbal SAT scores, age, and race) can predict student success on NCLEX-RN with a high level of accuracy.

A quantitative *ex-post facto* study by Beet-Bejos (2005) of 155 BSN graduates over a three-year period found that nursing course grades and the ERI NET® were predictive of success on NCLEX-RN. Data analysis from this study suggested that nursing course grades should be considered as important variables to identify students at risk for failure. This study also found that Anatomy and Physiology I to be the only significant science course predictive of success on NCLEX-RN.

Ueyhara et al. (2007) conducted a five-year retrospective study of 288 BSN graduates in a university undergoing curriculum changes implemented to address decreased NCLEX-RN and program success rates. Data were collected over five years after implementation of the new

curriculum, and success rates were very high. Variables included preadmission data, SAT scores, ethnicity, nursing course grades, exit nursing GPA, Mosby Assess Test™, and NLN Achievement test scores. Consistent with several other studies, the Mosby Assess Test™ scores, nursing course grades, and NLN Achievement test scores were significant predictors of success on NCLEX-RN.

The purpose of a retrospective study by Tipton et al. (2008) was to assess the role of academic performance and other variables on NCLEX-RN performance. Data were collected and analyzed from four years of classes that included 385 associate degree nursing (ADN) graduates. Specific areas examined were cumulative nursing course grades, Nursing Entrance Test (NET) scores, test taking characteristics, and stress. Statistical tests used for data analysis included percentages, means, Pearson r , chi-square, and t tests. Participants who were successful on the NCLEX-RN had very similar but statistically significant higher cumulative nursing course grades in comparison to those who failed the NCLEX-RN. Because there was very little variation in cumulative nursing course grades for both groups, subtle differences in cumulative nursing course grades were significant. Variables in this study not associated with student success included NET scores, type of test taker, and types of stress. Findings from this study suggested that even subtle differences in academic performance could be used to identify students at-risk for failing the NCLEX-RN.

Waterhouse and Beeman (2003) found that studies on nursing graduates who took the examination prior to 1988 were generally able to classify up to 86% of students or to account for up to two thirds of the variance in NCLEX-RN scores. Since 1988 with the institution of pass/fail grading on the NCLEX-RN, fewer studies have been published. This reflects the difficulty of making correlations and predicting success based exclusively on pass/fail scores that usually fall into the “pass” category. The computerized licensure examination, CAT NCLEX-RN, adopted in 1994, added yet another dimension to predictive studies, such as whether students have adequate experience in computerized test-taking.

NCLEX-RN scores began to decline in the mid-90s after implementation of CAT in 1994. Baccalaureate level candidates' pass rates of first-time examinees dropped slightly from 86.7% in 1997 to 86.4% in 2007 before rebounding to 89.49% in 2009. A slight decline to 88.69% was recently reported for 2010 examinees (NCSBN, 2010). The NCSBN reevaluates the passing standard every three years and recommends changes as deemed necessary based on results from the annual Standard Setting Surveys, which solicit the opinions of employers and educators regarding the competence of the current cohort of entry-level RNs. The passing standard was increased in 2004, 2007, and 2010. A slight reduction in pass rates is noted in each of these years (NCSBN, 2010). The average pass rate for Georgia baccalaureate degree nursing graduates for the years 2004-2010 was 89.6%, while graduates of this southern university college of nursing for the current study was 82.33% (NCSBN, 2010; GBN, 2010). These figures illustrate a need for continued research in predictors of success on the NCLEX-RN.

A downward trend of NCLEX-RN pass rates has negative implications for the reputation of nursing schools and nurse faculty. The NLNAC, the CCNE, and State Boards of Nurse Examiners all use NCLEX-RN pass rates as criteria for accreditation or approval (Sifford & McDaniel, 2005). The NCSBN raised the passing standard in 2004, 2007, and 2010 to align the examination with the current job market analysis data, suggesting a need for a higher level of practice based on patient acuity. Changes in the NCLEX-RN test plan and the increased passing standards underscore the need to reexamine curricula, the faculty role in preparing students, and interventions to promote success (Davenport, 2007). Preparing for success on NCLEX-RN is no longer viewed as final semester activity. Helping students prepare for NCLEX-RN must be an integral part of a program's educational plan. Failure to pass the NCLEX-RN delays entry into the work force and causes financial and emotional distress on the applicant. Because of the value placed on success on NCLEX-RN for both the student and the program, it is imperative that nurse educators determine predictors of success prior to graduation and candidacy (Humphreys, 2008).

Most, if not all, schools of nursing, including the southern university examined in the current study, use standardized comprehensive testing products for benchmark comparisons with other schools of nursing to assess students' preparedness for the NCLEX-RN. There are several products available on the market today (Uyehara et al., 2007). For years, the College of Nursing of this southern university used the ERI Total Testing® program as an external testing product. The ERI® was replaced a few years ago with the ATI-CARP®. Other products include the HESI®, Evolve's Prep-U™, and Mosby's Assess Test™. The HESI® is the most widely studied product, and several studies reported 97.4% or greater accuracy in predicting success on NCLEX-RN (Lauchner, Newman, & Britt, 1999; Nibert, 2003; Frith, Sewell, & Clark, 2006; Harding, 2010). Fewer studies that evaluate ATI products are available at present. Those that have been done indicate a high degree of accuracy in ATI's predictions (Davenport, 2007; Humphreys, 2008; Ukpabi, 2008). Table 2 summarizes research on standardized test products.

Table 2 *Research on Standardized Test Products*

Researcher	Program	Participants	Significant Predictor
Lauchner, Newman, & Britt (1999)	ADN BSN Diploma	1,976 520 59	Health Education Systems Inc. (HESI)
Nibert (2003)	RN LPN	6,300 1,035	HESI
Frith et al. (2006)	BSN	269	HESI and Mosby Assess Test (HESI preferred for ease of administration over Mosby's paper and pencil test)
Davenport (2007)	ADN	300	ATI TEAS and Comprehensive
Humphreys (2008)	ADN BSN	337	HESI and ATI Comprehensive
Ukpabi (2008)	BSN	39	ATI TEAS and Comprehensive
Yates (2007)	ADN	298	ATI Comprehensive, ACT, Cumulative GPA, NLN

Lauchner, Newman, and Britt (1999) conducted a study designed to determine the accuracy of computerized comprehensive nursing examinations, HESI E2s®, in predicting RN and practical nurse student success on the licensing exam. Schools of nursing that administered the HESI-E2® during the academic year 1996-97 were surveyed to determine how many students ($n = 2,809$) predicted by the HESI-E2® to pass the licensure exam had failed, and if the exam administration was monitored or proctored. Based on the findings of this study, the HESI-E2® was determined to be an accurate predictor of students' success on the licensing examination. However, it was significantly more accurate ($p = .05$) when the examination was monitored (99.49%) than unmonitored (96.82%). The HESI-E2® was determined to be highly predictive of students' success on the licensing examination for all groups tested: associate degree, baccalaureate, diploma, and practical nursing students.

Nibert (2003) surveyed over 300 registered and licensed practical nursing programs with results from over 6,000 RNs and 1,000 licensed practical nurses (LPNs) who took the HESI-E2® by conducting a descriptive comparative study of predictors. This investigator found the HESI E2® to be highly predictive of performance on the NCLEX among all programs. This study was the fourth annual study of the HESI-E2®. The percentage of students failing increased with each successive drop in scoring intervals.

One university sought to increase their declining pass rates and conducted an internal study to determine which measures, including exit examinations, would benefit their program and improve outcomes. Frith et al. (2006) compared the HESI-E2® and Mosby Assess Test™ by administering both tests to several cohorts of students (n = 269) over 2001-2005 and determined that they were comparable in predictability. The HESI-2® was selected because it is a computerized test that allows the student to practice computerized testing, and the Mosby is a pencil-and-paper test that is time consuming to grade. A one-hour-credit course was added to the curriculum to support, motivate, and test students to prepare them for the exit examination. The academic and non-academic support in the review course led to improved scores on the HESI-E2® and on the NCLEX-RN.

