2011

Academic Predictors of National Council Licensure Examination for Registered Nurses Pass Rates

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Abstract

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MSN, University of South Alabama, 1998

BSN, Pensacola Christian College, 1995

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Health Services

Walden University

August 2011

Abstract

The United States continues to be affected by a severe, long-standing nursing shortage that is not projected to resolve within the next 10 or more years. Unsuccessful passage of the National Council Licensure Examination for Registered Nurses (NCLEX-RN) among graduate nurses remains one of several key contributors to the nursing shortage. The goal of this study was to identify if either cumulative fall semester GPA; the overall prenursing science, mathematics, and English GPA; type of high school background; TOEFL score; clinical pass or fail; and on-time program completion best predicted passage of NCLEX-RN. Archived records from the academic years of 2006-2010 of students/graduates of a small, private BSN program were analyzed. A nonconcurrent, prospective design of secondary data was guided by the theoretical implications of the Seidman retention formula that surmises that early identification of academic problems is a necessary precursor to implementations that promote academic success. Significant, positive correlations were found between GPA of prenursing courses and achievement in clinical courses and on-time nursing program completion. Forward and backward, logistic regression procedures revealed that clinical performance was the strongest predictor of NCLEX-RN success but with an inverse relationship. Implications for positive social change include retention of BSN students to improve graduation rates. This ultimately will foster achievement on the NCLEX-RN, resulting in more graduates will be able to competently serve the health care needs of individuals and communities and alleviation of the nursing shortage.

An Assessment of Admission and Within-Program Criteria in Relation to the National

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Dedication

This dissertation is lovingly dedicated to my family. Mom and Dad you are amazing parents and wise stewards of your money, and you most certainly sacrificed in so many ways so that your children could receive the training that would be the precursor to our work and service for our Lord, Jesus Christ. Thank you Rob and Lydia (Bryanna & Alex) and Dan and Lea (Naomi, Logan, & Caleb) too for your unending encouragement. The prayers, support, understanding, and patience that you gave on my behalf were what I needed to fulfill this long journey. Lord Willing, I plan to be at the next family reunion—sorry I missed so many. I love you all so very much.

Acknowledgements

"Thou wilt shew me the path of life: in thy presence is fullness of joy; at thy right hand there are pleasures for evermore." (Psalm 16:11, KJV)

First and foremost, I would like to give all Honor and Glory to my precious, Lord and Saviour, Jesus Christ; for without Your provision of strength, knowledge, perseverance, and wisdom, I would never have survived this educational journey. I look forward to Your continual guidance throughout my future life endeavors as well.

I would also like to especially thank my chair and mentor, Dr. Robert Hoye. Do you ever sleep or take a vacation? You are always there for your students. Your wise council and "work smarter, not harder" reminders are a driving force through the intimidating processes of higher learning. Dr. Anna Marie Brock, you were also a great mentor, and you got me started on my PhD track and helped to inspire me to pursue the dissertation topic that I chose. Thanks too to Dr. Jeanne Connors. You were one of two assessors for my very first KAM. Your constructive suggestions and words of encouragement were so instrumental for my later KAMs and dissertation work. Dr. Joanne Perry, you taught my favorite course at Walden—I absolutely adored statistics, and you motivated me to choose a quantitative study and to try my hand at more difficult statistical equations. I am honored and grateful that both Dr. Connors and Dr. Perry served as members of my committee. All of the time expended on behalf of this dissertation by my entire committee deserves my whole-hearted appreciation.

Thanks too to Dr. Peter Anderson, my URR reviewer and Jamie Patterson, my Form and Style Editor, and to all of the KAM and dissertation editors that pored over my documents and helped to stretch me in ways that influenced my growth in becoming a more effective communicator. I appreciate all of your time and effort.

Mr. McLaughlin ("lord love a duck"), I never knew what your favorite phrase meant, and I have not seen you since I took Grade 10 English at White Oaks Secondary School in Oakville, Ontario; but obviously I have never forgotten you. I do not think that I would know anything about the structure of the English language and proper sentencing without your instruction in these matters. You gave me my foundation in grammar and the Lord knew that I would need grammar in my university education.

Thanks too to Dr. Denise McCollim for your all of the time that you spent to collect the data and to organize it in a way so that I could keep my commitment of maintaining privacy and confidentiality of the information that I received for my study. Your hard work and dedication to every task that you set forth to do is an inspiration to me.

Dr. Ronda Yoder, you were my "away from Walden" mentor. Thank you for your help with some of my methodology and computer issues. You are a good friend. All of my close friends and coworkers need to be thanked for your prayers, for putting up with me, and for your efforts in trying to keep updated with my progress. The Lord has blessed me greatly through all of you and I am sincerely thankful.

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Chapter 1: Introduction to the Study

A long-standing nationwide nursing shortage is occurring in the United States of America (American Association of Colleges of Nursing [AACN], 2009; Robert Wood Johnson Foundation, 2010). The nursing shortage is also purported as being a problem in other developed countries across the world (Blackman, Hall, & Darmawan, 2007). General causes of the shortage problem include (a) an increased elderly population (Robert Wood Johnson Foundation, 2010; Institute of Medicine, 2010; Health and Human Services Health Resources and Services Administration [HRSA], 2010), (b) an older nursing workforce, and (c) disparities in hiring and keeping nurses in needed positions (HRSA, 2010; Kuehn, 2008).

More specifically, key contributors to the nursing shortage stem from the area of nursing education. Three such examples include a lack of available space within nursing programs, not enough graduates from nursing schools because of limited enrollment and program attrition to meet the needs of the health care system (Robert Wood Johnson Foundation, 2010), and not all nursing graduates successfully pass the National Council Licensure Examination for Registered Nurses (NCLEX-RN; National Council of State Boards of Nursing [NCSBN], 2009b). This section addresses the relevance of focusing this study on a Bachelor of Science in Nursing (BSN) program specifically.

Lack of Nursing Program Space

One reason for the nursing shortage is that there is not enough nursing program space for entrants due to a deficient number of nursing faculty and limited clinical site locations (Robert Wood Johnson Foundation, 2010). Admissions are limited in many U.S. nursing programs (Orsolini-Hain & Malone, 2007). The problem, however, is not

too few applicants; instead nursing programs have to refuse eligible candidates because of a deficient amount of space within these programs (National League for Nursing [NLN], 2006, August). The NLN (2009) indicated that about 40% of students who meet the qualifications for entry are not granted admission into nursing programs. In the year 2004 to 2005, there was about a 59% increase in interested applicants to nursing programs (NLN, 2009).

Florida had over 5,800 eligible BSN prenursing entrants during the 2009-2010 academic school year, but was only able to allow about 2,400 students into nursing programs (Florida Center for Nursing [FCN], 2011). This meant that about 3,400 or almost 59% of these eligible students could not begin their nursing studies that year. When looking at all nursing programs, Florida did not accept almost 56% of eligible entrants for the year 2009-2010. From a national standpoint, approximately 45% of nursing school applicants were admitted into BSN programs, and about 30% of eligible prospective students were denied entrance (NLN, 2010). About 24% of these BSN nursing programs, overall, did not permit could-be nurses into nursing programs. The same trends indicated that during the 2006-2007 school year, there was a sizable increase in applicants to BSN programs compared to the previous year. Graduation rates were also increased. There was a steady rise in BSN enrollments over several years (AACN, 2009), However, these changes, due to the percentage of students turned away from nursing programs, is not enough to turn around the nation's nursing shortage (FCN, 2010).

Orsolini-Hain and Malone (2007) suggested that more open enrollments into nursing programs would help to increase the number of graduate nurses and thus benefit

the nursing shortage. Higgins (2005) found that acceptance criteria are, in fact, not stringent enough due to the need to fill vacant student positions to help improve the nursing shortage. In the past, the State of California sought to release some of their admission standards due to high levels of attrition (California Nursing Programs Drop Admissions Requirements, 2000). This protocol was intended to allow equal-opportunity admission. Thus, students with low academic scores were able to enter nursing programs and admission was no longer limited to only the stronger students. Yet these revised standards opened the door to concerns pertaining to low grades and lengthier college completion times.

Baker (2008) also proposed that higher admission rates would assist in alleviating the nursing shortage because it would attempt to optimize the number of nursing graduates. Nevertheless, a rise in nursing students being admitted to and finishing an undergraduate nursing program is affected by a decrease in nursing faculty, which is preventing the maximization of acceptance to all qualified prenursing students (Murray, Merriman, & Adamson, 2008; Rosenberg, Perraud, & Willis, 2007). The AACN (2009) signified that although there was a documented rise in BSN program enrollments, the number of eligible students declined admittance also raised significantly due to inadequate numbers of nursing instructors. A 2007 survey from the NLN (2009) showed a deficit of approximately 1,900 faculty members in programs across the country. The majority of these programs were for Registered Nurse (RN) or graduate nursing students. About 11% of Florida's faculty positions, likewise, were left unfulfilled. In BSN programs alone, the faculty deficiency was about 61% (Robert Wood Johnson

Foundation, 2010). The Florida Board of Nursing (2007) advised that nursing programs

plan admissions depending on availability of faculty and clinical practice sites.

According to the AACN (2010b), approximately 6.9% of faculty positions across

the United States are yet to be fulfilled, and out of the 556 schools that were surveyed,

54.5% of these schools indicated that they were deficient in faculty members. There are

many open faculty positions within nursing programs; like nurses in the health care

workforce (HRSA, 2010; Kuehn, 2008), many faculty are older and thus are on the verge

of retirement (Potempa, Redman, & Anderson, 2008). The increase in the number of

older nurses retiring will place strains on the amount of experience present in nursing

practice and will also have an impact on nursing education (Orsolini-Hain & Malone,

2007). Some of the other problems contributing to the low faculty numbers are ascribed

to (a) programs requiring faculty to have long-term clinical training prior to teaching, (b)

faculty receiving less annual pay than many nurses in clinical positions, and (c)

inadequate faculty salaries because of institutionally-based financial problems (Yordy,

2006).

Despite a national recession causing drops in employment across various

disciplines, the U.S. Bureau of Labor Statistics (2009) reported that even in general

health care there are increased openings for nurses, due to the shortage. The vacancies in

nursing jobs increases the likelihood of employment of new graduate nurses into areas of

nursing that require a level of competence that exceeds their graduate-level knowledge

base. Even so, Donnelly (2009) stated that available positions are down in some health

care areas because of limited hiring, as affected by the struggling economy. Henderson

(1994) recognized that limiting the hiring of new nurses is found to be a feasible option

for decreasing added expenses during a tough economic time. Furthermore, orientation of graduate nurses who either fail the NCLEX-RN or who leave the work place within a short timeframe places a severe financial burden on the affected organizations (Poorman, Mastorovich, & Webb, 2002). Financial problems within health care institutions and the decreased number of practicing nurses also affects the number of clinical sites available in which nursing students can practice (Miller, 2005). These problems further necessitate the need to graduate more fully competent nurses who will successfully achieve on the NCLEX-RN.

Not Enough Graduates from Nursing Schools

A second contributor to the nursing shortage, from an educational standpoint, is that there are too few graduates from nursing programs. Of those students who were granted admission into nursing programs, over 90% actually accepted the position (NLN, 2006). Nevertheless, the retention and graduation rates within nursing programs are of notable concern. Retention, on average, in BSN programs is about 87%; whereas the national average of retention in all types of college-level programs was reported to be around 72%. Associate Degree Nursing (ADN) and diploma nursing programs have about 80% and 75% retention rates respectively (NLN, 2006). These values may not appear too disconcerting. In fact, according to the NLN (2009), the graduation rate from nursing programs is also slightly up. Although BSN program enrollments have increased, the rise is not substantial and is significantly lower than the enrollment for ADN programs. In the 2006-2007 school year, there was an approximate 3% increase in graduates from RN programs overall; however, BSN graduation rates grew only about 2.3% compared to a 20% growth in 2005 (NLN, 2009). The national graduate nurse rate

was about 71,000 RNs (HRSA, 2004). The way the current nursing shortage is going, estimates show minimal changes nationally in the rates of nursing graduates through the year 2020. Shideler (2008) described the increased number of graduates compared to the needs of the nursing job market to be a "black hole" (para. 1). This is because subsequent increases in program completion rates are remote from the national needs to alleviate the nursing shortage (AACN, 2009).

In the State of Florida, there were over 150,000 practicing RNs according to a 2008 survey (FCN, 2009b; HRSA, 2010). The projected supply calculations (when demand was not considered) showed that there will be about 164,000 nurses practicing in Florida in the year 2020 (FCN, 2008). The needed number of nurses for the year 2020 in the State of Florida is estimated to be about 216,000. Thus, Florida is expected to have a shortage of about 52,000 nurses by the year 2020. Earlier estimates showed that when supply and demand were factored into an equation for the year 2005, Florida showed a deficit of -18,200 nurses (86%), when compared to the data from the year 2000 (HRSA, 2004).

According to the Robert Wood Johnson Foundation (2010), only one-third of nurses receive their education at the baccalaureate level. Orsolini-Hain and Malone (2007) emphasized the necessity of BSN-prepared nurses to fill the voids imposed by the nursing shortage. The FCN (2010) proposed that to adequately fill in the nursing deficit, there needs to be about 90% more graduates than the current U.S. values. To do this, the graduation rate must increase to about 15% each year through the year 2016, while continuing to maintain the retention of nurses already in practice. Nevertheless, although students might successfully graduate from nursing programs, some students are unable to

achieve their primary means into the nursing profession, which is passage of the NCLEX-RN.

Failure of the NCLEX-RN

A third problem related to nursing education that is affecting the nursing shortage is that some students, although successful in the nursing program, do not pass the NCLEX-RN (NCSBN, 2009b), which is a National requirement prior to practice as an RN. Haas, Nugent, and Rule (2004) stressed the importance of a first-time pass rate of the NCLEX-RN. The researchers noted that failures are costly to governmental funds that support students through their schooling. Some institutions, due to the current financial situation of the economy, are careful about hiring graduate nurses (GNs) because of the expenses of orientation and the risk of a student's NCLEX-RN failure (Reiter, Young, & Adamson, 2008). Likewise, NCLEX-RN failures contribute to the nursing shortage (Reiter et al., 2008; Silvestri, 2010). The National League for Nursing Accrediting Commission (NLNAC; 2008) indicated that accreditation of programs are at risk when NCLEX-RN pass rates fall below standard levels. Thus low rates can seriously affect a nursing programs' reputation and potentially affect enrollment figures (Spurlock & Hanks, 2004). An Act Relating to Nursing Programs (2009), a revised legislature, was initiated on July 1, 2009, as issued by the Florida House of Representatives, with new additions specifically for institutions offering nursing education. The mandate indicated a probationary term with the potential for school closure if a program's NCLEX-RN passage rate drops below 10% of the national average.

The student must also face the emotional and psychological ramifications and the embarrassment that follows failure of the NCLEX (Silvestri, 2010). Likewise, there is a

long time span between the failure and the retake of the NCLEX-RN without any clinical practice to assist in the learning process. This time span, according to Siktberg and Dillard (2001), can further hinder future NCLEX-RN performance as well as nursing practice.

BSN Nursing Education

The Bachelor of Science in Nursing (BSN) level of nurses' training provides educational curricula that encompass a wide range of nursing areas that are not typically included in Associate Degree Nursing (ADN) or diploma nursing programs. The BSN education allows for practice in ambulatory and other clinic-type settings, and graduates are prepared to keep abreast of the increasing acuity of patients and the sophistication of modern health care (American Association of Colleges of Nursing [AACN], 2010c). The AACN (2010c) stated, "The primary pathway to professional nursing, as compared to technical-level practice" (para. 1), is the BSN program. The degree is also foundational to advanced practice roles in nursing (AACN, 2010c). The U.S. Bureau of Labor Statistics (2009) noted that graduates from BSN programs have a higher eligibility of progression within the profession, as these individuals "receive more training in areas such as communication, leadership, and critical thinking" (U.S. Bureau of Labor Statistics, 2009, Training and Other Qualifications, para. 3). There is, therefore, an urge for more BSN-prepared nurses, especially in specialty areas of the hospital and the community (AACN, 2010c). There also remains a need to graduate more BSN-prepared nurses to meet the needs of the continually rising population (U.S. Bureau of Labor Statistics, 2009). Attrition, financial concerns, and limited clinical locations are among the barriers that nursing schools face in trying to increase their graduation rates (Melnyk

& Davidson, 2009). In turn, lower graduation rates, as discussed above, complicate the existing nursing shortage. Thus the general focus of this study was to identify if current admission criteria used in a small, private BSN program in Norwest Florida, as well as clinical and overall program success, were indicative of NCLEX-RN achievement.