Harding (2010) conducted a review of the literature to assess predictability associated with exit examinations and found the HESI-E2® to be the most widely studied. There have been four major studies and several smaller studies that replicated portions of the major studies. Other frequently used products include the ERI®, ATI-CARP® and the Mosby Assess Test™. Harding concluded that end-of-program computerized testing has been found to be a consistently strong predictor of NCLEX-RN success among students who score high on the exit examination, but standardized testing should not be the sole method of determining students' readiness for graduation and the NCLEX-RN.

Davenport (2007) reported how a small Midwestern university nursing program with an enrollment of 300 BSN and ADN students chose to take a proactive and comprehensive approach

to preparing students to take the NCLEX-RN. Through the study of available research related to success on the NCLEX-RN, a proactive, comprehensive plan was developed. The ATI-CARP® were selected for this purpose. Preliminary data analysis of 259 first-time NCLEX-RN test takers showed that the ATI Comprehensive Predictor® differentiates between those who pass the test on the first attempt and those who fail. Scores also significantly correlated with first-time test takers and cumulative GPA. Those who passed on the first attempt were significantly more likely to have a slightly higher cumulative GPA and to have always met nursing progression criteria.

Humphreys (2008) conducted a study of 338 ASN and BSN students in a Midwestern community college between 2006 and 2007. Descriptive and inferential statistics were used to discern possible differences between the dependent variable, NCLEX-RN pass rate, and various independent variables, including the HESI E2® and the ATI Comprehensive Predictor®. Higher scores on both were found to be predictive of future success on NCLEX-RN.

A study conducted by Ukpabi (2008) at one Southeastern university evaluated the predictability of 18 predictor variables for success on NCLEX-RN. Variables in this study included scores on the assessment tests of 18 courses. Participants in this study included a convenience sample of 39 nursing students who graduated and took the 2006 version of NCLEX-RN. Discriminate analysis was used to identify which variables adopted were significant in predicting success on NCLEX-RN. Eleven of those were found to be statistically significant, including test scores on the ATI TEAS® reading English and math, ATI Critical Thinking, ATI Psychiatry-Mental Health, ATI Nursing Fundamentals, and ATI Pharmacology, in combination with NLN Tests (Adult Health I, Adult Health II, and Pediatrics) to best predict success on NCLEX-RN.

There are several ways to implement these testing products into a nursing curriculum, including progression policies and exit testing, and each university must determine which will meet the needs of their students and their college or university (Morrison, 2000). Although available for years, according to Giddens (2009), nursing programs have recently begun to

heavily rely on extensive assessment and remediation packages offered by commercial vendors to ensure NCLEX-RN success at a significant cost to the student. Nurse educators have the responsibility of ensuring that external testing products benefit the student and college/university rather than the vendor.

Academic success and attrition rates continue to be a concern of nurse educators and program administrators. There continues to be a need for effective tools for identifying students in need of remediation. Assessment tools that predict academic success or failure could assist faculty in advising students, in developing student support services when planning nursing programs, and could assist students in developing an action plan to prepare for the NCLEX-RN. Studies indicate that standardized testing and available student data can predict student success and identify students at risk early in a program so that interventions can be implemented to increase student retention, graduation, and success on the NCLEX-RN. Further research in this area will also provide faculty with information about validity and generalizability of previous findings (Sayles, Shelton, & Powell, 2003).

Spector and Alexander (2006) stated that many nursing programs are using standardized assessment examinations as a method of benchmarking and remediation to improve percentages of first-time pass rates. These are often referred to as progression or exit examinations. While they may be a valuable assessment tool for all types of programs, they must be used prudently. Using them to evaluate students' readiness for taking the NCLEX-RN and to design individualized remediation programs is a win-win situation for both the students and the nursing program. However, these examinations are sometimes administered only at the end of a nursing program, with little or no structured remediation available for students. Students are required to achieve a certain score on the exit examination before they are considered credentialed to graduate and take the NCLEX-RN. Students who are not successful often have little recourse, and they turn to State Boards of Nursing for help.

In a doctoral dissertation, Yates (2007) found the ATI-RN Comprehensive® examination and NCLEX-RN to have a positive relationship, and identified it as a predictor for NCLEX-RN success. This was a study of 298 ADN students that also included variables related to preadmission aptitude; Test of Basic Education (TABE), NET, and the ACT.

Summary

Prediction of NCLEX-RN success was reported in the literature to be a multifaceted phenomenon composed of both academic and non-academic factors (Alexander & Brophy, 1997; Briscoe & Anema, 1999; Sayles, Shelton, & Powell, 2003; Haas, Nugent, & Rule, 2004). NCLEX-RN pass rates have steadily declined since the change in method of scoring and the implementation of computerized testing (Waterhouse & Beeman, 2003; NCSBN, 2010). Most colleges of nursing have implemented the use of standardized testing products to assess students' preparedness for NCLEX-RN (Morrison, 2000; Uyehara et al., 2007; Giddens, 2009). The HESI-E2® has been extensively studied and demonstrates > 94% accuracy in prediction of likely success (Nibert, 2003; Harding 2010). The prediction of failure on NCLEX-RN has not been demonstrated by research on standardized test products (Morrison, 2000; Waterhouse & Beeman, 2003; Nibert 2003). An analysis of the studies suggests that prediction of success is inexact, and colleges of nursing need to conduct periodic studies of the predictive value of the standardized test products that are currently in use (Nibert, 2003). Fewer published studies have been conducted on ATI products, but the findings are similar to that of HESI-E2® (Davenport, 2007). Utilizing the results of standardized testing to improve attrition rates and increase NCLEX-RN pass rates should not be the sole method of determining students' readiness for graduation and NCLEX-RN (Spector & Alexander, 2006; Harding, 2010). Instead, these scores are most useful as an early indicator for determining student readiness and allowing time to implement a comprehensive remediation plan that addresses students' needs. Faculty should be encouraged to adopt progression policies that acknowledge the many issues that influence student success on the NCLEX-RN (Michel, 2006).

Chapter III

METHODOLOGY AND PROCEDURES

This chapter describes the methodology and procedures that were used for this study. The methodology and procedures selected permitted the researcher to examine specific variables related to student performance on the NCLEX-RN. The variables in this study included: grades earned in core courses, grades earned in major courses, scores for ATI-CARP® examinations, and graduate GPA. According to Haas, Nugent, and Rule (2004), the prediction of potential student failures provides the opportunity for early intervention. Reliable and easily obtainable predictors are important in identifying at-risk students for remediation purposes.

Research Question and Hypotheses

One research question was developed for this study: What variables are predictors for first-time success on NCLEX-RN for baccalaureate nursing students attending one university college of nursing in southern Georgia? Three hypotheses were also formulated for this study:

1. H1: Higher scores on the ATI-CARP® test increase the likelihood of passing the NCLEX-RN on the first attempt by baccalaureate degree-prepared nursing students from one southern university college of nursing.
2. H2: Higher grades for science courses and nursing theory courses increase the likelihood of passing the NCLEX-RN on the first attempt by baccalaureate degree-prepared nursing students from one southern university college of nursing.
3. H3: Higher cumulative GPAs increase the likelihood of passing the NCLEX-RN on the first attempt by baccalaureate degree-prepared nursing students from one southern university college of nursing.

Research Design

A quantitative, non-experimental, *ex-post facto* research design was used. Quantitative research is used to “examine relationships among variables and to determine cause-and-effect interactions between variables” (Melnyk & Fineout-Overholt, 2005, p. 256). In this study, the independent variables were grades earned in core courses, grades earned in major courses, scores for ATI-CARP® examinations, and cumulative GPA. The NCLEX-RN results were recorded with a coding of pass = 1 or fail = 0 as the dependent variable. Computerized archival data comprised the source of data for this study.

Setting, Population, and Sampling

For this study, the setting was a southern Georgia university college of nursing that offers study for the BSN degree for traditional, accelerated (second degree), and RN-BSN students. Additionally, the Master of Science in Nursing degree is offered for study as nurse practitioners, clinical nurse leaders, and nurse educators. Work is also being completed for establishment of the Doctor of Nursing Practice (DNP) degree. Several hundred students are enrolled in pre-nursing courses or one of the programs mentioned above. Subjects for this study included a deliberate convenience sample of approximately 200 senior baccalaureate nursing students who both graduated and took the NCLEX-RN over the past three years since the institution of the ATI-CARP® as the external testing program. All subjects had completed the required theory and clinical courses at this university, received the BSN degree, and had taken the NCLEX-RN.

Ethical Considerations

The ethical considerations for this study were related to maintaining confidentiality of the graduates' records. Approval to conduct the study was obtained from the Institutional Review Board (IRB) at this university (see Appendix B). The Dean of the College of Nursing granted permission to conduct the study, and provided access to graduates' records in the Banner student database.

Archival data were used, and names on graduates' records were replaced with assigned codes on the data recording sheets. The only people to review the data were the researcher, the supervisory committee, and personnel designated by the dean. Data are maintained in a secure place at the college of nursing and in the Banner student database.

Instrumentation and Procedures

The instruments measured the research variables that include NCLEX-RN first attempt outcomes, ATI-CARP® test composite scores, grades for core and major courses toward the degree, and cumulative GPA at the time of graduation. The data source used in this study to determine outcomes of student performance was the NCLEX-RN program report from the NCSBN. The NCSBN conducts a yearly analysis of all candidates' results on the NCLEX-RN and provides a report to deans of the colleges of nursing. This report becomes a part of the total program evaluation and on-going assessment for all schools (Beet-Bejos, 2005).

The NCLEX-RN is a computer-adapted, standardized examination designed to determine if a candidate possesses the minimum knowledge and abilities to provide entry-level nursing care that is safe and effective. CAT is a method for administering tests that merges existing computer technology with modern measurement theory to increase the efficiency of the testing process. The NCLEX-RN examination, administered via CAT, uses items with a variety of response formats, such as single response multiple choice, multiple response, fill-in-the-blank and drag and drop, and a variety of display formats, such as, chart/exhibit displays, tables, and graphic images, etc. Regardless of the response or display formats, all items are scored as right or wrong; there is no partial credit. Each candidate's examination is unique, based on their responses. The NCLEX-RN ends when a candidate's measure of competence is determined to be above or below the passing standard with at least 95 percent confidence (is significantly above or below the standard), and at least the minimum number of questions have been answered (NCSBN, 2011). The examination is constructed so that candidates are classified as passing or failing.

The reliability of the NCLEX examination was assessed via a decision consistency statistic. This statistic is used instead of a traditional reliability statistic, such as Cronbach's alpha, because it captures the reliability of dichotomous pass/fail decisions rather than the reliability of continuous scores or ability estimates. The decision consistency statistic incorporates a candidate's ability estimate and standard error with normal theory to obtain two probabilities: the probability that the candidate's "true" ability (as opposed to the estimate of their ability) is above passing and the probability that their "true" ability is below passing. The decision consistency of the NCLEX-RN examination is psychometrically sound, normally running between 0.87 and 0.92 (NCSBN, 2011).

There are several different aspects of validity: content, face, construct, predictive, and scoring (passing standard) validity. NCSBN procedures ensure that the NCLEX-RN is valid with respect to these aspects of validity (NCSBN, 2011).

Content validity is related to how the questions are written. Panels of selected applicants from around the country and with backgrounds covering the entire spectrum of different specialties and practice settings write examination questions. The diverse backgrounds of the item writers reflect the entire domain of entry level practice (Beet-Bejos, 2005; NCSBN, 2011).

The NCSBN uses Rasch measurement theory to construct the NCLEX-RN scale (NCSBN, 2011). There is an abundance of research that certifies this theory's capability to produce valid measures of a latent construct, such as entry-level nursing competency (NCSBN, 2011).

The NCSBN ensures the pass/fail validity by determining the minimum level of competency that an examinee must attain to pass the NCLEX-RN. This level is investigated thoroughly on a triennial basis. This level of competency is called the passing standard. The passing standard is established by the NCSBN's Board of Directors after they have reviewed extensive information gathered systematically from several sources, including a panel of nursing

experts. Through this process, the passing standard maintains currency and validity (NCSBN, 2011).

The ATI-CARP RN Comprehensive Predictor® is meant to mirror the NCLEX-RN to the greatest extent possible, and as such, the test specifications are directly based on those of the NCLEX-RN. The NCLEX-RN 2007 detailed test plan is based on the results of a nationwide practice analysis conducted by the NCSBN in 2005. The NCLEX-RN is a computer adaptive test and allows for some fluctuation in the percentage of items a given candidate may receive across the eight major content areas. The ATI Comprehensive Predictor® is a fixed length test of 150 scored items and 30 non-scored pretest items. The number of scored items in each major client need category was determined by finding the median percentage within the NCLEX-RN range. For example, the NCLEX-RN test specifications stipulate that 13-19% of the items a candidate receives be in the Management of Care category; therefore, 16% of the ATI-Comprehensive Predictor® scored items are in this category (24 of 150 items). Like the NCLEX-RN, each item on the ATI-Comprehensive Predictor® is written to assess mastery of one of the 595 nursing job tasks on the NCLEX-RN detailed test plan. Each of these tasks falls under one of the eight major client need categories. The item writer who initially submits the item specifies the NCLEX-RN task, and subsequent reviewers validate or change the task assignment. Given that there are 595 tasks on the NCLEX-RN detailed test plan, it is not feasible for any given form of the NCLEX-RN or the ATI-Comprehensive Predictor® to have an item assigned to each task. Accordingly, both tests sample from the domain of available tasks to ensure representative coverage (ATI, LLC, 2009).

Most of the items on the ATI-RN Comprehensive Predictor® were written by outside RN nurse educators on a contract basis. Some items from previous versions of the ATI RN Comprehensive Predictor® were revised by ATI nurse educator staff and placed on the new version. ATI production staff entered all of these items into a bank in preparation for the item review process. Participants in the item review meetings included two RN nurse educators, a

psychometrician, and a production specialist. The RN nurse educators all held MSN or PhD degrees and had teaching or practice experience in the specific content of the items under review (e.g. medical-surgical, mental health, etc.). The participating psychometricians held PhDs or Master's degrees in statistics and educational measurement or psychological measurement and provided guidance in the technical aspects of item construction. The production specialists all held degrees in English, journalism, or related fields (ATI, LLC, 2009).

A study conducted by Yates (2007) was among the first to include the ATI RN Comprehensive Predictor® as a predictor variable. Yates found a positive relationship between the examination and the NCLEX-RN and added it to the list of possible predictors of success on NCLEX-RN.

Students at this southern Georgia university college of nursing are required to take the TEAS® and score at or above the national average. The TEAS® is designed to measure the level of general academic preparedness of students entering a nursing program or to diagnose the strengths and weaknesses of admitted students immediately following entry into a nursing program (ATI, LLC, 2009). All BSN students must pass selected standardized tests in Nursing of Adults, Maternal Child Nursing, Fundamentals of Nursing, and Pharmacology to progress to the capstone course. To pass the capstone course, all senior students must pass a standardized test predicting success on the NCLEX-RN. These examinations identify areas of student weaknesses to provide a guide for remediation throughout the nursing program and prior to graduation. The RN Comprehensive Predictor® is administered in the capstone course during the last semester and must be passed at a rate of 95% predictability of NCLEX-RN success for successful completion of the capstone course.