Researchers have found that attrition, although sometimes related to nonacademic reasons, such as financial and personal problems, is most often a result of academic reasons (Trice & Foster, 2008; Uyehara, Magnussen, Itano, & Zhang , 2007). Several studies conducted in ADN schools considered various enrollment procedures for admission into nursing programs in relation to students' program completion and their NCLEX-RN success.

Ali (2008) identified that high academic preadmission achievement was indeed linked to successful performance in nursing school and that attrition rates were actually increased when admission standards were lowered. Jeffreys (2007) also found that low course grades in prenursing were positive indicators of program attrition. Esper (2009) and Muecke (2008) found that grades in prenursing courses were not significantly related to success in the first-semester nursing courses. On the other hand, Frazor (2004) noted that students' GPAs in prenursing courses significantly correlated with their GPA in the first year of the nursing program. Likewise, Gilmore (2008) noted that the combination of prenursing science courses, the American College Test (ACT) values, and GPA correlated with nursing program success. Higgins (2005) also recognized that grades in science courses taken prior to program entrance were a positive predictor of successful nursing program completion. Future studies that specifically address predictors of BSN program achievement need to be implemented.

Only a few studies specifically looked at admission criteria in relation to program or NCLEX-RN achievement within BSN programs. Even so, the researchers tested a variety of variables and achieved an array of discrepant results. Harris (2006) noted that demographic variables, such as age and race, were predictors of NCLEX-RN achievement but that academic admission variables had no apparent significance. Murray et al. (2008) specifically assessed course grades and scores on the Health Education Systems, Incorporated (HESI) admission test. Although they found that these variables did significantly relate to ADN program completion, there was no identified relationship with BSN program completion. Likewise, Baker (2008) found that preadmission tests and science course grades were not significantly linked to successful passage of the NCLEX-RN. On the other hand, an older study by Seldomridge and DiBartolo (2004) noted that low prenursing grades had a significant negative correlation to success on the NCLEX-RN. Newton and Moore (2009), likewise, indicated that prenursing GPA was predictive of success on an end-of-program practice NCLEX-RN test. The authors noted that although students met the admission criteria of a BSN nursing program, it did not mean that they were successful in the program or on the NCLEX-RN. Another study within a BSN program also focused on admission test scores (Newton, Smith, & Moore, 2007). Simmons, Haupt, and Davis (2004) identified that Nurse Entrance Test (NET) scores were indeed a predictor of program success. Likewise, Newton et al. (2007) found that prenursing GPA and scores on the Test of Essential Academic Skills (TEAS) were predictors of success for students who entered a nursing program based on their academic standing, but that these scores had no significance for students who were enrolled on a

first-come, first-serve basis. Vandenhouten (2008), however, noted that prenursing ACT values were related to successful passage of the NCLEX-RN.

Other noted predictors, besides admission criteria, of NCLEX-RN achievement for BSN programs, based on the literature, included

- The HESI test completed at the end of the nursing program (Abbott, Schwartz, Hercinger, Miller, & Foyt, 2008),

- Gades in nursing courses (Campbell, 2006; Matos, 2007; Vandenhouten, 2008),

- Clinical performance (Crow, Handley, Morrison, & Shelton, 2004),

- The Mosby Assessment Test (Kilcullen, 2004),

- The California Critical Thinking Skills Test (CCTST; Giddens & Gloeckner, 2005), and

- Overall program GPA. (Fortier, 2010)

Chapter 2 covers, in more detail, literature related to prenursing admission criteria as well as nursing program and NCLEX-RN achievement.

A guideline of the Nurse Practice Act for the State of Florida is that the BSN education incorporates "ongoing program evaluation in relation to…effectiveness of graduate performance" (Florida Board of Nursing, 2007, p. 31). Likewise the Florida Center for Nursing (2007) strongly promotes increased retention of nursing students and their subsequent graduation from nursing programs. Although the literature contains a sundry of studies related program and NCLEX-RN success, more research is needed in this area. Nursing programs, although they must follow a set curriculum outlined by the board of nursing, are each unique in their own respect. The students and faculty also vary

across programs. No known study had yet looked at admission or program retention and completion criteria in relation to passage of the latest NCLEX-RN modification, which took place in April of 2010. Neither had any study ever looked at type of high school attended as a possible predictor variable of nursing program success. There remained a need for individual programs to conduct assessments of the adequacy of their nursing programs (Esper, 2009; Lauchner, Newman, & Britt, 2008; Roat, 2008; Vandenhouten, 2008), including an examination of methods of nursing student retention, prevention of attrition, and ways to increase enrollments in nursing programs (Orsolini-Hain & Malone, 2007). Higgins (2005) suggested that admission criteria be reviewed within individual programs, and early identification of students who are likely to fail the program or the NCLEX-RN is a necessary implementation (Jeffreys, 2007). No such study was ever conducted in the study's program prior to this one. Thus this research added to what was already conducted so that the literature about standard admission procedures that promote achievement of the NCLEX-RN remained current, and it also specifically identified any academic variables within the BSN program of study that were indicative of inadequate NCLEX-RN success, so that future changes could be made if needed.

<div align="center">**Problem Statement**</div>

The United States is facing a nursing shortage that is projected to continue, at the very least, through the year 2020 and is likely to worsen in the meantime (AACN, 2009; Robert Wood Johnson Foundation, 2010). From a nursing education standpoint limited enrollment, student attrition, and failure of the NCLEX-RN are found to be among the causes of the nursing shortage. The research problem that this study addressed was ineffective criteria and poor outcomes of students who are enrolled nursing programs. As

such, the academic criteria of individual programs were investigated (Esper, 2009; Lauchner et al., 2008; Roat, 2008; Vandenhouten, 2008), beginning at enrollment and continuing through the students' completion of the program and the NCLEX-RN to identify criteria that are effective and to likewise recognize factors that are predictive of poor outcomes so that curricula can be changed and remediation measures that promote student success can be initiated, if needed (DiBartolo & Seldomridge, 2008). Some researchers that implemented remediation strategies within nursing programs did so following assessments of admission or program variables indicative of either nursing program (English & Gordon, 2004; Seago & Spetz, 2003) or NCLEX-RN success (Nibert & Young, 2008).

Background of the Problem

An assessment of prenursing and within-program academic variables was used to identify predictors of students' achievement on the NCLEX-RN. As portrayed above, there were discrepancies within the current knowledge base about predictors of student success, both in the nursing program and on the NCLEX-RN. Nonacademic variables have also been tested factors in relation to student attrition from nursing programs and failure of the NCLEX-RN (McCallum, Donaldson, & Lafferty, 2006; Trice & Foster, 2008). However, nonacademic variables tend to be personal, based on the circumstances of an individual, and are much more difficult to predict in relation to the function of an educational program (Shapinsky, 2006). In one older study, for example, students perceived that low self-esteem and not fitting in with their peers or the stipulations set out by the nursing program were reasons for unsuccessful program completion (Lisk, 2003).

Demographics, such as age (Esper, 2009; Hopkins, 2008; Muecke, 2008), gender (Esper, 2009; Pryjmachuk, Easton, & Littlewood, 2009), native language (Blackman et al., 2007), race (Harris, 2006; Pryjmachuk et al., 2009), marital status (Harris, 2006), and housing location in relation to school (Pryjmachuk et al., 2009) have also been factors tested in relation to program and NCLEX-RN achievement. Increased age (Humphreys, 2008; Vandenhouten, 2008) and White race (Harris, 2006) were identified as predictive of NCLEX-RN passage. Pryjmachuk et al. (2009) also linked increased age to successful nursing program completion; whereas younger college-aged students, males, and Black students were predictive of program attrition. Otherwise, demographics have not been shown to have a strong link to academic achievement in nursing programs or on the NCLEX-RN. This study, therefore, added to the literature by testing the relationship between type of high school from which a student received his or her education to nursing program and NCLEX-RN achievement. As the study's nursing program admits students from a variety of educational backgrounds, including home schooling, it was reasonable that a link was deemed feasible to assess.

The United States offers diverse curricula and types of schooling; parents have the option to choose from various forms of high school settings in which to have their children educated. The most recent data, from the National Center for Education Statistics (NCES, 2008), showed that approximately 2.9% of U.S. school-aged children receive their schooling in the home environment compared to 88% and 10% of school aged children that attend public and private schools respectively (Center for Education Reform, 2009). Upcraft, Gardner, and associates (1989) explained that knowledge of predictor variables of achievement in college, including students' high school

backgrounds, could better help institutions to plan for effective student success endeavors early on in the students' college training. Noel (1987) stressed the importance of faculty involvement in projects that assess student retention issues. He further encouraged academic advising in the early days of the students' college admission, especially with helping them to transition from their various high school environments. Horton (1998) implicated that admission factors should investigate high school curricula to identify learning needs of students prior to course entry and that students should possess a good background of learning skills that would foster success in college. However, it was beyond the scope of this study to assess high school curricula, specific high school grades, or even evaluate the strengths and weaknesses of the present high school systems. As no apparent studies considered type of high school in relation to success in nursing education or NCLEX-RN achievement, I correlated this variable individually with intraprogram variables, as well as examined type of high school as a predictor variable to NCLEX-RN success specifically.

A vast assortment of academic variables such as

- GPA (Fortier, 2010; Landry, Davis, Alameida, Prive, & Renwanz-Boyle, 2010);

- End-of-program nursing comprehension examinations (Frith, Sewell, & Clark, 2008; Lauchner et al., 2008; Nibert & Young, 2008);

- Prenursing entrance tests (Baker, 2008; Hopkins, 2008; Murray et al., 2008; Roat, 2008);

- Grades in various prenursing courses (Baker, 2008; Esper, 2009; Gilmore, 2008; Roat, 2008);

- Nursing program course grades (Matos, 2007; Murray et al., 2008; Uyehara et al., 2007);

- Standardized nursing tests (Uyehara et al., 2007);

- SAT and/or ACT scores (Gilmore, 2008; Hopkins, 2008; Humphreys, 2008);

- Iintelligence testing (Hughes, 2007); and

- clinical experience (Pryjmachuk et al., 2009)

have been studied in relation to performance in the overall nursing program and/or on the NCLEX-RN. The findings of these studies will be discussed in greater detail in chapter 2.

My study went beyond what had already been conducted in the literature in that it looked at a spectrum of academic variables from program entry to completion and first-time performance of the NCLEX-RN. Furthermore, multivariate techniques were used to assess how well each factor predicted NCLEX-RN achievement. Unlike Uyehara et al. (2007) who also examined prenursing (high school and prenursing GPA and scores on the National League for Nursing [NLN] prenursing test) and intraprogram variables (nursing and science courses and the Watson-Glaser Critical Thinking Appraisal Test) in relation to overall nursing program and NCLEX-RN success, this study incorporated clinical pass and fail as one of the predictor variables to NCLEX-RN performance.

Furthermore, no apparent study had considered the Test of English as a Foreign Language (TOEFL) as a predictor variable of NCLEX-RN success. O'Neill, Tannenbaum, and Tiffen (2005) suggested, through their study that tested competency levels of students with a nonEnglish primary language, that the minimal electronic TOEFL examination score be 220 and the minimal written TOEFL examination score be

560 to be eligible to take the NCLEX-RN. Although Whitehead's (2006) study

compared the critical thinking ability of English as a Secondary Language (ESL) students

and native English students in relation to their success on the NCLEX-RN, he found no

apparent difference between the two groups. Yet no such study examined TOEFL scores

specifically. Qualitative studies, on the other hand, in relation to English-speaking ability

have been studied. Donnelley, McKiel, and Hwang (2009) interviewed students and

faculty to identify the perceived learning needs of ESL students. Wood, Saylor, and

Cohen (2009) noted that increased locus of control, especially of external factors, was

significantly linked to lower grades in Medical-Surgical nursing, particularly among

Filipino students. Sanner (2004) implied that the learning needs of ESL students needs to

be a consideration for nursing programs because there "is also a lack of ethnic diversity

among practicing nurses to care for an increasingly diverse society" (para. 1). This study

was apparently the first one to examine TOEFL scores of students whose primary

languages are not English as a prenursing predictive variable of NCLEX-RN success.

Therefore this study looked at prenursing and within-program variables including

cumulative Fall Semester GPA, overall prenursing science, mathematics, and English

GPA, type of high school background, TOEFL score for students with a nonEnglish

primary language background, clinical pass or fail, and on-time program completion

versus program failure as possible predictors of the outcome of achievement on the

NCLEX-RN. A visual depiction of the potential relationship between the independent

and dependent variables was presented as a conceptual model further along in this

chapter. The quantitative, descriptive statistical measures entailed the identification of

means, standard deviations, and frequencies for the variables measured at the interval-

level. For nominal-level variables, descriptive statistical analyses included identification of modes as well as frequencies by way of simple tables and crosstabulations (Salkind, 2000). Correlations were also tested to identify significant associations between independent and dependent variables (Steinberg, 2008). The phi coefficient was used to assess bivariate correlations of dichotomous, categorical data (Salkind, 2000). The chi-square statistic, which also tests the relationship between two variables by identifying differences between frequencies, was used to calculate the phi coefficient (Welkowitz, Ewan, & Cohen, 1991). Point biserial correlations were used for bivariate associations between interval and categorical data, and the Pearson product moment correlation coefficient was implemented to identify relationships among variables that both contained interval-level data (Marion, 2004). A multivariate regression analysis was also used to measure how well each independent variable predicted the categorical dependent variable (Ryan, 1997). Multivariate regression analysis informed me about the significance of relationships between independent and dependent variables yet it also controlled for the influence of all other independent variables that were entered into the equation (Mutchler, 2006). Therefore, once relationships were recognized, I identified which variable(s) had the strongest relationship to the dependent, outcome variable.

Nature of the Study

The nature of this study was to identify prenursing admission and nursing program variables that contributed to student achievement on the NCLEX-RN. Thus a nonconcurrent prospective study using secondary data was conducted. The nonconcurrent prospective design involved examination of predictive factors along with a potential outcome (Guralnik & Manolio, 2007). I not only explored the outcome of

NCLEX-RN achievement, but also considered factors that affected students' progress through the nursing program. Nonconcurrent in relation to design means that the researcher examines participants at different points in time (Watson & Workman, 2002). Nonconcurrent, according to Watson and Workman (2002), also means that the outcome is in the present time period, but the risk factors are retrospective, or historical. Descriptive statistics, bivariate, and multivariate data analyses were therefore conducted. Authors of other recent studies also used a variety of multivariate techniques, such as discriminant function analysis (Ukpabi, 2008), logistic regression (Campbell, 2006; Vandenhouten, 2008), and Partial Least Square Path Analysis (Blackman et al., 2007), to examine predictor variables in relation to NCLEX-RN success for BSN programs (Ukpabi, 2008). Their predictive variables, however, included standardized test scores (Ukpabi, 2008; Vandenhouten, 2008), demographic variables (Blackman et al., 2007; Vandenhouten, 2008), grades in nursing courses (Blackman et al., 2007; Campbell, 2006; Vandenhouten, 2008), overall program GPA (Blackman et al., 2007; Campbell, 2006: Ukpabi, 2008), and type of clinical location (Blackman et al., 2007).

Although I also examined prenursing GPA values, the multivariate model used in my study incorporated other predictive variables that had not been well researched by either bivariate or multivariate means in the current literature. The population of interest was graduates from a BSN program from which a sample of student academic records from one private, BSN program in a Northwest Florida college was conveniently selected. The research design is presented in greater detail in chapter 3.