Data were obtained from the database maintained by the college of nursing and included grades earned in science core courses, grades earned in nursing courses, cumulative GPA, ATI test scores, and NCLEX-RN results. Science courses that were considered are those corresponding to ATI-CARP®, which are Chemistry I, Chemistry II, Human Anatomy and

Physiology I, Human Anatomy and Physiology II, Microbiology in Health and Disease, and Human Growth and Development. Nursing courses that were used for the purpose of this study and correspond to the ATI-CARP® include Pharmacology in Nursing Practice; Nursing Care I: Health Promotion and Competencies; Nursing Care II: Acute Health Alterations; Nursing Care III: Chronic and Multisystem Health Alterations; Professional Nursing Development I: Values, Roles and Issues; Professional Nursing Development II: Research and Evidenced-Based Practice; Community Health Nursing Care; Professional Nursing Development III: Leadership and Management; Nursing Care of Women, Neonates, and Childbearing Families; Mental Health Nursing Care; Health Assessment Across the Lifespan; Health and Well-Being in Older Adults; and Professional Nursing Practice. Cumulative grade reports for the courses were retrieved from a computer-based program. (Refer to Appendix A: Data Recording Sheet.)

Summary

The research approach to this study utilized a quantitative, non-experimental, *ex-post facto* design. The intent of using this design was to describe the relationship between the research variables of the ATI testing scores, student scores in content areas selected for the study, cumulative GPAs, and NCLEX-RN outcomes. The participants of the study were a deliberate convenience sample of baccalaureate degree nursing student records from one southern university college of nursing. A computerized data recording sheet (Appendix A) was used to record data. Confidentiality was maintained by the use of numerical codes instead of student names. Disclosure of data was limited to members of this research committee and the dean of the college of nursing. The completion of data analysis utilized the Statistical Package for the Social Sciences (SPSS Student Version 18.0; IBM Cooperation, Armonk, NY) for descriptive and inferential statistics.

The intent of the researcher was to collect information regarding the use of internal testing/evaluations and the external ATI testing program and their ability to predict success on the NCLEX-RN. The determination of valid variables to predict success of nursing students on

NCLEX-RN should enable nursing programs to devise pertinent admission criteria, identify and intervene with students at risk of failing, and provide needed advisement and academic support to increase student likelihood of passing the NCLEX-RN on the first attempt. Focused educational strategies based on the findings of this study could be implemented to improve student performance on the NCLEX-RN.

Chapter IV

DATA ANALYSIS AND RESULTS

Archival data for 158 BSN graduates from 2009 through 2011 at one southern Georgia university college of nursing that offers traditional, accelerated (second degree), and RN-BSN baccalaureate programs were obtained from official college records. Data containing the dependent and independent variables were entered into the SPSS software program for analysis. The initial number of cases was 183, but after omitting those who did not have NCLEX-RN results or did not complete the program, there were 158. There were missing data in most variables either related to curriculum changes or transfer status. Descriptive statistics were analyzed to describe the population in relation to the CAT NCLEX-RN. Frequencies, means, medians, modes, ranges, and standard deviations were tabulated on all variable categories. Inferential statistics were analyzed with correlational r statistics, and t tests of independent means to determine which variables significantly predicted or were associated with NCLEX-RN outcomes. Correlational statistics involve an index of the relationship of two variables. The t test of independent means is conducted when two groups are independent of one other, and each case is tested only once (Salkind, 2011). An alpha level of .05 was used for all statistical tests.

Descriptive Analysis

Variables in this study related to academic success included nursing theory grades, required science course grades, and cumulative GPA. To facilitate analysis, science, core, and nursing theory grades that were recorded in the nominal letter grades of A, B, C, D, and F were converted to the following 4-point scale: A = 4, B = 3, C = 2, D = 1, and F = 0. Variables related to the external testing product, ATI-CARP® were recorded using scale data, and statistics were

analyzed separately. The majority of the population had scores in all ATI variables. NCLEX-RN results are dichotomous and were coded and recorded as Pass = 1 and Fail = 0.

Science and Core Courses

Because the profession of nursing is so heavily reliant on a strong science base, required science courses were included in the study. It should be noted that grades were not available in these courses on all accelerated BSN (second-degree) students, which created a number of missing cases for those variables. The science courses included were Anatomy and Physiology I and II, Chemistry I and II, and Microbiology. Additionally, Human Growth and Development was included in this group as it was the only other core course included, and it fit well in this grouping. Table 3 lists the scores for science and core course grades.

Table 3 *Science and Core Course Grades*

	Statistics					
	N		Mean	Median	Std. Deviation	Range
	Valid	Missing				
Chem I	120	39	3.56	4.00	0.658	2
Chem II	118	41	3.58	4.00	0.658	2
A&P I	130	29	3.27	3.00	0.713	2
A&P II	127	32	3.05	3.00	0.754	2
MICRO	127	32	3.34	3.00	0.669	2
G&D	126	33	3.56	4.00	0.639	3

Nursing Course Grades

Nursing course grades encompassed a change in curriculum for this population. Since some new courses were added, only those students attending since the change had grades in those courses. Health and Well-Being of Older Adults was added as a new course, and Professional Development II: Research and Evidence Based Practice replaced Research in Nursing. Women,

Neonates, and Families replaced Maternal and Child Nursing. Table 4 lists the scores for Nursing Course Grades.

Table 4 *Nursing Course Grades*

	Statistics						
	N		Mean	Median	Mode	Std. Deviation	Range
	Valid	Missing					
PATH	90	68	3.34	3.00	3	0.564	2
PHARM	157	1	3.31	3.00	3	0.541	2
NURS CARE I	153	5	3.12	3.00	3	0.419	2
NURS CARE 2	158	0	3.13	3.00	3	0.543	2
NURS CARE 3	157	1	3.25	3.00	3	0.565	2
Mental Health	95	63	3.41	3.00	3	0.574	2
Care of Older Adults	95	63	3.40	3.00	3	0.659	4
Prof Nsg Dev I	74	84	3.81	4.00	4	0.428	2
Prof Nsg Dev II	70	88	2.91	3.00	3	0.717	4
Prof Nsg Dev III	158	0	3.83	4.00	4	0.378	1
Community	157	1	3.70	4.00	4	0.459	1
Maternity	158	0	3.47	3.00	3	0.514	2
Prof Nsg Practice	157	1	3.92	4.00	4	0.299	2
Research in Nursing	62	96	3.13	3.00	3	0.495	2

Cumulative GPA

Cumulative GPAs were included as an academic variable. Hypothesis three (H3) stated that higher cumulative GPAs increase the likelihood of passing the NCLEX-RN on the first attempt by baccalaureate degree prepared nursing students. Figure 1 illustrates the distribution of graduation GPAs from the study group.

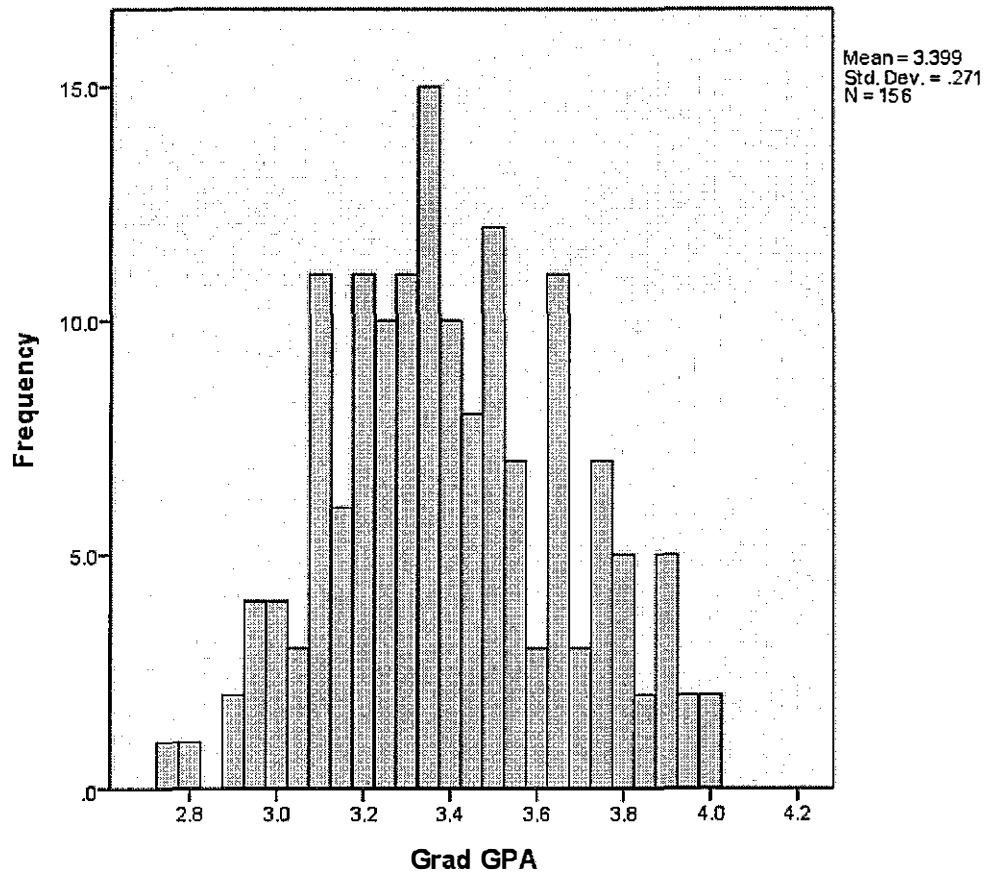


Figure 1: *Cumulative GPAs*

ATI-CARP®

Successful progression through the BSN program is contingent upon students, achievement of target scores (identified through psychometric analysis) on ATI-CARP® examinations throughout the nursing program. The senior capstone nursing course, Professional Nursing Practice, requires students to earn a specified passing score for the ATI-RN Comprehensive Examination® to pass the course (VSU Nursing, 2012). Table 5 lists scores obtained on the ATI-CARP® examinations.

Table 5 *ATI-CARP® Scores*

	Statistics					
	N		Mean	Median	Std. Deviation	Range
	Valid	Missing				
TEAS Reading	121	38	77.074	79.000	14.2474	98.0
TEAS Composite	121	38	78.612	80.000	10.4520	95.0
ATI Critical Thinking	101	58	68.634	67.500	11.2301	50.5
ATI Fundamentals	155	4	71.261	73.300	10.0308	53.7
ATI Pharm	155	4	61.604	63.300	9.8516	50.0
ATI Adult Med Surg	153	6	62.758	62.200	7.8125	37.7
ATI Maternity	154	5	75.744	76.700	7.3501	35.0
ATI Pediatrics	154	5	61.874	61.700	8.6336	51.7
ATI RN-Comp I	154	5	70.975	70.700	6.4526	36.0
ATI RN-Comp II	34	125	39.969	72.000	60.4905	158.3

NCLEX-RN

The results of the licensing examination, NCLEX-RN, are reported to the college of nursing by the GBN on each candidate. The results are maintained in a secure file in the nursing administration office. Results are returned on a quarterly basis. Figure 2 demonstrates the frequencies of the NCLEX-RN results for this population. Results were not available on all graduates, which explains $n = 139$.

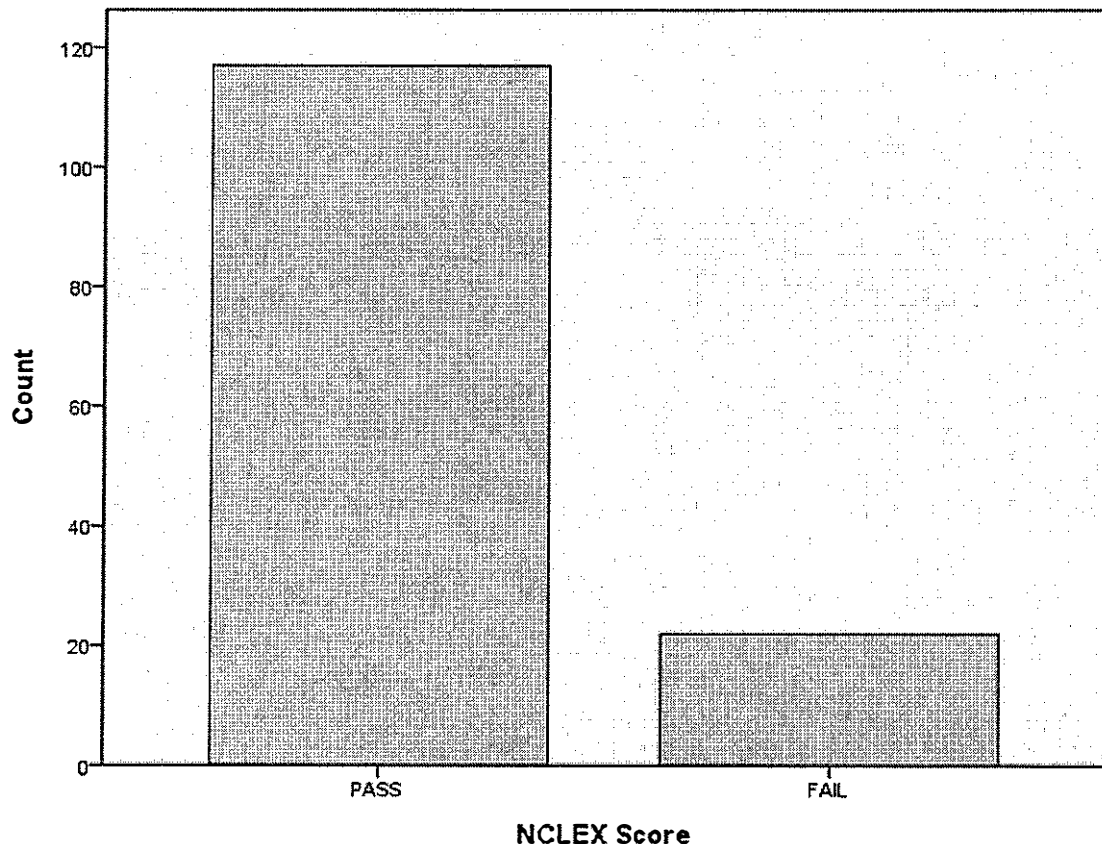


Figure 2: *NCLEX-RN Scores, Pass, Fail*

Inferential Statistics

Data for one research question and three hypotheses were analyzed for testing as follows:

Research Question:

What variables are predictors for first-time success on NCLEX-RN for baccalaureate nursing graduates from one university college of nursing in southern Georgia?

Hypothesis One:

Higher scores on the ATI-CARP® examinations increase the likelihood of passing the NCLEX-RN on the first attempt by baccalaureate degree-prepared nursing graduates from one southern Georgia university college of nursing.

This southern Georgia university college of nursing has a progression policy that requires passing scores on strategically placed ATI-CARP® examinations. Fundamentals and Pharmacology are required at the Junior I level and must be passed prior to progression to Senior

I clinical coursework. Maternity, Adult Medical/Surgical, and Pediatrics are required in the Senior I level and must be passed prior to progression into the nursing capstone course. The hypothesis that a significant difference existed between ATI-CARP® and subsequent success on NCLEX-RN was tested using the *t* test of equality of means and the correlational coefficient, *r*. Statistical analysis indicated that ATI-CARP® scores are good predictors of NCLEX-RN success. The results of the *t* test of independent samples showed $p < .01$ in ATI Pharmacology, Adult Medical/Surgical Nursing, Maternity, and Pediatrics, and $p < .05$ in Fundamentals. Table 6 demonstrates a five–to–ten point variation in mean scores on ATI-CARP® examinations between the “Pass” and “Fail” groups for NCLEX-RN.