Research Question

Generally I sought to answer the question: How do various prenursing and intraprogram factors contribute to passage or failure of the NCLEX-RN? Multivariate logistic regression was used to determine how the independent variables predicted the categorical outcome of NCLEX-RN pass or fail (Mertler & Vannatta, 2010; Tabachnick & Fidell, 2007). More specifically, the research question asked: How do the individual or combined variables of (a) cumulative Fall Semester GPA, (b) overall prenursing science, mathematics, and English GPA, (c) type of high school background, (d) TOEFL score, (e) clinical pass or fail, or (f) on-time program completion versus program failure, best predict the outcome of NCLEX-RN passage or failure?

Purpose of the Study

The purpose of this study was to explore and identify prenursing and intraprogram academic variables within a multivariate setting that were indicative of students' performance in the nursing program as evidenced by pass or fail of the NCLEX-RN. The study contributed to what had been covered in the current literature base by focusing on a BSN nursing program and by examining the variables of type of high school, clinical achievement, and TOEFL score of students whose primary language was not English, among other academic factors that might contribute to or hinder success in the program and on the NCLEX-RN so that current program policies might be revised or improved if needed. The research was carried out through the review of program records of graduate nursing students who entered the nursing program during the academic years of 2006 through 2007. Although the data in the students' records were secondary information, they were never before used in any research of this nature. I had to carefully organize the

information to conduct the statistical analyses that were required. The reason why records from these specific years were studied was that the information was very current and that the 2010 graduates had just taken the NCLEX-RN following its updated revisions that began in April of 2010 (NCSBN, 2009c). These revision processes that the NCLEX-RN test undergoes are discussed in further detail in chapter 2.

The records that were analyzed were from a private college's baccalaureate nursing program located in Northwest Florida. The program offers two semesters each year. Eligible prenursing students are accepted for program admission as sophomores in September (Fall Semester) of any given year and then complete the standard academic year at the beginning of May (end of Spring Semester) of the subsequent year. The students who remain on track begin and end each school year, as well as the program, with the same classmates with whom they entered the program.

Theoretical Base

The majority of previous studies that examined predictive factors related to nursing program and/or NCLEX-RN success were without theoretical frameworks (Abbott et al., 2008; Gilmore, 2008; Hopkins, 2008; Jeffreys, 2007; Newton et al., 2007; Nibert & Young, 2008; Pryjmachuk et al., 2009; Seldomridge & DiBartolo, 2004; Uyehara et al., 2007; Yoho, Young, Adamson, & Britt, 2007). The authors used a variety of study designs including descriptive (Hopkins, 2008; Nibert & Young, 2008; Uyehara et al., 2007; Yoho et al., 2007), descriptive ex-post-facto (Giddens & Gloechner, 2005; Strayer, 2010), retrospective descriptive (Abbott et al., 2008; Gilmore, 2008; Jeffreys, 2007); "exploratory descriptive" (Newton et al., 2007, p. 441; Newton & Moore, 2009), and retrospective cohort (Pryjmachuk et al., 2009). This study essentially followed the

research tradition (Bordens & Abbott, 2002) of studies that addressed the nursing

shortage and/or attrition (Esper, 2009; Hopkins, 2008; Hughes, 2007; Jeffreys, 2007;

Pryjmachuk et al., 2009; Seldomridge & DiBartolo; Vandenhouten, 2008) as the basis for

the examination of potential predictors of nursing program and NCLEX-RN

achievement. However this study also considered Seidman's (2005) formula for student

success. Although specific hypothesis testing of the theory was not conducted, the theory

instead served as a motivational guide for conducting research that assessed particular

predictive factors of student success in the preliminary and intraprogram stages of a

nursing school. The formula, officially titled, the "Seidman Retention Formula"

(Seidman, 2005, p. 296), appears as follows, "RET = E_{ID} + $(E + I + C)_{IV}$, that is,

RETention = Early $_{ID}$entification + (Early + Intensive + Continuous)$_{Inter_V}$ention"

(Seidman, 2005, p. 296). Retention, according to Seidman (2005), refers to the student's

accomplishment of a set purpose of graduation from a program of study. Early

Identification describes the recognition of students who are likely to be unsuccessful in

their schooling and the offering of assistance beginning at the onset of the recognition of

a likely unsuccessful student. Intensive and Continual are the interventions that Seidman

described as long term, until the desired outcome or graduation, and in the case of this

current study, NCLEX-RN achievement, is reached.

The retention formula was based on the medical diagnosis model, where

individuals are assessed for either the presence of or the absence of disease (Seidman,

2005). In the case of student retention, the student's admission data becomes the physical

assessment. Seidman (2005) noted that problems can be identified upon assessment.

Furthermore,he indicated that with medical diagnoses, patients are not always likely to be

compliant with interventions or willing to ask for medical assistance. The same is true with students. Thus students often have to be told that there is a noted academic problem. Finally Seidman found that a lack of intervention could cause further progression of disease; and likewise, students who do not receive help can potentially fail in a program of study. Problems, therefore, need to be recognized early to prevent long-term ramifications of academic weakness.

Conceptual Model

To fully understand how Seidman's (2005) formula relates to student retention from admission through graduation, a basic conceptual model illustrating the journey that students take through nursing school is depicted (Figure 1). The students' admission process shows the students' entrance to the program by meeting specified program prerequisites and specifications. The ultimate outcome, or horizon, is depicted as the achievement of graduation and finally the passage of the NCLEX-RN. Another box stems from the graduation box that shows that it is possible for student's to fail the NCLEX-RN. The boxes around the attrition and Fail NCLEX-RN boxes are dotted and dashed to represent that these aspects are hoped to be prevented through early detection of students who are likely to fail, based on academic markers, found upon the identification of predictors of failure of either the program or the NCLEX-RN.

GPA; type of high school attended; TOEFL score;

Admission

Course and Clinical achievement

Graduation

Pass NCLEX-RN

Fail NCLEX-RN

Program Attrition
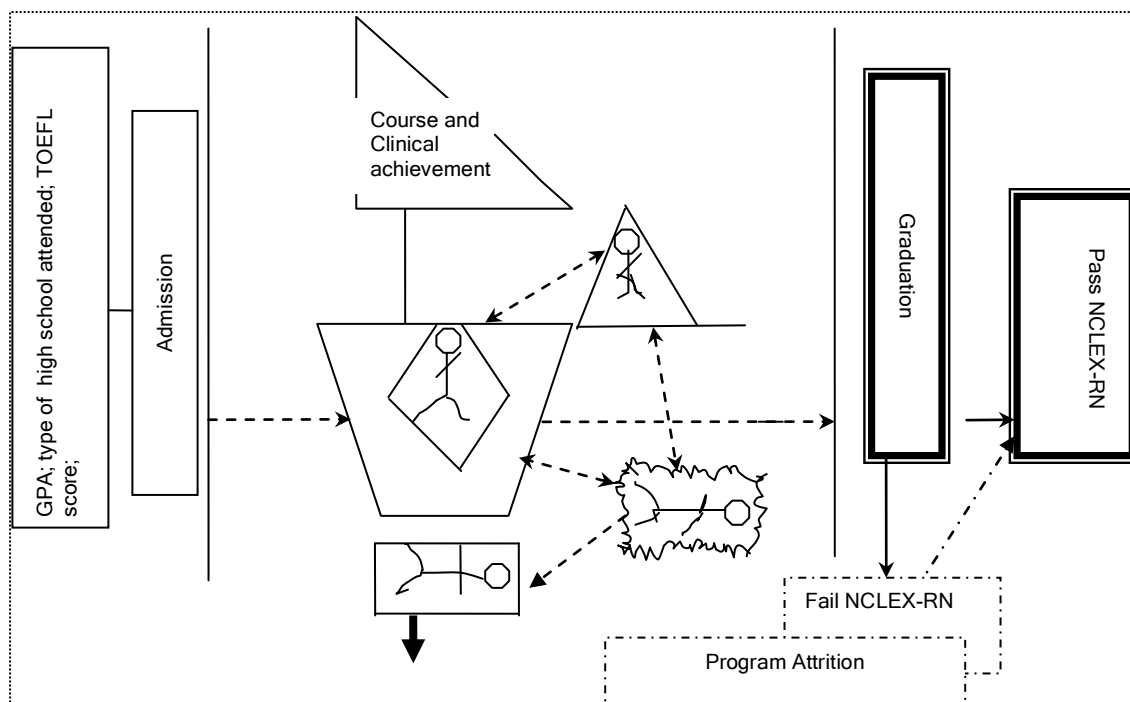
Figure 1. A conceptual model depicting nursing students' program progression from admission to the completion of the NCLEX-RN.

The central portion of Figure 1 represents the direction that students take following admission until the time of graduation. A boat-like image depicts the students' travels through the nursing program, like sailing on a vessel, as they take nursing courses and undergo clinical practice. The stick figure in the diamond-shape in the center of the boat depicts the students who stay on course from program onset to completion. Whereas, the stick figure in the triangle-shape that is walking across the gangplank, so to speak, on the upper ridge of the boat portrays the struggling students, who could either continue sailing or fall-off the boat, depending on academic achievement. The stick figure in the water, encircled by the jagged rectangle represents students who have, in fact, fallen off the boat because of failure. Yet the prostrate stick figure below the boat in the solid rectangle shows the student that leaves the program due to academic and nonacademic reasons. For the purpose of this present study only the academic factors,

such as not meeting the program requirements due to academic and/or clinical failures, were considered.

Finally, arrows and lines show the directional components of the model. The primary direction is from admission to program graduation to the passage of the NCLEX-RN. The dashed lines indicate that the course is not solid, and that just because students begin the program does not mean that that they will have a direct pathway to completion. Furthermore, some of these dashed lines are also bidirectional. For instance, dashed lines show that (a) strong students could potentially become struggling students; (b) struggling students could potentially fail, and failing students could potentially get back on the boat and perform well or remain in the struggling position; and (c) failing students could be forced to leave the nursing program completely if the program requirements are not met. Lastly, the lines extending from the graduation box to the Pass NCLEX-RN or Fail NCLEX-RN boxes are solid because the students will only either pass or fail this examination once it is taken (NCSBN, 2009a). A dashed and dotted line extends from the NCLEX-RN fail to the NCEX-RN pass box because future attempts of a student taking the NCLEX-RN does not mean that he or she will pass on these later tries.

Thus, the theoretical foundations and the conceptual representation of the theories guided this study into the direction of assessment of nursing students' progression from admission through graduation and the first-time attempt result of the NCLEX-RN examination. A specific look at the prenursing admission variables, performance in clinical training, and program completion related to achievement on the NCLEX-RN was conducted.

Operational Definitions

Baccalaureate nursing program: Standard 4-year degree program. The students accomplished one year of prenursing science and liberal arts courses to meet the completion requirements for graduation (Amos, 1998). The study's program is approved by the NLN.

Bachelor of Science in Nursing (BSN): The nursing degree obtained by the graduates of the study's nursing program upon successful completion of the program. BSN was also used in reference to the type of nursing program, as stated in the above definition, and was distinguished from the Associate Degree (ADN) nursing program, diploma program, and practical nursing (PN) program (Degree Directory, 2009).

Clinical success/achievement/pass/fail: The terms success, achievement, and pass were used interchangeably when referring to student performance in clinical courses (Blackman et al., 2007; Crow et al., 2004; Lengacher & Keller, 1990).

Prenursing GPA: The grade point average (GPA) total of combined course credits (Washington State Legislature, 2006) that were taken during the Freshmen year (Daley et al., 2003; Seldomridge & DiBartolo, 2004). These included the following divisions:

- *Cumulative Fall Semester GPA*: the courses included in this total are: (a) BI 101 New Testament survey (NT I), (b) BY 105 Principles of Biology (BY), (c) CH 106 Introduction to General Chemistry (CH I), (d) EN 101 English Grammar and Composition (EN I), and (e) HI 101 History of Civilization (HI I).

- *Overall prenursing Science, Mathematics, and English GPA*—the total GPA value of only the science, mathematics, and English courses combined.

Eligible students for program admittance can receive a minimal GPA score of 2.0. The maximum GPA value for the college is 4.0.

Program attrition and completion: Attrition was referred to students who discontinued enrollment in the program (Esper, 2009; Pryjmachuk et al., 2009; Stickney, 2008). Completion meant that students finished the nursing program within the standard 3-year timeframe. In cases of course and clinical failure, the program of study had special allowances. If a student failed one course during a particular semester, he or she might have been able to stay on track through repetition of that course during the between-semester breaks. However if the student failed more than one course or failed the clinical component of a course, he or she repeated the delinquent work during the next academic year and therefore became ineligible to complete the program in the standard timeframe. All students who finish the program, whether or not they did so in the normal time period for completion, were eligible to take the NCLEX-RN.

TOEFL exam: A test that measures level of English proficiency for students whose primary spoken language is not English (Educational Testing Service [ETS], 2009). The test is based on the ability of a student to listen and understand, write, speak, and read and understand the English language. The composite scores of the written TOEFL examination range from 310 to 677; whereas the composite scores of the computerized version of the examination range from 0 to 300 (ETS, 2009). O'Neill, Tannenbaum, et al. (2005) suggested, through their study that tested competency levels of students with a nonEnglish primary language, that the minimal electronic TOEFL examination score be 220 and the minimal written TOEFL examination score be 560 to be eligible to take the NCLEX-RN

Type of high school: The high school training received by the prenursing student prior to college admission. This variable included the institution type, such as:

- Public,

- Private, nonreligious,

- Private, religious

- Home-school, and

- General Equivalency Diploma (GED) certification (Gülleroğlu, 2008; McCullough, 1934; Thomas, 2004).

Assumptions, Limitations, Scope, and Delimitations

Assumptions refer to the philosophical approaches to the research problem (Bryant, 2004). When logistic regression was used, assumptions could not be made regarding the relationships between the independent and dependent variables, in that (a) normal distribution of the independent variables was not required, (b) the independent variables could be either categorical or continuous, (c) a linear relationship between the independent and dependent variables was not necessary, and (d) the logistic regression analysis should not relay a negative relationship between the independent and dependent variables (Tabachnik & Fidell, 2007). A couple of other assumptions, however, were made prior to the implementation of this study. First, it was assumed that the dependent variable of NCLEX-RN pass or fail status was valid and reliable. The NCSBN conducts research regularly to test the validity and reliability of the examination (NCSBN, n.d.; NCSBN, 2008; O'Neill, Marks, & Reynolds, 2005). According to the NCSBN, several validity measures are considered. These are listed and summarized below:

- Content validity—looks at actual nursing practice so that test items are accurate to what is important to know in the health care setting.

- Sampling validity—considers the variety of questions provided to each individual test-taker.

- Face validity—tests a variety of questions that cover a variety of areas of nursing.

- Construct validity—ensures that the examination measures basic, graduate-level "competence." (NCSBN, n.d., p. 3)

- Scoring validity—items are tested before banking them by placing them in examination as experimental, nonscored items.

Reliability of the NCLEX-RN is measured through the use of the "decision consistency statistic" (NCSBN, n.d., p. 1). The NCSBN identified the decision consistency statistic as a better tool for dichotomous data than other statistical measures. The examination's readability level was also examined (Woo, Wendt, & Liu, 2009).

Limitations are extraneous situations that abate the study (Calabrese, 2006). This research contained the following limitations:

- The sample of student records was selected conveniently rather than randomly. This form of nonprobability sampling might not have provided "accurate and precise representations" (Babbie, 2004, p. 186) of the population in question, and might have, therefore, presented sampling bias.

- This study included only the testing of academic variables. It did not, therefore, include nonacademic variables such as (a) critical thinking ability (Hopkins, 2008; Uyehara et al., 2007), (b) knowledge about nursing prior to

entering nursing school (Ehrenfeld & Tabak, 2000), (c) level of propensity toward caring (Rosenberg, Perraud, & Willis, 2007; Seago, Wong, Keane, & Grumbach , 2008), and (d) many others that have been tested by researchers. Tabachnik and Fidell (2007) indicated that eliminating "statistically significant predictors" (p. 441) from the data analysis is not an advisable practice. However because this study entailed nonlife-threatening outcomes, purposeful selection of potential predictor variables did not pose any risks to the study (Tabachnick & Fidell, 2007).