The ATI-RN Comprehensive Predictor® is administered in the final semester in a senior capstone course. Students must achieve a minimum designated score that is correlated to a 95% probability of passing NCLEX-RN on the first attempt as determined by ATI RN 2010 Probability of Passing Table (ATI, 2010). The lowest score the student could make was 73.3% to achieve 95% probability of passing the NCLEX-RN. Table 6 compares the group statistics of students who passed and those who failed the ATI-RN Comprehensive Predictor® examination. Statistical analysis as shown in Table 6 demonstrates higher scores on the ATI-RN Comprehensive Predictor® examination increased the likelihood of passing the NLEX-RN on the first attempt. The independent *t* test, $t = 2.6$, 134 degrees of freedom (*df*), $p = .01$ supports hypothesis one that higher scores on the ATI-RN Comprehensive Predictor increase the likelihood that students will pass the NCLEX-RN. The correlational coefficient, *r*, and all results supported hypothesis one with the following findings: ATI Pharmacology, $r = 0.366, p = 0.000$; ATI Medical/Surgical, $r = 0.324, p = 0.000$; ATI Maternity, $r = 0.366, p = 0.003$; ATI Pediatrics, $r = 0.285, p = 0.001$; ATI Fundamentals, $r = 0.185, p = 0.031$. All of these results indicate a statistically significant relationship between each ATI-CARP® examination and passing of NCLEX-RN.

Table 6 *NCLEX-RN Scores and ATI-CARP® Scores Group Statistics*

Group Statistics					
	NCLEX Score	N	Mean	Std. Deviation	Std. Error Mean
TEAS Composite	PASS	89	78.227	11.4869	1.2176
	FAIL	14	77.557	5.6858	1.5196
ATI Critical Thinking	PASS	73	69.192	11.7765	1.3783
	FAIL	13	61.231	8.4400	2.3408
ATI Fundamentals	PASS	114	71.633	9.5522	.8946
	FAIL	22	66.673	10.8064	2.3039
TEAS Reading	PASS	89	75.364	14.2840	1.5141
	FAIL	14	75.643	14.5951	3.9007
ATI Pharmacology	PASS	115	63.232	9.1278	.8512
	FAIL	21	53.429	8.7235	1.9036
ATI Adult Med-Surg	PASS	113	63.935	7.5223	.7076
	FAIL	21	57.090	6.0793	1.3266
ATI Maternity	PASS	113	76.525	7.1944	.6768
	FAIL	22	71.600	6.3777	1.3597
ATI Pediatrics	PASS	115	62.497	8.6305	.8048
	FAIL	20	55.490	7.1291	1.5941
ATI RN-Comp I	PASS	114	71.516	5.9508	.5573
	FAIL	22	67.814	6.6295	1.4134
ATI RN-Comp II	PASS	17	74.900	4.6462	1.1269
	FAIL	6	73.017	4.5181	1.8445

Hypothesis Two:

Higher cumulative GPAs for science courses and nursing theory courses increase the likelihood of passing the NCLEX-RN on the first attempt for baccalaureate degree-prepared nursing students.

Science course grades were analyzed by performing the independent t test comparing the means with those of the NCLEX-RN “pass” and “fail” groups. Anatomy and Physiology I and Growth and Development were the only two courses with significant p values. Anatomy and Physiology was tested with the independent t test with the results of $t_{(118)} = 2.26$ and $p = .021$. Growth and Development independent t -test results were $t_{(119)} = 2.9$ and $p = .031$. Anatomy and Physiology I and Growth and Development were predictive of passing NCLEX-RN, in this study, supporting hypothesis two. Chemistry I, Chemistry II, Anatomy and Physiology II, and Microbiology had p values $> .05$, which failed to support hypothesis two.

Statistical analysis of nursing course grades was completed by performing independent t test for equality of means on all nursing theory grades and NCLEX-RN results. Students who scored higher in Pharmacology ($t_{(136)} = 3.33, p = .000$), Care of Older Adults ($t_{(79)} = 2.17, p = .033$), Professional Nursing Development I ($t_{(63)} = 2.26, p = .034$), Community ($t_{(137)} = 2.23, p = .028$), and Research in Nursing ($t_{(55)} = 2.60, p = .012$) had p values $< .05$, when the independent t test was conducted, supporting hypothesis two. Other nursing courses did not meet this significance criterion.

Hypothesis Three:

Higher cumulative GPAs increase the likelihood of passing the NCLEX-RN on the first attempt by baccalaureate degree-prepared nursing students. Table 7 supports the hypothesis with the correlational coefficient, $r, p = .000$.

Table 7 Correlation of NCLEX-RN Scores and Graduate GPAs

		NCLEX Score	Grad GPA
NCLEX Score	Correlation coefficient	1	.294**
	Sig. (2-tailed)		.000
	N	139	138
Grad GPA	Correlation coefficient	.294**	1
	Sig. (2-tailed)	.000	
	N	138	156

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

Summary

In conclusion, the results of the statistical analysis conducted on the hypotheses in this study identified the following predictors of success on NCLEX-RN for these BSN graduates of one university college of nursing in southern Georgia: ATI-CARP® examinations:

Pharmacology, Adult Medical/Surgical, Maternity, Pediatrics, Fundamentals, and the RN Comprehensive. The predictors in science and core courses were Anatomy and Physiology I and Growth and Development. Nursing courses that were significant predictors were Pharmacology, Care of Older Adults, Professional Nursing Development I, Community Nursing, and Research in Nursing.

All of the ATI-CARP® scores were statistically significant regarding prediction of NCLEX-RN scores, with ATI Pharmacology and ATI Medical-Surgical having a slightly stronger relationship, $p = 0.000$. The weakest relationship with NCLEX-RN scores was ATI Fundamentals, $r = 0.185$, $p = 0.031$. The strongest predictor among core courses was Anatomy and Physiology I ($p = 0.021$). The core course with the weakest relationship was Chemistry I ($p = 0.812$). Among nursing courses, Pharmacology in Nursing had the highest predictor value ($p = 0.000$), and Professional Nursing Practice had the weakest relationship ($p = 0.834$), preceded by Professional Nursing Development II: Research and Evidence-Based Practice ($p = 0.749$).

Chapter V

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents the interpretation of the results, conclusions, implications, limitations, and recommendations for future research. This study partially replicated a study by Beet-Bejos (2005) and sought to determine if baccalaureate degree nursing students' ATI-CARP® scores, grades for science courses, grades for nursing theory courses, and cumulative GPAs could be used to predict success on the NCLEX-RN for one university college of nursing in southern Georgia. A quantitative, *ex-post facto* design was utilized to compare the relationships and differences among the variables. The population studied consisted of a deliberate convenience sample beginning with 183 baccalaureate graduates. Twenty-five cases were removed due to unavailability of NCLEX-RN results and the remaining 158 contained data required for the study. One hundred fifty four records contained ATI-CARP® results. Grades for science courses were available on 118-130 students, and nursing course grades were available on all 158 students. The cumulative GPA was also available in the Banner student database on 154 graduates. The study included graduates since the initiation of ATI-CARP® external testing products in 2009 that completed the required nursing theory and clinical courses at this university, received the BSN degree, and took the NCLEX-RN.

Permission to conduct the study was obtained from the dean at this southern Georgia university college of nursing. The proposal defense was conducted on February 2, 2012, after which application was made to the university's Institutional Review Board for consent to conduct the study. Approval to conduct the study was received in February 2012. Data collection began in February 2012 and was concluded in March 2012.

Anonymity and confidentiality were preserved by conducting the research at the college of nursing with access to secure, computerized archival data made available by staff designated

by the dean. Names were changed to numbers and used for all data sets. The researcher obtained all science and nursing theory grades and GPAs from Banner student database with temporary secure access made available by the dean. ATI-CARP® scores and NCLEX-RN results were obtained from computer files maintained at the college of nursing. The only people with access to the data were the researcher and designated staff. An author-generated computerized data collection tool was developed for recording data (Appendix A).

This study was based on the concepts of Rothman's Action Evaluation (1997) and the Futch (2003) model. Rothman focused on defining, monitoring, and assessing success through three stages: baseline, formative, and summative. The baseline stage includes the collection and analysis of data pertaining to relevant goal setting and communication of goals to major stakeholders. An action plan is then generated that can be used to pursue the goals. In the formative stage, goals are refined, and strategies are developed and implemented for overcoming the difficulties in achieving the goals. In the summative stage, goals are evaluated, and stakeholders may ask themselves how or what could be done differently. The action research framework is appropriate for project managers and/or participants who recognize the existence of shortcomings in their educational activities and who would like to initiate changes in regard to the problem based on research findings. Likewise, students preparing to take the NCLEX-RN should take responsibility for their educational outcomes by structuring themselves within the learning environment through goal setting and continued evaluations aimed at first-time success on the NCLEX-RN examination. Self-assessment activities encourage the active participation of the student, a prerequisite to learning (Beet-Bejos, 2005).

The Futch (2003) model seeks to understand the test taking experience within the framework of self-regulated learning and predicts positive relationships between a variety of variables, including NCLEX-RN results, high GPAs, the increased use of external testing plans, and the relationship of time between graduation and testing with enough time for remediation. Beet-Bejos (2005) and Futch (2003) study evaluated the ERI® testing product, and neither study

found the ERI® product predictive of success on NCLEX-RN. The ATI-CARP® product was initiated in fall semester of 2009. This current research study sought to determine which factors of ATI-CARP® examinations, which courses in the BSN curriculum, and whether the cumulative GPA were predictors of success on the NCLEX-RN at this southern Georgia university college of nursing.

Interpretation of Findings

The research question identified for this study was:

What variables are predictors of success on NCLEX-RN on the first attempt for baccalaureate nursing graduates from one university college of nursing in southern Georgia?

The following hypotheses were developed from the review of the literature, as well as implications from the theoretical framework:

H1: Higher scores on the ATI-CARP® test increase the likelihood of passing the NCLEX-RN on the first attempt by baccalaureate degree- prepared nursing students from one southern Georgia university college of nursing.

H2: Higher cumulative GPAs for science and nursing theory courses increase the likelihood of passing the NCLEX-RN on the first attempt by baccalaureate degree-prepared nursing students from one southern Georgia university college of nursing.

H3: Higher cumulative GPAs increase the likelihood of passing the NCLEX-RN on the first attempt by baccalaureate degree-prepared nursing students from one southern Georgia university college of nursing.

The completed data set was entered into the SPSS software program for statistical analysis. Descriptive statistics, including measures of central tendency and dispersion, were analyzed for each variable. Inferential tests included the independent *t* test and correlation coefficients, comparing the independent variables to the dependent variable of NCLEX-RN results. A statistically significant value of $p < .05$ was used for this analysis. ATI-CARP® tests were all found to be predictive of success on NCLEX-RN except for the ATI-RN Comprehensive

II, $n = 34$, $p = .013$. The RN Comprehensive II is generally used for students who did not score high enough to exit on the first attempt. The TEAS® exams, which were given as an entrance examination beginning in spring of 2010, did not predict success in passing the NCLEX-RN on first attempt. The critical thinking examination given at the beginning of the program was predictive of passing ($p < .05$), though it was not required for progression. These findings support hypothesis one that higher scores on ATI-CARP® examinations increase the likelihood of passing NCLEX-RN on the first attempt.

The results of tests conducted on science and core courses partially supported hypothesis two that higher GPAs in science courses increase the likelihood of passing the NCLEX-RN on the first attempt. Anatomy and Physiology I and Growth and Development were the only courses in this category found to be predictive of passing NCLEX-RN on the first attempt. These grades were not available for all students, probably because they were transfer credits. It was interesting to note that students who failed NCLEX-RN actually had higher mean scores in Chemistry I and II.

Analysis of the Nursing theory course grades also partially supported hypothesis two. The courses with p values of $< .05$ were Pharmacology in Nursing Practice, Professional Nursing Development I: Values, Roles, and Issues; Health and Well-Being in Older Adult; Community Health Nursing; and Research in Nursing.

Hypothesis three was well supported by the results of the correlational statistics. Those students with higher GPAs were more likely to pass the NCLEX-RN on the first attempt. This finding was also well supported in the literature review.

Conclusions

This study investigated the relationship of ATI-CARP® scores, science and nursing theory course grades, and cumulative GPAs to NCLEX-RN results. Based on the analysis of data the following conclusions were reached for this southern Georgia university college of nursing:

1. The ATI-TEAS® examinations, reading and composite, were not a predictor of first-time on NCLEX-RN success which may have been because it was introduced while the ERI-NET® was still in use and taking it was optional. All other ATI-CARP® examinations were predictive of first-time success on NCLEX-RN.
2. Two predictors of first-time success on NCLEX-RN were identified in the science and core courses: Anatomy and Physiology I and Growth and Development.
3. Five nursing theory courses were significant predictors of first-time success on NCLEX-RN: Pharmacology in Nursing Practice; Professional Nursing Development I: Values, Roles, and Issues; Health and Well-Being in Older Adults, Community Health Nursing; and Research in Nursing.
4. The cumulative GPA of the BSN graduate was predictive of success on NCLEX-RN on the first attempt.

Implications

The current nursing shortage and a decline in NCLEX-RN pass rates have nurse educators and program administrators concerned with nursing education. The nursing shortage cannot be alleviated without new RNs entering the work force. The NCLEX-RN is a high-stakes examination for both students and educators. A nursing degree is of no value to students if they do not obtain a license by passing this examination. Nursing programs are in jeopardy if they do not maintain a satisfactory pass rate percentage. The ability to predict which students are most likely to be successful is critical.

Most nursing programs use an external testing product, which is of great expense to students. It is the responsibility of nurse educators and program administrators to evaluate these products for their value and effectiveness. Some programs utilize a program entrance test provided by external testing programs, such as the TEAS®, an ATI product, but current research on these products is limited. A few studies (Humphreys, 2008; Ukpabi, 2008) found the TEAS® scores to be statistically significant. Though few studies were available on ATI products, the

results indicate that scores are statistically significant. Each nursing program needs to study its own predictors of success before adopting an external testing program into the curriculum.

The results of this study indicated that the cumulative GPA is indicative of probable success on the NCLEX-RN. Other program data, such as Anatomy and Physiology I, Growth and Development, and some nursing theory grades, are also predictive. The existing data can be used as progression criteria without the use of an external testing program, but for this study, the ATI-CARP® scores were consistently predictive, indicating that they can be of value as progression criteria. However, researchers should use caution in making generalizations from this study ($n = 158$) due to the small sample in one southern Georgia university college of nursing baccalaureate program.