- This study did not include the testing of standardized tests as academic variables. Thus by not including standardized testing as an independent variable, a possible predictor of program, clinical, or NCLEX-RN achievement might have potentially remained unfounded.

- The clinical evaluation system, in which the students received either pass or fail outcomes, used in the study's program was subjective as well as based on individual student experiences. Yet it would have been impossible to provide the students with identical clinical experiences in order to strengthen this limitation.

- The dependent variable of NCLEX-RN achievement was dichotomous, or discrete (Tabachnik & Fidell, 2007), in that it only measured whether students passed or failed in this area. Thus the outcome was "mutually exclusive" (Steinberg, 2008) and offered no other alternatives. The NCSBN (n.d.) accounted for this limitation in its reliability testing, as mentioned above.

The study took place in a baccalaureate program of a small, private university. The sample entailed academic and demographic information drawn from the records of current or former students or graduates that entered and/or completed the nursing program between the years of 2006-2010. A compilation of the data was collected and initial analysis involved descriptive statistics that proceeded with correlation and multivariate, logistic regression procedures.

Delimitations are factors within a particular study that are entirely specific to that study and thus cannot be stated as valid outside of the scope of the study (Bryant, 2004). The following delimitations existed within the research:

- The research setting was one campus in one region of the United States and did not include a comparison study of other BSN programs in other regional settings. The study was carried out at a small private baccalaureate nursing school in one region of Florida. Therefore, the sample was not necessarily representative of the larger population of baccalaureate nursing students in much larger university settings across the United States. This delimitation represented a breech in "population generalizability" (Wallen & Fraeknel, 2001, p. 143) in which the results of one, small study sample is not a valid example of the population.

- The data and subsequent findings obtained and identified from student records might not have been indicative of students currently and futuristically enrolled in the nursing program. Wallen and Fraeknel (2001) indicated that circumstances and experiences may vary across groups within the same environment.

- The variables were only tested based on the records of graduates from a BSN

  program and did not include the records of other students in other majors.

  Again, by limiting a sample to include only one group within a larger

  population, this might have affected the generalization of the findings and thus

  have affected the validity of the study (Wallen & Fraeknel, 2001).

Significance of the Study

Nursing program deans and educators need to have the mindset of social change

in regards to assessment and interventions that help to remedy academic problems early

on in individual programs. For example, not only will early identification of students

who will likely fail either nursing academics or the NCLEX-RN assist with the selection

of nursing program candidates and/or the implementation of appropriate remediation

strategies for struggling students, but will also aspire to assist to increase the number of

competent, new graduates that will go out into the nursing workforce, which will in turn

help to reverse the deficits that are found to be a cause of the national nursing shortage

(AACN, 2009; NLN, 2009).

This study, therefore, aimed to support the issue of social change and fill an

apparent gap in the current literature. To date, no one study had assessed NCLEX-RN

performance in a BSN program with the multivariate model that this study used. For

example, no apparent study had yet considered the academic variables of type of high

school, TOEFL score, or clinical pass or fail in relation to achievement on the NCLEX-

RN. Seldomridge and DiBartolo (2004) indicated that it is important to promote

assistance for struggling students by identifying "at risk students" (Seldomridge &

DiBartolo, 2004, p. 361) while they are in the early stages of their nursing course work.

Likewise, DiBartolo and Seldomridge (2008) and Frith et al. (2008) implicated that NCLEX-RN results might be indicative of the quality of the nursing program. Therefore it was important to conduct this research so that the weak points of the program could be clearly identified. High program and NCLEX-RN passage rates at a particular institution could also be a positive recruiting tool for prospective students (Frith et al., 2008). O'Neill, Marks, et al. (2005) encouraged any research that assesses variables linked to the NCLEX-RN because research in this area can be useful to those that design the NCLEX-RN and its standards for licensure. This study, therefore, contributed to this body of knowledge.

Morin (2006) noted that it is important to not base student continuation or graduation on only one measure. Likewise, Murray et al. (2008) stated that programs should not base admissions on one predictor alone, and they recommended help to at-risk students prior to entry into the nursing program. Therefore an assessment of multiple variables strengthened the study. Esper (2009) and Roat (2008) encouraged program-specific studies, as one program could potentially learn from the findings of another program. Campbell (2006) implied that perhaps nursing programs should increase admission standards and not allow a set number of students to enter the program regardless of their academic standings. However, this point was not easily and feasibly implemented until the prenursing variables were assessed for in the program in question.

The rationale for conducting this study was to improve overall program completion and NCLEX-RN passage rates through the identification of any variables that were associated with successful achievement or failure in these areas so that the standard admission procedures and/or the curriculum of the BSN program in question could be

changed, if the findings indicated a need to do so. No study along these lines had ever been conducted in the proposed program of study. It was also desired that the findings would help to identify students, that would likely struggle in the program, prior to admission so that assistance could be offered to them. Thus it was intended that the contribution of this study to the current knowledge-base would promote more eligible graduates to enter the work force that is suffering due to the social issue of the nursing shortage (HRSA, 2010).

Summary and Transition

A serious nursing shortage is affecting the nation (AACN, 2009; Robert Wood Johnson Foundation, 2010) as well as countries around the world (Blackman et al., 2007). There are several contributors to the nursing shortage, among which are lack of space within programs despite an increase in interested applicants (NLN, 2006), a low number of nursing program graduates (Shideler, 2008, December 13), and students' failing of the NCLEX-RN (Haas et al., 2004). However, no conclusive academic factors have yet been linked to NCLEX-RN achievement to help to alleviate the nursing shortage situation. Thus, this study attempted to identify prenursing variables as well as clinical achievement that were potentially linked to NCLEX-RN achievement by means of a nonconcurrent, prospective design based on Seidman's (2005) formula for student success. A conceptual model that depicted the direction that students take from program admission to completion described how student success and failure potentially related to the study's variables, as this study assessed the existence of any such relationships. The study's assumptions, limitations, and delimitations were also discussed in detail.

The next two chapters of this dissertation further provide details about the research. Chapter 2 highlights the development of the NCLEX-RN. The chapter also relays an analytical evaluation of the findings of past studies that have delved into the assessment of variables that were deemed predictive of nursing program and/or NCLEX-RN success. Some of the more detailed methodologies used by various researchers to gain a better understanding of these predictive factors and the rationale for the selected method of the proposed study are also discussed. Chapter 3 points out the specifics relating to the chosen methodology for the current study. The chapter details the study's design, the approach to the research that was conducted, and the sample and setting that was tested. The variables that were specifically assessed in this work are also described further.

Chapter 4 presents the data analysis that answers the study's research question through descriptive, correlation, and multivariate logistic regression procedures. Statistical figures and Tables that organize the data are displayed in the chapter's narrative. The specific processes used and the challenges faced throughout the analyses are also relayed.

Finally, chapter 5 summarizes and poses a discussion about the interpretation of the data analyses. The associations of the study's findings are compared to the theoretical base and the current literature. Furthermore, the limitations are reassessed and implications to practice and social change are proposed.

Chapter 2: Literature Review

Introduction

Program-specific studies, especially in BSN education, should continue to be conducted to identify the admission and intraprogram variables that are linked to successful passage of the NCLEX-RN. Several authors addressed the importance of individual programs conducting assessments of academic factors related to student success (Esper, 2009; Lauchner et al., 2008; Roat, 2008; Vandenhouten, 2008). Yet there also remained a deficiency of knowledge in the literature pertaining to variables such as TOEFL scores, type of high school from which a student graduated, and clinical success and whether or not these variables, among others, indicated successful achievement of nursing education and the NCLEX-RN. The question that this study, therefore, sought to answer was: How do the individual or combined variables of (a) cumulative Fall Semester GPA, (b) overall prenursing science, mathematics, and English GPA, (c) type of high school background, (d) TOEFL score, (e) clinical pass or fail, or (f) on-time program completion versus program failure, best predict the outcome of NCLEX-RN passage or failure? The outcomes of the research were intended to be a precursor to program implementations such as alterations to the current admission selection processes and remediation measures to foster more graduates from a BSN program, to increase the program's NCLEX-RN passage rate, and to in-turn help remedy the nursing shortage. The purpose of conducting this exhaustive review of the literature was to assess and synthesize, by means of a critical analysis, material related to predictive variables of nursing program completion and NCLEX-RN achievement. The chapter outlines the discovery of related material from the development of the NCLEX-RN to the current

body of knowledge that seeks to offer answers and suggestions related to student success and the nursing shortage issue. Furthermore, recognized gaps in the literature are discussed as they relate to the current study.

The literature review is organized by means of the following main topics:

- Historical Perspectives of the NCLEX-RN,

- Theoretical Basis,

- The Research Variables, and

- Literature Related to Methods.

Some subtopics are addressed under a few of the main headings as well. Prenursing admission and other variables used as predictors of achievement in the literature are explained as they relate to attrition, program, clinical, or NCLEX-RN performance.

Two area University libraries and the Walden Online Library were used in the search for relevant sources. Multiple resources were consulted for both past and recent information. Such sources included books, manual and computerized searches for articles through library periodicals and on-line databases containing journal articles, and published and unpublished dissertations. The databases primarily consulted included: (a) Academic Search Premier, (b) Business Source Premier, (c) CINAHL Plus with Full Text, (d) Communication and Mass Media Complete, (d) Computers and Applied Sciences Complete, (e) Educational Resources Complete, (f) ERIC, (g) PsycINFO, (h) SocINDEX with full text, (i) MEDLINE, and (j) ProQuest Central. Mostly peer-reviewed or refereed research articles were selected for review, unless the source contained relevant material that was useful as support material to explain some of the historical perspectives or issue concepts discussed in this study. Furthermore, the

majority of the articles chosen for review were full-text documents; however, in some cases, abstracts were used when the full-text documents were unavailable through database searches or Inter-Library Loan/Document Retrieval services. Specific key words used in the search of periodical sources were as follows: *student, nursing student, entrance scores, entrance requirements, nursing schools/programs, ability testing, admission, decision-making, academic performance/achievement/success, clinical performance/achievement/success, NCLEX-RN performance/achievement/success, measurement strategies, hiring freeze, nursing shortage, nursing graduates, vacancies and graduate nurses, job market and graduate nurses, orientation costs, NCLEX-RN failure, nursing program failure, predictors of success—academic and nonacademic, college/university success, high school education and college/university performance/achievement/success, type of high school education, public school versus private school versus home school, physical assessment and nursing program or NCLEX-RN performance/achievement/success, English and predictor of success/nursing education/academic performance, nurse extern program and academic performance/nursing education/predictor of success, retention theories/disease detection model, TOEFL and student success/NCLEX/nursing program/nursing program success/nursing/nursing education, English and student success/NCLEX/Nursing*, and *English ability and nursing education*. The resources obtained were critically analyzed and organized into the discussion presented below. Other searches for new, related materials were conducted on a routine basis. Articles older than 5 years and literature related to nonacademic predictor variables were reviewed but were not included in the discussion unless they were especially relevant.

The following section presents some of the historical perspectives of the NCLEX-RN. As the benchmark to nursing practice, the examination, consequently, requires its developers to maintain a close assessment of its significance in modern nursing.

Historical Perspectives of the NCLEX-RN

Nurses continue to pursue ways in which they can provide the ultimate care to their patients. One of the sought-out ways is through the use of competence assessments. The NCLEX-RN is a mandated national assessment tool designed to measure such competence of all nursing graduates pursuing a role in the field of nursing. The NCLEX-RN was designed by the NCSBN as a tool to measure "minimal" (O'Neill, Marks, et al., 2005, p. 147) competence in graduate nurses pursuing licensure. Annually, about 120,000 candidates sit for the NCLEX-RN.

A standardized test was initially developed at the onset of state licensure policies in the 1950s (Ellis & Hartley, 2001). The examination, called the "State Board Test Pool Examination" (Ellis & Hartley, 2001, p. 270), was developed by the NLN, but the standard pass and fail values varied from state-to-state. Since the development of the NCSBN in 1978, the examination's format and administration is managed by this organization (Eason, 2004). The examination has carried the official title of NCLEX since 1981. The NCLEX-RN is taken by registered nurses from diploma, ADN, and BSN programs. The NCLEX-PN is taken by graduates from practical nursing programs (Ellis & Hartley, 2001). During the early days of the NCLEX, a numerical value determined whether or not a candidate could receive a nursing license; since 1989, a nursing license is issued on the basis of simply pass or fail of the examination (Eason, 2004). The NCLEX became computerized in 1994.

Today, the NCSBN remains a branch of the NLN (NCSBN, 2009a). According to the NCSBN, the central focus of the NCLEX is the client. This organization commits to keeping informed about the latest issues affecting the nursing profession. The standards that are set by the NCSBN regarding NCLEX testing are done for the sake of the public rather than for the nursing profession. The test, therefore, cannot be altered to make its content easier so that the nursing shortage can be fixed; instead the test has to be made hard enough to keep those who are not ready to practice out of the profession so that patients are not harmed (O'Neill, Marks, et al., 2005). Consequently the examination has been made slightly more difficult to obtain a passing status. According to O'Neill, Marks, et al. (2005), to make decisions regarding standard passing values, the NCSBN seeks feedback and input from professionals in the nursing field. Due to the ever-changing health care profession and practice, the minimal standards for licensure are reassessed and modified about every 3 years. Past examination and achievement data and perspective surveys from professionals in the practice and educational settings help the NCSBN to make these changes.

Although the minimal value used as a standard by the NCSBN to separate those who pass and those who fail is based on an individualized test plan provided to each candidate who sits for the NCLEX, the procedures used to set the standards are designed so that graduates who display adequate knowledge and competence in practice can ideally pass and weak or ineffectual, and seemingly unsafe licensure candidates, are denied a passing status and are therefore kept out of public practice (O'Neill, Marks et al., 2005). Individual state licensure institutions are the only organization that can legally

issue or deny a nursing licensure. The decisions made in these cases, according to the authors, are nationally made based on the NCSBN standards.

Each test item used on the NCLEX undergoes a strict statistical analysis (O'Neill, Marks et al., 2005). The minimal number of items that a student may have on the examination is 75 and the maximum number is 265. A pass or fail status with only 75 questions is based on a standard deviation of 1.67 units from the predesignated minimal pass value. The minimal pass value is used as an absolute only when a candidate arrives at the 265 questions point. Here, "ability estimates" (O'Neill, Marks et al., 2005, p. 150) are integrated into the equation and a score above the standard value is marked as a pass and a score below the standard value is marked as a fail. Even more detailed measures are used when a candidate does not complete the examination in the timeframe allotted (O'Neill, Marks, et al., 2005). The test plan and passing standards were heightened by the NCSBN in 2004 (NCSBN, 2004), April of 2007 (NCSBN, 2006), and again in April of 2010 (NCSBN, 2009d). Changes were based on the results of an annual survey, conducted by the NCSBN, which asked practicing nurses to respond to items regarding the competence-level of graduate nurse (O'Neill, Marks, et al., 2005). The respondents were also asked to compare the perceived competence of new graduates to the competence of prior graduates.