Five nursing course grades were found to be statistically significant: Pharmacology in Nursing Practice; Professional Nursing Development I: Values, Roles, and Issues; Health and Well-Being in Older Adults; Community Health Nursing; and Research in Nursing. Pharmacology, which is considered a science course in some curricula, was the most predictive with a p value of .001, followed by Research ($p = .012$), Community Health Nursing ($p = .028$), Health and Well-Being of Older Adults ($p = .033$), and Professional Nursing Development I ($p = .034$). There were other nursing courses with a slightly lower significance level (Nursing Care I, II, & III) that are most likely predictors of performance on NLEX-RN, as well. A new curriculum in the BSN program was implemented spring semester 2011 Research in Nursing was replaced by Professional Nursing Development II: Research and Evidence-Based Practice, which explains $n = 57$ for that course. Health and Well-Being of Older Adults was added as a new course, and Professional Nursing Practice was added as the capstone course that included the ATI-RN Comprehensive® exit examination. It is unclear from this study if the curriculum change had an impact on nursing course grades.

Students not predicted to pass should not be denied the opportunity to take the NCLEX-RN based solely on the predictions of the small sample size in this study, and the results should

not be generalized beyond the curriculum for which the study was completed. Faculty should use caution when informing students of their *high risk* for failure on NCLEX-RN as this action could cause additional stress and anxiety for the student and a decrease in motivation.

An analysis of science course grades revealed that Anatomy and Physiology I and Growth and Development were the only ones with significant *p* values. There were a number of transfer students who did not have grades in these courses. The accelerated BSN students (*n* = 22) often transferred courses with no grade available in Banner student database. Beet-Bejos (2005) also reported that Anatomy and Physiology I was the only significant science course predictor. Despite these findings, science is the foundation for nursing, and mastery should be considered essential to the program.

The cumulative GPA has been consistently found to be a predictor of success on NCLEX-RN (Alexander & Brophy; 1997, Endres, 1997; Haas, Nugent, Rule, 2003; Beet-Bejos, 2005). The *p* value in this study was .000. Cumulative GPAs are available on all students for nurse educators' review, and based on this study should be valuable as a predictor of NCLEX-RN success.

The findings of this study are consistent with other studies cited in the literature review documenting academic variables as directly related to academic performance (Lengacher & Kellar, 1990; Alexander & Brophy, 1997; Endres, 1997; Briscoe & Anema, 1999; Uyehara et al., 2007; Humphreys, 2008; Tipton et al., 2008). Although studies varied in the mix of courses that were investigated, the commonality is that students who perform poorly in one or more nursing courses are more likely not to pass the NCLEX-RN. This study supports the findings of Beeman & Waterhouse (2001) that indicated that it is possible to identify students who are *at risk* for failure and implement remediation early.

This nursing shortage and declining NCLEX-RN pass rates have led to the use of standardized testing products, such as the ATI-CARP® analyzed in this study, to establish progression policies. Many nursing programs have begun to rely heavily on these products

(Sayles, Shelton, & Powell, 2003; Spector & Alexander, 2006; Giddens, 2009). The use of the ATI-CARP® as progression criteria could explain the higher scores found in the current research study. Students are generally more motivated when the stakes are higher. Future research could focus on students' perspectives associated with cost and effectiveness of these products. The outcomes of progression policies could also be studied to determine which are effective in increasing the likelihood of success on NCLEX-RN.

Limitations

Several limitations should be taken into consideration when interpreting the findings of this study. The sample was small, not randomly selected, and participants all graduated from one southern Georgia university college of nursing baccalaureate degree program. The results, therefore, may not be generalized to graduates from other baccalaureate degree nursing programs. This study only addressed academic and standardized examination variables; however, there may be other personal variables, such as those found by Endres (1997), Futch (2003), Eddy and Epeneter (2002). A curriculum change made collection of data more challenging because the names of courses changed, new courses were added, and other courses were deleted. The NCLEX-RN scores were not available in the fall semester 2011 at the time of the data collection, which caused elimination of that cohort of students. The college of nursing examined in this study has begun to record numerical grades in administrative computer files, which should enable more sophisticated statistical analysis of nursing course grades in the future. These were not available on all cohorts at the time of this study. The Banner database is an excellent resource for student information, but grades are recorded in ordinal letter grades.

Recommendations

Based on the findings, conclusions, and implications of this study, the recommendations are as follows:

1. The ATI-CARP® external testing program may be used to establish progression procedures in the nursing program. Each nursing program should continually monitor and evaluate the effectiveness of the progression procedure and the product in use.
2. Follow-up studies should include a larger sample that includes students in various nursing programs.
3. Follow-up studies should be done based on the new nursing curriculum when it has been in place for at least two years, and data sets are more complete.
4. Interviews or surveys of students' perceptions of their academic and non-academic problems need to be completed while the student is currently enrolled. The students may have valuable input that could aid the faculty in problem resolution. The students can identify which strategies have been effective and which have not.
5. Each nursing program should identify its own predictor variables. The need to identify *at-risk* students and develop programs of early intervention is clearly indicated.
6. Reassess admission criteria frequently to determine if the most likely to be successful students are being admitted into the program.

Summary

The primary purpose of this study was to identify academic predictors, using internal and external academic variables that would predict students' likelihood of success on the NCLEX-RN on the first-attempt. Results of this study confirm the ability of baccalaureate degree nursing programs to identify variables within their student population that predict success in the nursing curriculum and on NCLEX-RN. The ability of nurse educators to identify *at-risk* students will enable them to provide meaningful counsel, establish methods of remediation, and minimize further emotional stress and financial burden on these students. The benefits of effective strategies to prepare the student to be successful on NCLEX include a positive impact on the nursing shortage by increasing the supply of nurses, maintaining board of nursing approval and national accreditation, and provision of needed advisement and academic support. This study

should add to the research on the value of ATI-CARP® as an external testing product and has identified strategies for progression and identification of *at risk* students. The findings of this study are consistent with those studies that have identified performance on external testing products is directly related to NCLEX-RN performance.

As the NCLEX-RN passing standard continues to climb, it is imperative that colleges of nursing select and retain students who have a higher likelihood of practicing as professional nurses. The challenge for nursing programs to graduate, not just admit, more students requires that student success is ensured in order to address the nation's growing need for nurses (Vandehouten, 2008). Though there is no guarantee that categorizing students as "at-risk" will provide the motivation for them to change behaviors, it allows the opportunity to intervene. External testing products such as ATI-CARP® provide an external measure of a curriculum. If a weakness is identified, an opportunity exists to improve the performance of future graduates.

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APPENDIX A:
Data Recording Sheet

APPENDIX B:
Institutional Review Board
Protocol Exemption Report



Institutional Review Board (IRB)
For the Protection of Human Research Participants

PROTOCOL EXEMPTION REPORT

PROTOCOL NUMBER: IRB-02779-2012

INVESTIGATOR: Cathy P. Freeman

PROJECT TITLE: Predictors of first-time success on NCLEX-RN in one Baccalaureate Program in Southern Georgia

DETERMINATION:

- This research protocol is exempt from Institutional Review Board oversight under Exemption Category(ies) 4. You may begin your study immediately. If the nature of the research project changes such that exemption criteria may no longer apply, please consult with the IRB Administrator (irb@valdosta.edu) before continuing your research.
 - Exemption of this research protocol from Institutional Review Board oversight is pending. You may **not** begin your research until you have addressed the following concerns/questions and the IRB has formally notified you of exemption. You may send your responses to irb@valdosta.edu.
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ADDITIONAL COMMENTS/SUGGESTIONS:

Although not a requirement for exemption, the following suggestions are offered by the IRB Administrator to enhance the protection of participants and/or strengthen the research proposal. If you make any of these suggested changes to your protocol, please submit revisions so that IRB has a complete protocol on file.

Barbara H. Gray _____ Date: 7/31/12 ***Thank you for submitting an IRB application.***

Barbara H. Gray, IRB Administrator
259-5045.

Please direct questions to irb@valdosta.edu or 229-

cc: Dr. Anita Hufft (CON – Dean)
Dr. James Humphries (Advisor)

Form Revised: 09.02.2009