Theoretical Basis

The foundations for this study ultimately stemmed from "research tradition" (Bordens & Abbott, 2002) of the topic of predictors of nursing program completion and NCLEX-RN success with the addition of new independent variables: TOEFL scores, Type of high school, and Nursing clinical pass or fail. Yet a theoretical base that was

used to direct this study, as described in chapter 1, was the Seidman Retention Formula (Seidman, 2005). Seidman's (2005) formula effectively depicts that successful completion of a program of study is made possible when weak students, or those unlikely to achieve well or graduate on time, are identified and provided with assistance at the early onset of the program. Thus, by identifying the variables that best predict student achievement in individual nursing programs, academically and clinically, and essentially on the NCLEX-RN, nurse educators might be better equipped to offer assistance to students who are identified as being likely to struggle in any of these areas. The majority of the literature that related predictors of achievement in nursing education or NCLEX performance did not indicate any theoretical frameworks used as a basis for the studies conducted. One review study, however, conducted by Spurlock and Hanks (2004), used the disease identification model, which Seidman's (2005) study was founded upon, as a tool to measure the likelihood of pass and fail of the NCLEX-RN. The premise of the model, as stated by the authors, is that just as doctors can predict the likelihood of finding disease, researchers can predict the likelihood of finding academic failures. Spurlock and Hanks (2004) looked at guidelines set out by nursing schools related to "progression policies" (p. 539) or students' eligibility of graduating or taking the NCLEX-RN depending on their scores achieved on an end-of-program assessment test called the Health Education Systems, Incorporated (HESI) exit examination (E^2). The authors found that nursing programs might have the inclination to assume that E^2 scores that are lower than what is deemed the standard minimum value will label a student as likely to fail the NCLEX-RN. Progression standards must therefore be considered carefully and should not necessarily be made on the HESI exam results alone, nor should the E^2 exam

be used to predict NCLEX-RN failures. Nibert, Young, and Adamson (2005) and Nibert

et al. (2006) critiqued Spurlock and Hanks' use of the "disease detection model as the

conceptual framework" (p. 303) for conducting their literature search, as their selected

framework did not seem to work well in the study and thus cannot be used as a

foundation to predict NCLEX-RN failure from results on the E^2. Spurlock (2005) refuted

the criticism and indicated that their work clearly explained the operational definitions

and how they fit into the model or how they were adapted to make the model work in

their study. Besides these studies, the disease detection model was only used in a recent

study related to veterinary medicine (Salman, 2009).

A similar theory, titled, The Shelton Model of Student Retention, adapted from

Tinto's (1987) model of student attrition, was used as the framework for Shelton's (2003)

work. The model was chiefly used to test student retention. It was projected by the

authors that career-aged women entering the nursing program were less likely to

complete the ADN program than students at the standard college age. Shelton

hypothesized that faculty have a direct impact on whether students persist or do not

persist in the nursing program. Shelton's methodology was unclear, however. It was

difficult to determine if the questionnaire used in the study was the same for both the

students in the nursing program and the students who were no longer in the program.

Furthermore, there were graduates in the sample that completed the survey, but it was not

apparent at what level the students who dropped out actually left the program.

The Research Variables

The Florida Center for Nursing (2009a) indicated that although nursing program

enrollment numbers may be slowly rising, the number of graduates from BSN programs

is not changing at a significant rate. However because of a lack of program space or limited nursing faculty, interested candidates to nursing programs are often turned away (NLN 2009; Orsolini-Hain & Malone, 2007). Higgins (2005) noted that nursing program admission criteria need to be stricter. This statement is feasible considering retention rates within nursing programs are not at their optimum (NLN, 2006). The current program completion rate is not adequate enough to even remotely remedy the nursing shortage issue (FCN, 2010). Although there are vast areas of nursing in which to practice, the actual education that nursing students receive across programs has a congruent focus. Yet nursing schools themselves vary in admission standards and curricula. According to Catalano (2000), the main goal of nursing education is to orient students to both the acute and community-care areas of the field of nursing. Furthermore, nursing education emphasizes three areas: health promotion, illness prevention, and health maintenance (AACN, 1999). Thus, overall, students learn these main areas of nursing in order to practice effectively and to achieve success on entry-level into nursing practice, the licensure examination.

Even though students might enter a nursing program by specific admission criteria, they, in fact, perform quite differently within the program. This issue was considered more closely by addressing the research literature pertaining to factors that influence or do not influence student achievement. Researchers have not been able to agree on definitive variables that affect course and clinical performance, program completion, or NCLEX-RN success. Apparent contradictions and gaps identified from a review of these studies were addressed throughout the discussion as was found necessary.

Recent Literature Related to Program and/or Clinical Achievement

Discrepancies, as discussed further in this section, continue to remain in the literature about variables found to affect the program and clinical achievement of nursing students. Furthermore many of the authors of more recent studies have looked at program success, retention, and attrition in ADN programs (Esper, 2009; Gilmore, 2008; Hopkins, 2008; Jeffreys, 2007; Muecke, 2008; Palmer, 2008); whereas other researchers have considered the comparison of different types of RN programs (Murray et al., 2008). Still, several other related studies were conducted in overseas nursing programs (Ali, 2008; Blackman et al., 2007; Pryjmachuk et al., 2009). The type of program was not specified by other researchers (Hughes, 2007; Trice & Foster, 2008; Uyehara et al., 2007). Only a few recent studies, nevertheless, were carried out exclusively in BSN programs (Campbell, 2006; Newton et al., 2007; Roat, 2008; Strayer, 2010). This section contains a detailed description of identified literature that relates to predictors of program or clinical achievement. Subheadings of this section include admission criteria and nursing program attrition, admission criteria and nursing program success, and the study's independent variables and nursing program success.

Admission criteria and nursing program attrition. Nursing student retention is among several strategies devised to alleviate the nursing shortage (Stickney, 2008). The literature reveals an assortment of criteria by which nursing programs consider candidates for enrollment into nursing programs. Baker (2008) suggested that higher admission rates would assist in alleviating the nursing shortage. The number of applicants, however, does not reconcile the nursing shortage, especially when attrition continues to be a problem (Stickney, 2008). Yet the means by which one school accepts nursing

program candidates is different than that of other schools. For instance, Seago and Spetz (2003), in their retrospective analysis of nursing schools across California, found that many programs randomly choose students who meet the admission standards and either put them back in the pool, so to speak, until the next recruitment, or wait-list them. Their evaluation noted that many programs assess students' course grades and whether or not they have any background experience in health care. Qualifications for program admission in a Great Britain study conducted by Wharrad, Chapple, and Price (2003) included at least C grades in three advanced prenursing subjects including Biology or success in "Mathematics, English Language, and Chemistry" (p. 247). Students older than 21 years, transfer, or prior precollege or college-trained students applied via an "Access Course" (p. 2003) in which they had to achieve satisfactory standing. Newton et al. (2007) implied that "ranked" (p. 439) admissions are common for BSN programs when there are only a limited number of student spots available. On the other hand, "rolling" (p. 439) admissions are used more commonly when there are fewer students as applicants than what the school desires; therefore, the program accepts students based on "minimum admission requirements" (p. 439). The researchers noted that rolling admission methods tend to choose the first applicants instead of necessarily the top applicants.

Researchers also looked at various admission variables in relation to nursing program attrition (Pryjmachuk et al., 2009). These factors were assessed to determine if linkages to poor program outcomes for students could be pinpointed in the early stages of the program. The general premise of the findings indicated that students meeting admission qualifications did not necessarily mean that they were successful to complete

the nursing program. Newton et al. (2007) found that increased admission standards did not necessarily mean better program outcomes for students. The researchers looked at prenursing GPA in relation to the attrition rates of students who entered the program during either the Fall or Winter Quarters of a particular school year. They found that there was a 10% attrition rate among students who entered the program during the winter quarter compared to a 2% attrition rate among students who entered during the fall quarter. Unfortunately, this study did not address attrition past the first semester of the nursing program. Newton et al. (2007) advised that rolling admission procedures in which schools select students according to order of application be avoided in nursing programs and that program administrators should select students based on high GPA values and Test of Essential Academic Skills (TEAS) scores.

Wharrad et al. (2003), however, concluded, based on their findings, that high achievement prior to program entry was indeed significantly linked to program achievement. They conducted a study for a BSN program in Great Britain and specifically sought to identify admission variables that were related to academic success measured by course grades and cumulative course grades. Academic achievement was compared among students who entered the nursing program under "conventional" (p. 224) versus "unconventional" (Wharrad et al., 2003, p. 246) admission methods. Only approximately 11% of the students were over 21 years and therefore entered the program through special admission procedures. Almost 46% of these special entry students dropped out of the program due to academic or nonacademic reasons. These students were found to also have overall lower academic grades. Wharrad et al. did not explain some of the abbreviations used in their research, and so the admission criteria and

grading scales of the English schools were evidently different than that of American schools. Simmons et al. (2004) identified that the majority of students who dropped out of nursing school did so following failure of nursing courses in the early stages of the program. This finding implied that fundamental nursing courses may be especially challenging to students.

Course grades were also found to have a significant, positive link to nursing student attrition in a study conducted by Jeffreys (2007). Jeffreys noted that the program had a 75% overall retention rate with 26% of the students finishing on time, while still admitted, but with at least one delay, and 25% finishing on time, but with noncontinuous enrollment and with at least one academic delay. Nine percent of the students dropped out in the first semester of the program, and 14% of these students dropped out by choice. Two percent dropped out due to failure and/or not meeting program requirements. Jeffreys found that the order in which the students took their courses had no effect on retention or attrition. On the other hand, increased grades in nursing courses positively correlated with successful on-time progression; whereas decreased grades positively correlated with all three types of attrition. As Jeffreys's study was conducted in an ADN program, I found it of interest to identify correlations between prenursing admission variables and attrition within a BSN program.

Nonacademic reasons for unsuccessful completion of a nursing program also exist. Pryjmachuk et al. (2009) analyzed multiple variables related to student attrition in a nursing program in the United Kingdom. The researchers claimed that the operational definition of attrition needs to distinguish between students who leave the program by choice and students who leave the program because of academic or personal reasons.

Pryjmachuk et al. found that more students dropped out by choice, compared to students who were required to withdraw. The following: clinical experiences, age at the start of the program, and academic status on admission were found to be significantly linked to graduation or attrition. Specifically, increased age was positively linked to retention; whereas traditional-aged college students were more likely to drop out of the program. Also attrition was highest among male and Black students. Students with a low admission standing at the start of the program had a higher likelihood of attrition than students who entered the program in high academic standing (Pryjmachuk et al., 2009). The authors of this study mistook, through reversal, the independent and dependent variables; thus this made reading and interpretation of the communicated findings challenging. Pryjmachuk et al.'s study, although it included type of clinical experience, did not test clinical pass or fail in relation to success or failure of the program. Thus this variable was lacking in the literature and was, therefore, measured in my current study.

Two studies that assessed both academic and nonacademic variables in relation to attrition found that attrition showed a higher, more positive link to academic factors (Palmer, 2008; Uyehara et al., 2007). Uyehara et al. (2007), in their assessment of prenursing admission variables, found that 36% of the student drop-outs were due to academic reasons; whereas 34% and 30% were due to personal situations and a desired change in profession pursuits respectively. Even so, Palmer (2008) used "Motivation Profile Scores (MPS)" (para. 1) from a questionnaire and GPA values to correlate with program attrition in a dissertation study. The researcher found that GPA was significantly linked to attrition more so than the MPS; however the two variables combined were found to have more predictive ability than GPA by itself.

Literature pertaining to admission criteria and nursing program success.

Researchers have also considered admission criteria in relation to nursing program success. Admission criteria, which vary from program to program, are the basis by which students are ultimately selected into a nursing program (Gilmore, 2008; Hopkins, 2008; Jeffreys, 2007). The Florida Center for Nursing (2005) implied that opening space within nursing programs for eligible students will promote retention. The program space and clinical space are bidirectional—both impact each other as far as adequate education and thus will provide to the nursing shortage an adequate "supply" (Florida Center for Nursing, 2005, "Addendum A", para. 1) of graduate nurses. It makes sense, consequently, that researchers would seek to assess whether or not admission factors are acceptable means by which to select students. Although one researcher considered success only in the early stages of the students' training (Frazor, 2004), another one compared admission variables to overall nursing program success (Campbell, 2006). Many of the studies, discussed further, were focused in ADN programs and so another study along these lines needed to be conducted in a BSN program.

Frazor (2004) assessed the relationship between prenursing GPA and ACT scores and overall first-year nursing program GPA. Frazor noted that prenursing GPA significantly correlated with overall first-year nursing GPA; however ACT scores were not found to be significantly related to the first-year GPA value. Simmons et al. (2004), on the other hand, looked specifically at the individual components of the Nurse Entrance Test (NET) to identify their links to the pass or fail of the nursing program. Esper (2009) also considered admission criteria, such as the math, science and English components of the TEAS admission test, as well as age, gender, grades in prenursing English, math, and

science classes to the students' achievement in first-semester nursing courses in a dissertation study of an ADN program. However there were found to be no significant predictors of first-semester success (Esper, 2009). Higgins (2005), though, found that grades in some general college courses were indicative of ADN program completion. Higgins specifically assessed admission criteria linked to course achievement. The researcher utilized quantitative and qualitative designs and looked at the following: (a) general college courses, (b) a preadmission test, (c) nursing exit tests, and (d) nursing skills courses and correlated the variables to program completion. Grades in Anatomy and Physiology and Microbiology were linked to program success. No significant correlations were identified between the prenursing admission test and program success; however, reading, science, and math areas of the prenursing admission test did have a significant positive correlation to program completion. Prenursing variables linked to clinical performance were lacking in this study. Thus this current study assessed for this potential correlation.

Studies within nursing programs located outside of the United States have also contained similar predictor variables with relevant findings (Ali, 2008; Blackman et al., 2007). Blackman et al.'s (2007) study assessed course achievement during the fifth semester, clinical placement during the student's practicum, and self-perception of independence at the end of the program. The student's clinical performance was measured by means of a survey that was completed by the preceptor. Blackman et al. (2007) did not clearly communicate, however, whether the students had a choice where they were placed for their clinical practicum or if the site location was chosen by the faculty or administration. Perhaps, therefore, the student's level of enjoyment during the

clinical experience could affect his or her performance at the site. Both academic, final year course grades, and nonacademic, perceptions of clinical autonomy findings were found to be linked to overall nursing program GPA. However it was deemed interesting to discover how clinical performance related to overall program success, as this current study assessed. Admission variables such as student status, overall academic standing prior to college, and gender, on the other hand, were all found to be significantly linked to program success in a study by Ali (2008) that took place in three diploma nursing programs in Pakistan. The researcher noted that the academic variables were more significantly related to predictability of program success than all other variables. Therefore, Ali (2008) concluded that academic standing should take precedence when considering applicants.

Increased course grades were also found to be indicative of success in a study carried out by Murray et al. (2008). However the results differed between the BSN and ADN programs tested. The "HESI Admission Test" (Murray et al., 2008, Abstract, para.1) was administered to students by Murray et al. (2008) as a posttest for purposes of identifying academic disparities in students so they could receive extra help during the program. HESI scores, as relayed by the researchers, showed a significant positive link to program success, especially early in the program. However, course grades were a stronger predictor of program success in an ADN program compared to a BSN program. Roat (2008), on the other hand, compared admission variables for a regular BSN program and an Accelerated BSN program. Following a regression analysis, Roat (2008) found anatomy and physiology, entrance test math and reading components, and prior degree status to be positively correlated with the exit test results. On the other hand,

mathematics and science courses, psychology grades, and the admission test reading component positively correlated with overall GPA.

The means by which a student entered a BSN program were correlated with program success in a study conducted by Newton et al. (2007). Thus Newton et al. looked at rolling admission processes specifically based on the following independent variables: (a) prenursing GPA, (b) "Test of Essential Academic Skills (TEAS)" (p. 439), and (c) first semester GPA. For the Fall admission group, it was noted that their prenursing GPA was the best predictor of first semester nursing success and they had higher overall prenursing GPA values, TEAS scores, and first semester GPA averages compared to the Winter group. However this study seemingly focused on admission methods rather than admission criteria related to overall program success. Prenursing TEAS scores were also used as a predictive factor to success on other standardized tests taken early in the nursing program in a study conducted by Wolkowitz and Kelley (2010). The results showed that science ability, followed by "reading; written/verbal, and mathematics" (p. 501) on the standardized admission test strongly predicted achievement on the early program standardized test. Strayer (2010) researched demographics along with prenursing and program variables as predictors to an end-of-program medical-surgical nursing course. His findings indicated that age and the retake of a science course were indeed linked to achievement in medical-surgical nursing academics.

Hopkins (2008) found that course success significantly and positively correlated with the following admission factors: SAT value, High school GPA, and Composite NET results. Hopkins looked at both academic and nonacademic factors in relation to the passage of a fundamental nursing course taken in the first semester of an ADN nursing

program. The variables were found to be 83% likely of positively predicting passage of the fundamentals course. However the methods, as signified by Hopkins, were not very adept at predicting course failure. Overall, the variables were not high predictors of achievement in the nursing course tested. Hopkins (2008), therefore, suggested future analysis of retention throughout the nursing program and also linking the variables to the passage of the NCLEX-RN.

Gilmore (2008) assessed the following admission variables: Overall ACT and subject-specific scores, science grades, and preadmission GPA and correlated them with overall GPA in nursing courses The culmination of the variables, according to Gilmore (2008), showed a positive correlation to program outcome; however, when tested alone, only the ACT English value was statistically significant to program outcome ($p < .05$). Muecke (2008), on the other hand, found no significant links between prenursing and nursing course variables to overall program achievement.

The study's independent variables and nursing program success. These studies, as well as other related knowledge, can also be summarized into categories representative of the variables assessed in this current study. The subheadings to follow include these variables: GPA, type of high school, TOEFL score, and clinical achievement.

GPA. Prenursing GPA values were significant predictors of first-semester program success for students who entered the program by means of ranked admission procedures; whereas GPA had no significance for students admitted through rolling admissions (Newton et al., 2007). Likewise Frazor (2004) also found that prenursing GPA values significantly correlated with overall first-year GPA in an ADN nursing

program. Gilmore (2008) identified that prenursing GPA values, when combined with

ACT scores and science course grades, was indicative of success in an ADN program.

However, Palmer (2008) indicated that GPA was significantly linked to program attrition

in an ADN program, especially when the student's GPA value was linked with the results

of a "Motivation Profile Score (MPS)" (Gilmore, 2008, Abstract, para. 1) that the

researcher conducted by means of a questionnaire. Conversely, prenursing GPA was

found to have no significance in relation to program retention or attrition in Jeffreys's

(2007) research pertaining to an ADN program. Thus more research needed to be

conducted to consider prenursing GPA values in relation to clinical and overall program

achievement in a BSN program.

Type of high school. No apparent studies about nursing education prior to this

one had considered the types of high schools from which students graduate in relation to

college program achievement. However a few general studies were conducted in this

area. An old study, conducted by McCullough (1934), assessed private versus public

high school students in relation to admission testing and preparation strategies. Time

management strategies were found to be more of an emphasis in private (86%) compared

to public schools (58%). However, the researcher did not specifically assess the

differences in achievement between the two groups. Sutton and Galloway (2000)

expressed that the quality of a student's high school education, whether public, private, or

home school, is a factor in his or her college achievement. Although homeschoolers, in

their study, were found to be comparable to public and private schooled groups as far as

academic achievement in college, the homeschooled group were noted to be ahead of the

other two groups in the area of leadership positions held within the college setting.

Horn and Kojaku (2001) identified that the more difficult the high school curriculum program in which a student participated, the more likely he or she was to remain in his or her course of study in college (Horn & Kojaku, 2001). Klicka (1995) felt that the public school system was producing students who were inept and unprepared for college. Homeschoolers, according to Klicka (1995), are often provided with access to even the most prestigious colleges in the United States, but stated that there is lack of sufficient evidence regarding how they perform in the college setting. Horton (1998) conducted a dissertation that compared public versus private high school education along with whether students received a traditional high school diploma or a GED certificate as predictor variables to success in a general college program. He found that type of high school was a significant predictor of success in a freshman-level science course. Kimrey (1999) also relayed that type of high school was a significant predictor of freshman success; however the study's sample size was found to be too small to establish the findings as generalizable.

More recently, however, Thomas (2004) compared students' SAT scores with their high school performance in a retrospective study conducted in the general college setting. The researcher also sought to identify personal and demographic factors, including high school GPA and rank, to a student's likelihood of taking the SAT II. Thomas stated that type of high-school, whether public or private, and the students' age upon completion of high school were controlled for in the study. It was found that the type of high school was a big factor in a student's likelihood of taking the SAT II; however the findings related to this statement were not clearly communicated. Yet Thomas did state that most SAT II takers were from "high ranking high schools"

(Thomas, 2004, p. 1327). Also Gülleroğlu (2008), in an assessment of various factors that were potentially predictive of performance in a general Turkish University found that students' high school GPA and "type of high school" (p. 30) were significant predictors of university performance. Duggan (2010) compared types of high school education to student's perceived overall academics, "mathematics, reading comprehension, and desire to learn" (Duggan, 2010, p. 25). The authors noted that the private school students perceived better ability to study, and the public school students perceived better computer and writing ability. The sample consisted of a low response of participants. There may be a difference in how well students see themselves as prepared for the academic rigors of college. Therefore I desired to add to the body of knowledge by examining a potential relationship between type of high school a student attended and nursing program achievement.

TOEFL score. Special English assistance for those students who do not have a strong English background (Blackman et al., 2007) was deemed as a possible strategy if English was identified as a variable linked to program performance. Seago et al., (2008) stressed the importance of meeting the learning needs of a diverse student population. As was discussed in chapter 1, the literature is void of studies that correlate TOEFL scores related to either nursing program or NCLEX-RN achievement. However closely related was a study conducted by Whitehead (2006). He found that there were no significant differences of critical thinking ability and NCLEX-RN achievement among students whose first language was English compared with ESL students. Otherwise only qualitative studies that addressed the learning needs and achievement of ESL nursing students were evidently examined in the literature (Donnelley, McKiel, & Hwang, 2009;

Wood, Saylor, & Cohen, 2009). Therefore this study sought to assess whether or not TOEFL scores of BSN nursing students were relative to achievement in the nursing program.

  Clinical achievement. There are also limited studies that address students' clinical performance in relation to either attrition or nursing program completion. Blackman et al. (2007) noted from survey responses in relation to students' course and clinical performance that self-perception of autonomy in clinical practice was a strong predictor of success in the nursing program. However quantitative findings, such as the pass or fail status of students linked to program outcome, was not assessed in Blackman et al.'s study and therefore was assessed in the present study to seek to fill this apparent gap in the literature.

Recent Literature Pertaining to Prenursing/Nursing Program Outcome and NCLEX-RN Achievement

  Knowledge of retention and attrition rates and recognition of students at-risk for program or NCLEX-RN failure early on in the nursing program are necessary measures for the institution to foster sound performance (Jeffreys, 2007). Much of the literature pertaining to student performance sought to relate academic and nonacademic variables to NCLEX-RN achievement. The general premise of these studies was that academic prenursing and program factors might predict whether or not nursing graduates successfully pass the NCLEX-RN. The question remained, however, which academic factors were predictive? Daley et al. (2003) stressed that it is important to identify the variables that correlate with success on the NCLEX-RN and any variables that signify correlation with failure of the NCLEX-RN. By knowing the areas linked to poor

performance on the NCLEX-RN, nursing professors will be able to identify and assist students who are struggling in these areas (Muecke, 2008; Pryjmachuk et al., 2009). Once again some researchers primarily assessed admission criteria in a variety of nursing programs to determine if student selection processes related to performance on the NCLEX-RN (Baker, 2008; Jeffreys, 2007; Roat, 2008). Others sought to exclusively identify intraprogram factors related to NCLEX-RN success (Frith et al., 2008; Humphreys, 2008; Lauchner et al., 2008; Matos, 2007; Nibert et al., 2008). Only a few current studies were conducted in traditional BSN programs that assessed a combination of selected prenursing and nursing program progression variables in relation to NCLEX-RN achievement (Fortier, 2010; Harris, 2006; Uyehara et al., 2007; Vandenhouten, 2008). Yet once again the researchers were at a loss to agree with each other on definitive predictors of NCLEX-RN success. The following section relays a literature review of related studies that focused specifically on passage and/or failure of the NCLEX-RN. Also notably, an assortment of nursing programs was represented in the literature. For instance, Shapinsky (2006) considered predictors of NCLEX-PN success for an LPN program. Five of the studies assessed specified that they were conducted in ADN programs (Gilmore, 2008; Higgins, 2005; Jeffreys, 2007; Muecke, 2008; Zappaterreno, 2006) and three of them were carried out in various types of nursing programs (Lauchner , 2008; Nibert & et al.; Young, 2008). BSN programs were represented in eight current studies (Abbott et al., 2008; Campbell, 2006; Fortier, 2010; Harris, 2006; Matos, 2007; Roat, 2008; Strayer, 2010; Vandenhouten, 2008); whereas six groups of authors did not specify the type of nursing program studied (Baker, 2008; Frith et al., 2008; Humphreys, 2008; Simon, 2006; Uyehara et al., 2007; Yoho et al., 2007).

Several researchers in the current knowledge base examined standardized testing in relation to success on the NCLEX-RN. The general premise portrayed by some of these studies was that achievement on a standardized test does indeed relate to achievement on the NCLEX-RN (Adamson & Britt, 2009; Giddens & Gloechner, 2005; Lewis, 2005) Yet other academic variables, such as course performance and overall program GPA, could not be ignored as potential predictors of achievement (Fortier, 2010; Harris, 2006; Humphreys, 2008; Matos, 2007; Uyehara et al., 2007). Giddens and Gloeckner (2005) assessed the California Critical Thinking Skills Test (CCTST) and the California Critical Thinking Disposition Inventory (CCTDI) as potential predictors of NCLEX-RN pass or fail. Demographic variables included overall GPA, gender, and age. High posttest scores for both tests were linked to the passage of the NCLEX-RN. High pretest CCTST critical thinking scores were found to be significant to NCLEX-RN passage; however no significance was identified between pretest CCTDI scores and pass or fail of the NCLEX-RN. Overall no apparent changes in critical thinking were noted by the researchers over the 2-year time period of the study. The critical thinking skills tests demonstrated a 92% predictability of NCLEX-RN success. The tests, therefore, were a better predictor of NCLEX-RN passage than of failure. The authors suggested repeating this study in the future with other programs, especially in a program that has a higher overall fail rate on the NCLEX-RN.

Standardized testing also demonstrated an assortment of NCLEX-RN outcomes in various nursing programs when the two variables were correlated. Overall there does appear to be a significant correlation between satisfactory achievement on admission tests and passage of the NCLEX-RN (Nibert & Young, 2008; Uyehara et al., 2007; Yoho et

al., 2007). For example, the HESI E^2 was also tested as a possible predictor of NCLEX-RN achievement in Lewis' (2005) retrospective study of 9,695 students from 182 programs. The specificity of the study included the following:

- How predictable the E^2 was in identifying NCLEX-RN pass or fail,

- What E^2 result values were linked to NCLEX-RN pass versus NCLEX-RN fail, and

- Which strategies, designed to aid at-risk students were found to be linked to NCLEX-RN success.

The results indicated by Lewis (2005) showed the HESI E^2 to be approximately 98% feasible in determining NCLEX-RN pass. The researcher also noted that low E^2 scores increased the likelihood of failure of the NCLEX-RN. Noted was the finding that E^2 values were higher among schools that had established progression standards than those that did not. In Yoho et al.'s (2007) research, significant positive correlations were identified between the HESI "Mid-Curricular (MC)" (Yoho et al., 2007, p. 81) examination and the E^2 and between the E^2 and the NCLEX-RN.

Adamson and Britt (2009) noted that the third attempt of the HESI increased the risk of NCLEX-RN failure compared to students who passed the initial or second E2 test. Likewise, Uyehara et al. (2007) recognized that significant positive correlations with the NCLEX-RN were found with the following: (a) Mosby Assessment Test, (b) NLN Adult Health Comprehensive Test, (c) NLN Maternal-Newborn Comprehensive Test, (d) NLN Pediatric Nursing Comprehensive Test, and (e) overall nursing GPA. Fortier (2010), however, did not find that prenursing TEAS scores were linked to NCLEX-RN success. Pennington and Spurlock (2010) indicated that students must be proactive in their

preparation for NCLEX-RN achievement and they suggested continued use of standardized test, but that remediation is not a guaranteed remedy to failure problems. Harding (2010), in a review of the literature pertaining to standardized testing and NCLEX-RN achievement, surmised that combinations of academic factors need to be considered, not just standardized tests alone. Nevertheless because of a general congruence in findings that indicate that standardized testing is linked to passage of the NCLEX-RN, my study did not specifically assess this variable.

More closely related to the proposed research are studies relating admission criteria to NCLEX-RN performance. Admission criteria for nursing program and overall program achievement were correlated in the current literature to performance on the NCLEX-RN. A common link found in some studies was GPA (Campbell, 2006; Fortier, 2010; Humphreys, 2008). However, Daley et al. (2003) suggested that looking at a final program GPA only in relation to NCLEX-RN success is not going to be of assistance to students in the midst of the program. Even so, Vandenhouten (2008) linked low GPA values to failure of the NCLEX-RN, but noted no significance between GPA and passage of the NCLEX-RN. Other variables and their relationships to the NCLEX-RN are discussed further. There were noted discrepancies in the literature base on positive predictors of achievement outside of standardized testing.

Higgins (2005), as mentioned in the discussion about program achievement, also specifically assessed admission criteria linked to passage of the NCLEX-RN. No correlations were found between prenursing college courses and NCLEX-RN success. However, grades in an Anatomy and Physiology course were linked to NCLEX-RN passage. No significant correlations were identified between the prenursing admission

test and NCLEX-RN success. Nevertheless reading, science, and mathematics areas of the prenursing admission test did have a significant positive correlation to NCLEX-RN success. Baker (2008), on the other hand, also correlated a variety of nursing program admission variables to NCLEX-RN pass and found that standard admission tests, science course grades, and other admission variables were insignificantly related to achievement on the NCLEX-RN.

Effective retention strategies are also important to promote the success of students in a nursing program and on the NCLEX-RN. Spurlock (2006) encouraged the retention of students at risk for failure of the NCLEX-RN by means of being held back within the program when the standard requirements for graduation are not met. This approach was meant to maintain high passage rates for program credibility purposes. However it is also important to consider other aspects of how a program functions (Spurlock, 2006). Zappaterreno (2006) studied multiple prenursing and program academic and nonacademic variables from a BSN school to identify their links to NCLEX-RN achievement. Variables that were identified by Zappayerreno to have some predictive value included the following:

- Computerized Adaptive Test (CAT) admission test,

- Prenursing course grades,

- Race,

- Age,

- Birthplace, and

- Grades in initial nursing courses.

Notably when Zappaterreno verified the findings across another group of student records, it was found that the results were not repeatable from one group to the next.

Hopkins (2008) suggested that researchers analyze student retention throughout the nursing program and link variables to passage of the NCLEX-RN. Ackerman (2006) pointed out that increasing attrition rates and increasing NCLEX-RN passage rates could be a feasible means of increasing graduates from nursing programs. Nevertheless Higgins (2005) identified that even with improved passage of the nursing program there remains a problem with increased failure of the NCLEX-RN. Similarly Newton et al. (2007) implied that admitting large numbers of students into a nursing program does not mean that students have the ability to achieve satisfactorily in the program. Thus the identification of positive and negative correlations needed to be made so that implementations could be proposed and later conducted to improve students' likelihood of NCLEX-RN passage. Nibert and Young (2008) believed that lack of remediation efforts in RN schools increased the likelihood of low-scoring students failing the NCLEX. Yet there was no significant variance between the pass of the NCLEX-RN for high-risk students who had remediation or high-risk students who did not have any remediation. Nibert and Young indicated that more studies are needed that look at progression standards' effects on NCLEX-RN passage.

Increased age and White race were found to have a significant, positive correlation to NCLEX-RN pass in a study by Harris (2006). Harris looked at overall nursing program GPA compared to GPA on admission into the program and then linked these variables to NCLEX-RN passage. Harris also considered the number of times science courses were repeated and various demographic characteristics such as, "age,

gender, marital status, and ethnicity" (Abstract, para. 1). Harris found that the study's program, overall, had a high NCLEX-RN pass rate and so it was difficult to base conclusions from the results.

Likewise, Vandenhouten (2008) tested multiple variables to identify relationships to achievement on the NCLEX-RN for a BSN program. The researcher found that decreased overall GPA and low standardized comprehensive RN test results were, in fact, linked to NCLEX-RN failure. On the other hand, the following were found to have significant, positive correlations to NCLEX-RN passage: (a) increased admission age, (b) ACT scores, and (c) grades in "Pharmacology, Adult Medical Surgical I, Community Health Nursing, Family focused Care and Community Health Nursing: Population Focused Care" (Abstract, para. 2). Various program and demographic variables were also correlated to passage of the NCLEX-RN in Humphreys (2008) study. Significant predictors of NCLEX-RN passage were overall college GPA, ACT math and science components, and the program exit examination. Age was the only demographic variable found to have a significant correlation with NCLEX-RN passage.

Other strategies for an assessment of potential predictors of NCLEX-RN achievement have been considered with again varying outcomes. Campbell (2006), as discussed in the previous section pertaining to program achievement, also attempted the design of a nursing program implementation to increase pass rates on the NCLEX-RN. Logistic regression procedures identified that a combined use of GPA, number of grades equal to or below 'B-', and pathophysiology course grades were 95% accurate in predicting NCLEX-RN passage and 50% accurate in determining unsuccessful completion of the NCLEX-RN. Other strong predictors of NCLEX-RN passage were

nursing course grades. Simon (2006) assessed clinical performance linked to "NCLEX-RN Readiness Performance" (Abstract, para. 1), a practice NCLEX-RN test, and the nursing course with the strongest link to the examination performance. Simon found a combination of the following to have a significant relationship with the NCLEX-RN readiness examination results: (a) GPA, (b) performance in nursing subjects, and (c) prenursing science courses; however no one factor, according to Simon, was strongly linked to performance on the examination. Landry, Davis, Alameida, Prive, and Renwanz-Boyle (2010) compared three types of nursing programs, traditional BSN program, satellite BSN program, and "Master's entry nursing program" to NCLEX-RN achievement (p. 260). They found that mean GPA was greater among master's program students compared to the other two groups. A regression analysis revealed no links to NCLEX-RN achievement in the master's preparatory program. However it was found that together GPA and various course grades were related to NCLEX-RN performance, but the final analysis showed that an early nursing course and medical-surgical nursing were the best predictors for this group. The BSN students had GPA and pathophysiology as the best predictors, and the satellite BSN group showed no significant predictors.

Matos (2007) identified that increased scores on the Educational Resources Incorporated (ERI) exit test, as well as increased GPA, had a significant positive correlation to passage of the NCLEX-RN. Increased course grades were also found to correlate with NCLEX-RN passage. Likewise Muecke (2008) also assessed prenursing and nursing course variables and correlated them with first-time passage of the NCLEX-RN. Muecke (2008) found that increased overall college GPA before nursing school and second-semester nursing theory course grades as well as ACT results were significantly

linked to NCLEX-RN passage. My study, therefore, assessed GPA as a potential predictor of NCLEX-RN success and verified whether or not the results fit in with the current research tradition in this area.

Even so there appeared to be opposing outcomes in relation to even GPA. Following evaluation procedures, Frith et al. (2008) noted increased GPA of students who passed the NCLEX-RN on the first attempt compared to those that failed the NCLEX-RN; however the results were not found to have statistical significance. Neither did GPA nor SAT scores correlate with success on the Mosby Assessment Test. Roat (2008), however, compared admission variables for a regular BSN program and an Accelerated BSN program across two separate nursing schools. Roat found that microbiology was the best link to the NCLEX-RN outcome.

Jeffreys (2007) also assessed program retention and attrition linked to NCLEX-RN pass or fail in a detailed study of an ADN program. The admission requirements included overall prenursing GPA, prenursing science grade in anatomy and physiology, and "number of local credits and number of transfer credits" (p. 410). Increased failures and breaks in the nursing program attributed to a negative correlation with passage of the NCLEX-RN on the first try. On the other hand, Jeffreys noted that an average grade of B or greater was linked to a 100% passage of the NCLEX-RN on the first try.

Literature pertaining to this study's independent variables and NCLEX-RN achievement. As with the previous section about variables pertaining to academic achievement, the findings of studies that related to NCLEX-RN achievement are sub-divided into sections that concern my study's variables. Again the discussions of these

variables show how inconsistent the researchers' findings were, based on the literature presented.

   GPA.   GPA was well studied in relation to NCLEX-RN pass or fail but again the findings were not completely congruent among researchers that tested this variable. The overall nursing program GPA was identified to be significantly linked to NCLEX-RN success in Uyehara et al.'s (2007) work and the overall college GPA value likewise correlated in Humphreys (2008) study. The nursing program GPA was also a predictive variable in Fortier's (2010) dissertation. Matos (2007) noted that increased GPA values raised the likelihood of positive achievement on the NCLEX-RN. Conversely Vandenhouten (2008) realized that decreased overall nursing program GPA values increased the likelihood of NCLEX-RN failure. Yet others specified that increased overall college prenursing GPA values were predictive of NCLEX-RN achievement (Abbott et al., 2008; Gilmore, 2008; Jeffreys, 2007) and Muecke (2008) found the same, especially among students who had a prior science degree. Landry et al. (2010) also noted that GPA in combination with the student's grade in a pathophysiology course was predictive of NCLEX-RN achievement for BSN students. Campbell (2006), in particular, discovered that the GPA value when combined with number of grades at or below B- and pathophysiology course grades were 95% accurate in predicting NCLEX-RN pass and 50% accurate in predicting failure of the NCLEX-RN. Simon (2006), on the other hand, found that GPA values in relation to "NCLEX-RN Readiness Performance" (Abstract, para. 1) did signify whether or not a student was prepared well enough to take the NCLEX-RN. However, GPA was not found to be a significant predictor in Frith et al.'s

(2008) work. My study, therefore, examined NCLEX-RN achievement in relation to prenursing GPA.

Type of high school. Only one apparent study in the body of knowledge considered type of high school education received to NCLEX achievement (Parrish, 1994). The study was conducted in a PN program, nevertheless, but the researcher compared students who gained their GED status versus students who graduated from college in relation to program attrition passage rates on the NCLEX-PN. Although age and race were found to be linked to the outcome variables of program attrition and NCLEX-PN passage, type of high school graduation was not identified as a significant factor. Other studies from the general college setting were conducted in relation to college achievement. Thus the literature appeared to be lacking in this area. Therefore along with assessing the type of high school from which a student graduated in relation to overall nursing program achievement, my study also sought to identify if there was a link between type of high school and NCLEX-RN pass or fail.

TOEFL score. Research is lacking that assesses TOEFL scores of students whose primary language is not English in relation to achievement of the NCLEX-RN. Whitehead (2006), however, found that critical thinking ability correlated with NCLEX-RN pass or fail among students with English as their primary language compared with students with English as their secondary language was no different across the two groups. Therefore this study sought to assess if BSN nursing students' TOEFL score was linked to NCLEX-RN achievement.

Clinical Achievement. A student's performance in the clinical setting related to achievement on the NCLEX-RN has not been well-documented in the current literature.

A closely related study, conducted by Simon (2006), assessed nursing course and clinical performance linked to achievement on an NCLEX-RN practice test. Although prenursing science and nursing course grades as well as GPA had significant links to the practice test score, a student's clinical status was not noted to have any significant relationship. Thus more research was needed in this area to assess for any relationship between clinical pass and fail and success on the NCLEX-RN. My study attempted to fill this apparent gap in the literature.

It was surmised that more than just one factor may be predictive of performance in nursing academia (Morin, 2006; Murray et al., 2008). Still, a researcher would be at a loss to identify positive or negative links to achievement without assessing a complete spectrum from program admission to completion of the NCLEX-RN. My study did not allow time to study every possible academic variable. Therefore my research considered some prenursing admission criteria, clinical achievement, and completion or attrition from a specific BSN nursing program and their predictive values to pass or fail of the NCLEX-RN to add to the current body of knowledge and to fill the gaps where the recent research was lacking.

Literature Related to Methods

A variety of methods have been used in the current literature to assess predictive variables related to nursing program and/or NCLEX-RN achievement. For example, a survey instrument was used in Hughes's (2007) study to assess a student's level of intelligence in relation to success in nursing academic courses. Hughes's findings with this method, however, were too inconclusive to significantly link intelligence scale to course performance. Nonacademic variables were assessed by some researchers by

means of interview tools (Palmer, 2008; Rosenberg et al., 2007; Trice & Foster, 2008). Interviewing worked well for researchers identifying motivation levels of students (Palmer, 2008) and perspectives about the nursing program (Rosenberg et al., 2007), for example. Although interviewing is an appropriate tool for qualitative research designs (Creswell, 2003), quantitative measures are necessary in studies that involve descriptive figures and correlations (Mertler & Vannatta, 2010) Yet other researchers utilized mixed-method approaches when they assessed combinations of academic and nonacademic variables (Campbell, 2006; Higgins, 2005; Norman et al., 2005). Others have considered program evaluation and implementation methods (Frith et al., 2008; Trice & Foster, 2008). However, the majority of the current studies that assessed academic predictors of student achievement used diverse descriptive statistics and regression analyses procedures to correlate the independent and dependent variables (Esper, 2009; Gilmore, 2008; Harris, 2006; Hopkins, 2008; Jeffreys, 2007; Matos, 2007; Muecke, 2008; Murray et al., 2008; Newton et al., 2007; Pryjmachuk et al., 2009; Roat, 2008; Shapinsky, 2006; Uyehara et al., 2007; Vandenhouten, 2008).

A longitudinal study involving a sample of currently enrolled students with the use of a path analysis, as was used in Blackman et al.'s (2007) study, would have improved the validity of the research (Bordens & Abbott, 2002). Longitudinal designs study one particular group over an extended period of time (Bordens & Abbott, 2002). With a new set of students entering the program each year, and with the program of study upon the students' entrance into the nursing program being only 3 years, it would not have been feasible to extend the study past the students' NCLEX-RN examinations. Likewise a path analysis was not practical. The purpose of conducting a path analysis is

to illustrate, by means of a model, how the variables might be tested in future studies (Babbie, 2004). Unfortunately the path analysis was not feasible to the scope of this study due to a limited timeframe that prevented carrying out such a complicated method.

This study, therefore, entailed a nonconcurrent, prospective design that used secondary data and applied descriptive statistics to "describe" (Tabachnick & Fidell, 2007, p. 7) the individual research variables that were assessed along with multiple correlation measures that identified any relationships between the variables. Unlike in experimental research where the researcher can adjust or control the variables to some extent to identify a means by which one variable affects another (Tabachnick & Fiddell, 2007), correlational methods only seek to recognize whether or not a relationship exists between the variables (Bordens & Abbott, 2002). Assessments of the relationships between variables were found to be the most appropriate means by which to answer the study's research question. Thus regression analysis was therefore used to identify the level of prediction the independent variables had in relation to the dependent variables (Tabachnick & Fiddell, 2007). Logistic regression is an especially useful method to use when the dependent variables are discrete (Tabachnick & Fiddell, 2007) as was the case in this study.

Summary

Multiple studies were conducted that assessed relationships of either academic, nonacademic, or both types of variables to either program performance or NCLEX-RN achievement. Yet even then the findings were incongruent and further program-specific studies are therefore required. A handful of studies were conducted that looked at both program and NCLEX-RN performance as dependent variables; of these studies none

considered (a) clinical achievement, (b) TOEFL scores, or (c) type of high school attended as potential factors, and only Roat's (2008) study was conducted in a BSN program, although its apparent focus was to compare a BSN program with an accelerated BSN program. Therefore this current study attempted to fill the gap in the literature. The findings were intended to be a primary assessment to future implementations in relation to potential changes in the admission policies, curricula, and remediation strategies of the study's BSN nursing program. Such knowledge was also intended to contribute to benefiting the current nursing shortage, a significant social change issue, by fostering the progression and program completion of nursing students and enabling more candidates for the sorely deficient nursing workforce.

Chapter3: Research Method

Introduction

The purpose of this study was to discover academic variables that were predictive of NCLEX–RN achievement, which individuals are eligible to take following graduation in a private BSN nursing program. The study was guided by Seidman's (2005) retention formula. The adaptation of the formula to this study involved the implication that early detection of academic-specific problems prior to entry into the nursing program and during progression within the program itself could potentially promote the students' success and likewise prevent the students' failure of the nursing program and/or the NCLEX-RN. Therefore, the object of this nonconcurrent, prospective study, using secondary data, was to use the findings later to potentially improve the program's admission policies and curricula so that the program's attrition rate is decreased, the graduation rate is increased, and the NCLEX-RN passage rate improves instead of declines. Furthermore this study attempted to identify areas where struggling students might be assisted before entrance into the nursing program. By identifying variables that were linked to program and/or NCLEX-RN passage or failure, it was expected that the implications for program improvements would make a positive social change contribution to the issue of the nursing shortage that this country is facing, as was described in chapter 1.

In this chapter a detailed explanation of the study's methodology is covered. The following main headings are addressed:

- Research Design and Approach,
- Setting and Sample,

- Instrumentation and Materials,

- Data collection and Analysis, and

- Protection of Participants.

Research Design and Approach

The following research question was sought to be answered by means of this nonconcurrent prospective study using secondary data: How do the individual or combined variables of (a) cumulative Fall Semester GPA, (b) overall prenursing science, mathematics, and English GPA, (c) type of high school background, (d) TOEFL score, (e) clinical pass or fail, or (f) on-time program completion versus program failure, best predict the outcome of NCLEX-RN passage or failure? To answer this question, the study utilized correlations to identify the relationships of the independent and dependent variables. Trochim (2006) stated, "A correlational relationship simply says that two things perform in a synchronized manner" (Trochim, 2006, The Nature of a Relationship, para. 1). Likewise Babbie (2004) implicated that a correlation does not necessarily mean a cause. Even though associations were found between variables, the independent variable did not necessarily cause the dependent variable to occur. Likewise in correlational studies the researcher has no control over the independent variables (Tabachnick & Fidell, 2007). This method along with a multivariate regression analysis was useful in answering the study's research question, which sought to identify a relationship or the existence of "predictability" (Tabachnick & Fidell, 2007, p. 56) between the independent and dependent variables.

The correlation procedures began with basic descriptive statistical measures. Descriptive statistics involved an assessment of means, frequencies, and standard

deviations (Daley et al., 2003) among other tests described further in this chapter for data collected pertaining to the following variables:

- Cumulative Fall Semester GPA,

- Overall prenursing science, mathematics, and English GPA,

- Type of high school background,

- TOEFL score,

- Clinical pass or fail, and

- Program completion or attrition in relation to NCLEX-RN success.

Then correlations between the independent and dependent variables were conducted to identify any associations (Steinberg, 2008). The correlation coefficient identified the existence of a linear relationship between the variables and whether the relationship was a positive or negative one (Munro & Page, 1993). An association between two variables is considered positive when the statistical figures for the independent and dependent variables are both high or both low (Steinberg, 2008; Trochim, 2006). Conversely a negative association occurs when the statistical figures of one variable rise or fall while the figures of the comparative variable go in the opposite direction (Steinberg, 2008).

A step-wise multiple logistic regression analysis followed the correlations to measure the amount of prediction the identified related independent variable had on any of the dependent variables (Ryan, 1997). Therefore once relationships were recognized, I identified which variables had the strongest relationship to the dependent variable of NCLEX-RN passage versus failure. The multiple regression procedures, according to Munro and Page (1993), were useful for making predictions about the relationship between variables when those relationships existed at the nominal and ratio levels.

Setting and Sample

The study's setting was a BSN program in a small, private college in Florida. The population, therefore, entailed BSN students and the sample was conveniently selected by means of the assessment of records, considered "archival research" (Bordens & Abbott, 2002), of nursing students who entered the study's program during the academic school years 2006 through 2007. Although convenience samples can be biased because the participants are not randomly selected and so are not necessarily representative of the larger population (Babbie, 2004), this method was necessary in this study in order to acquire a sufficient number of recent academic files. Therefore, 231 student records were initially analyzed from this group.

Currently, the admission procedures of the study's nursing program involve the following criteria:

- Prenursing course grades of at least C-,

- Science course GPA value,

- Overall Fall Semester GPA, and

- Score on the NET.

The science courses factored into the science GPA value include Biology, General Chemistry, Anatomy and Physiology I, Organic and Biological Chemistry, and Nursing Medication Calculations. The top 120-125 students are admitted into the nursing program and 20 additional students are placed on a waiting list in the event that admitted students choose to give up their places in the program prior to the start of their sophomore school year. Students not accepted into the program in a particular year and

who decide to continue will be a part of the same admission procedures the subsequent year without any preference to their prior application.

Delucchi (2004) stated,

To estimate the required sample size for a logistic regression, one requires an estimate of the expected outcome proportions of the 2 conditions (the effect size) plus the level of correlation p [population correlated coefficient)] between group membership and the set of covariates that will be used in the logistic regression. (Estimating required sample size, para. 2)

However, Delucchi (2004) went on to indicate that estimates are not always possible. This study especially was not interested in hypothesis testing and a precalculated effect size but instead simply attempted to identify predictability levels between variables (Tabachnick & Fidell, 2007). Yet a simple method to calculate sample size was used. An appropriate effect size, or power, for a correlational study based on *A priori* specifications and a 95% degree of probability value, according to Buchner, Erdfelder, Faul, and Lang's (2006) computations, was 111 participants. However the initial sample size ($N = 231$) of the study actually exceeded the suggested sample size. The larger the effect size or power the greater the accuracy of the findings (Steinberg, 2008). However Tabachnick and Fidell (2007) stated, "The cases-to Independent Variables ratio has to be substantial or the solution will be perfect—and meaningless" (p. 123). This means that the effect size will vary according to the number of variables being examined in the study (Tabachnick & Fidell, 2007). A medium sample size has a power of .80 (Lenth, 2001). A standard formula that can be used to obtain a medium-level sample size for multiple correlation procedures is "N $\geq$ 50 + 8m" (Lenth, 2001, p. 187). I

counted the study's independent variables to obtain the value of *m* (Tabachnick & Fidell, 2007). Thus, by using this computation with the study's six independent variables, the sample size came out to approximately 98 participants. Therefore the values of Lenth's (2001) and Buchner et al.'s (2006) sample size methods were fairly close. However this study had to also consider a dependent case (Cohen, 1969) of graduate records for the variable of TOEFL scores, because only some of the students who entered the program spoke English as their secondary language and thus were required to complete the TOEFL. Using Buchner et al.'s (2006) calculation again but adjusting the coefficient of determination to 0.5 as a medium-range value (Cohen, 1969; Tabachnick & Fidell, 2007), the estimated sample size for the TOEFL variable correlated with the dependent variable became 13 student records.

All records of students who entered the program during 2006 and 2007 school years were assessed. Earlier years' records were also assessed to obtain enough data to assess the TOEFL score variable, because only a small percentage of the nursing student population spoke English as a second language. If incomplete data was identified, a record of these findings was tracked for the study's discussion; however it was not used in the analysis process.

Instrumentation and Materials

The information and figures were obtained by the program's Dean of Nursing from student academic records that were coded to protect the names and identifying information of the students and then were provided to me by means of a data spreadsheet. I classified the material for each of the study's variables. On a Microsoft Excel (2007) data spreadsheet, the left-hand column contained the numerical code assigned in place of

the student's identification, and the successive columns displayed the data of each of the variables. The upper row headings of the spread sheet specifically classified the variables. Each row entry was coded, by the Dean of Nursing, with a numerical value, in lieu of the student's name, prior to the my retrieval of the material. The numbers were randomly assigned to the files so that the number order assigned did not convey the information of any individual student. Data containing numerical values, such as GPA and TOEFL scores, were not altered or coded. Once the raw data were completely entered, the data analysis process occurred. A detailed description of the study's variables are described further, and the steps involved for analysis of each variable are described below and in greater detail in chapter 4.

Independent Variables

GPA. The study's program uses the following grade-point system, based on the letter grade and the number of credit hours of each course:

- A- to A+ = 4.0,

- B- to B+ = 3.0,

- C- to C+ = 2.0,

- D to D+ = 1.0,

- F = 0.0.

Two aspects of the prenursing GPA were correlated with the dependent variables. First, the *Cumulative Fall Semester GPA* was analyzed. The courses included in this total were BI 101 New Testament survey (NT I), BY 105 Principles of Biology (BY), CH 106 Introduction to General Chemistry (CH I), EN 101 English Grammar and Composition (EN I), and HI 101 History of Civilization (HI I). The total of the GPA values for these

courses is what is used as a factor in the current program admissions procedures. However the *Overall Prenursing Science, Mathematics, and English GPA* was also calculated. These courses were correlated to the dependent variables separately because the grades of these courses are specifically used as criteria for program admission. Eligible students for program admittance can receive a minimal GPA score of 2.0. The maximum GPA value for the college is 4.0.

The following depicts the prenursing courses, according to semester, that were used to obtain the GPA values that were assessed in this study (Table 1). The shaded areas indicate those courses that were used to calculate the total GPA values of the sciences, mathematics, and English Courses alone.

Table 1

Prenursing courses

Fall Semester Courses	Spring Semester Courses
NT I	NT II
BY	A&P I
CH I	CH II
EN I	EN II
HI I	MA
	SP

Type of high school. Again, the type of high school a student attended is representative of nominal data, because it is categorical (Triola, 2005). The information was entered into the spreadsheet according to an assigned numerical code. The classifications assigned, in no significant order, in this case were:

- Public High School = 1,
- Private NonReligious High School = 2,
- Private Religious School = 3,

- Home School = 4, and

- GED certificate = 5.

TOEFL score. The TOEFL scores of the nursing students who took the examination prior to entry into college were also examined as a predictor variable. Specifically the total score with a minimum value of 310 and a maximum value of 677 (ETS, 2009) was assessed and entered onto the spreadsheet along with a separate entry for the Test of Written English (TWE) or Essay Rating (ER) scores, which are also components of the examination. The minimal TWE score that a student could achieve, according to the ETS (2009), is 1.0 and the maximum value is 6.0.

Clinical course pass or fail. A component of the study's nursing program is the clinical training that the students receive. The nursing courses that require the student to take the clinical component include (a) Fundamentals of Professional Nursing I, (b) Fundamentals of Professional Nursing II, (c) Psychiatric/Mental Health Nursing, (c) Maternity Nursing, (d) Medical-Surgical Nursing I, (e) Pediatric Nursing, (f) Medical Surgical Nursing II, (g) Community Health Nursing, and (h) Preceptorship. Students who took these courses were evaluated based on daily observations from nursing instructors (the preceptorship experience required weekly evaluations and feedback from the students' assigned preceptors). At the end of the Semester the students received either a "pass" or a "fail" status for the clinical course. A "pass" did not affect the student's GPA; however a "fail" status went on record as an "F" for the course, and the GPA value was lowered accordingly. Students who failed a clinical course were required to retake the course during the next academic school year because these courses were only available during certain semesters. For example, Maternity Nursing is a clinical course

that is only offered during the Fall Semester. Repeating this course due to clinical

failure, therefore, requires that the student does so in the next Fall Semester. Therefore

clinical failure automatically prevents a student from having an on-time program

completion. To simplify the analysis, the student's pass and fail status was coded

numerically as "0" for Fail and "1" for Pass, even if a student failed more than one

clinical course.

Completion/attrition of a BSN program. Nursing program achievement was

coded using a pass = '1' and failure = '2' system initially and then recoded using pass =

'1' and failure = '0', as described in chapter 4. The aim was to identify if the student

completed the program successfully in the expected 3 year timeframe or if a failure in

either academic or clinical courses classified the student as unsuccessful.

Dependent Variable

The NCLEX-RN results were also numerically coded so that the results could be

communicated into statistical figures. Passage of the NCLEX-RN was coded as "1" and

Failure of the NCLEX-RN was coded as "0".

Data Collection and Analysis

A nonconcurrent prospective design, using a multivariate approach, was used to

conduct this research of secondary data. As I was only attempting to identify the

existence of a relationship between the variables, hypotheses were not tested in this study

(Tabachnick & Fidell, 2007). Data collection occurred in multiple steps. First, the

student files were retrieved by the Dean of Nursing from a college database that is only

accessible by the institution's Records Office Personnel and the college's Administration.

A coded spreadsheet to protect the identification of the individuals was provided to allow

my access to this information. This type of data, although considered "archival" (Bordens & Abbott, 2002, p. 206) or secondary, is commonly used in research studies that require the analysis of filed data. As discussed in chapter 1, no research, formal or informal, had been previously conducted with the data that was examined in my current study. The NCLEX-RN scores were previously manually entered onto the database by the college's Dean of Nursing who contacted the graduates individually or looked up their names on the Florida Board of Nursing website to obtain their pass or fail status.

The Statistical Package for the Social Sciences (SPSS; 2009) computer program was used to conduct the statistical measures. Descriptive statistics including ranges, means, medians, modes, standard deviations, and frequencies were used appropriately to analyze the data prior to correlations of the independent and dependent variables. The range was obtained by subtracting the lowest number from the highest number in a list of figures (Mertler & Vannatta, 2010). The range simply informed me about the approximate variability of the numbers represented in the list. The means of each data set, however, informed me about the averages of the distribution of figures that were continuous (Babbie, 2004); however I considered the median value as a potential alternative in the case that the upper or lower values of the distribution were far apart from the rest of the figures (Mertler & Vannatta, 2010). Modes and frequencies were appropriate statistics for categorical data (Salkind, 2000). Standard deviations were calculated for the GPA and TOEFL values because they represented interval-level data (Mertler & Vannatta, 2010). The standard deviations indicated the distance of the data from the mean. In other words, it represented the variability of the group of data being assessed.

Following descriptive statistical measures, I conducted correlation studies. Correlations were used to identify the existence and significance of relationships between two variables (Mertler & Vannatta, 2010). The chi-square statistic and the phi coefficient were calculated for two nominal variables; whereas point biserial measures were used to identify a correlation between discrete and continuous forms of data (Salkind, 2000). For correlation of data sets that were both interval-level, the Pearson product moment coefficient was measured (Marion, 2004). Multiple logistic regression procedures were conducted in a step-wise fashion, which is a common method for studies that are simply "exploratory" (Mertler & Vannatta, 2010, p. 164). By the step-wise approach, Mertler and Vannatta (2010) relayed that the researcher adds to and takes away from the model based on the identified significance of each independent variable to the outcome variable. Thus if two independent variables were found to have a similar correlation to the dependent variable, the like independent variable that was entered first was removed from the model. This step-wise sequence continued as each independent variable was tested (Mertler & Vannatta, 2010). In general logistic regression, according to Tabachnick and Fidell (2007), is used when multiple, dichotomous outcome variables are examined. With this measure, it is also fine that the independent variables are nominal or interval (Mertler & Vinnatta, 2010), as was the case with this current study. This study also tested the "goodness of fit model" (Mertler & Vinnatta, 2010, p.) to identify the reliability of the regression curve.

Protection of Participants

Permission to conduct the research was obtained from the study's institution, and permission to use the limited data set of students and graduates from the nursing program

was also obtained prior to Institutional Review Board (IRB) approval (Walden University

IRB approval #09-28-10-0252943), which was needed to formally conduct the research.

Any information contained in these documents that indicated the name of the study's

institution was removed to protect the privacy of program in question. The study's

sample did not entail human subjects but instead included archived data from student

files and records retrieved from the institution's database of documents. Thus the data

obtained from these records were numerically coded prior to my access to the

information and therefore any identifying information linked to the data did not exist.

Summary

A nonconcurrent prospective design of secondary data was used by means of a

multivariate approach with step-wise logistic regression procedures to identify how each

independent variable predicted the outcome of NCLEX-RN achievement. Correlation

measures were used to test bivariate relationships independently. The statistical measures

explored the study's research question of: How do the individual or combined variables

of (a) cumulative Fall Semester GPA, (b) overall prenursing science, mathematics, and

English GPA, (c) type of high school background, (d) TOEFL score, (e) clinical pass or

fail, or (f) on-time program completion versus program failure, best predict the outcome

of NCLEX-RN passage or failure? Data from the sample of archived graduate files of

students who entered a small, private, BSN nursing program during the years of 2006-

2007 were conveniently selected to represent the most recent academic years, and was

coded to protect the identity of the individuals in the study. According to sample size

calculations, the estimated sample needed to include 111 student records (Buchner et al,

2006). For the TOEFL score category, because only a select number of students spoke

English as a second language and thus were required to take the TOEFL prior to admission, calculations showed that approximately 13 students records entailed an appropriate sample size for this study (Buchner et al., 2006). The study, guided by Seidman's (2005) Retention Formula, was used to ultimately identify strengths and potential barriers that affected nursing program and NCLEX-RN achievement.

Chapter 4: Results

Introduction

A nonconcurrent, prospective design was used to answer the question: How do the individual or combined variables of (a) cumulative Fall Semester GPA, (b) overall prenursing science, mathematics, and English GPA, (c) type of high school background, (d) TOEFL score, (e) clinical pass or fail, or (f) on-time program completion versus program failure, best predict the outcome of NCLEX-RN passage or failure? Descriptive statistics, bivariate correlation procedures, and a step-wise, multivariate, logistic regression analysis were used to answer the research question. With descriptive statistics, I was able to see the mean outcomes, standard deviations, and frequencies within each variable studied (Daley et al., 2003). Bivariate correlations displayed any existing relationships across variables (Steinberg, 2008) and the findings were analyzed further for statistical significance. A multivariate logistic regression procedure was used to determine how well each independent variable predicted the outcome of NCLEX-RN achievement (Tabachnick & Fidell, 2007); the findings were also assessed for statistical significance. In conducting the analysis, I was mindful of the theoretical, motivational guide for the study, Seidman's (2005) retention formula. Seidman's formula, based on the medical diagnosis model, encourages academic leaders to recognize early in their programs of studies students who are likely to be unsuccessful. This recognition of academically weak students promotes interventions, such as remediation efforts, to retain students within the program and to ultimately help them to achieve their goal-oriented outcome of program completion. However, in this current study, the outcome assessed was successful completion of the NCLEX-RN. Thus chapter 4 presents the data

collection and analyses procedures used to identify any prenursing or intraprogram academic factors that were linked to NCLEX-RN achievement.

Data Analysis

The data files were presented to me by the program's Dean of Nursing (DON) in a spreadsheet format. Each entry had already been numerically coded by the DON; therefore, no identifying information, in any way, was ever available to me. The sample included conveniently selected archived records of all of the students or graduates who entered a small, private BSN program within the 2006 through 2007 academic school years. The information received in the spreadsheet included the following categories for each individual entry:

- Year of program entrance,
- Year of graduation,
- Semester and year of attrition,
- Cumulative Fall Semester GPA,
- BY grade,
- CH I grade,
- A & P I grade,
- CH II grade,
- EN I grade,
- EN II grade,
- MA grade,
- Type of high school attended,
- TOEFL score,

- Clinical courses failed,

- Academic courses failed, and

- NCLEX-RN failures.

I originally used a Microsoft Excel (2007) spreadsheet to organize and code the data.

The science, mathematics, and English course grades were converted to a GPA by using

the Microsoft Excel (2007) spreadsheet formula: =VLOOKUP(cell column and row

number,$column of first parameter$cell number of first parameter:$column of last

parameter$cell number of last parameter,2) with the following parameters (see Table 2)

and subsequently calculated into GPA values using the same formula and the parameters

listed (Table 3). The letter grades and GPA parameters are in accordance with the

study's academic program.

Table 2

Parameters Used to Calculate Letter Grades

Numeric Grade	Letter Grade
0	F
59.5	D
66.5	D+
69.5	C-
72.5	C
76.5	C+
79.5	B-
82.5	B
86.5	B+
89.5	A-
92.5	A
97.5	A+

Table 3

Parameters Used to Calculate GPA

Grade	GPA
0/F	0.00
59.5/D	1.00
69.5/C-	2.00
79.5/B-	3.00
89.5/A-	4.00

The study's dependent variable was pass or fail of the NCLEX-RN. The independent variables analyzed included the continuous variables of cumulative Fall semester GPA, overall prenursing science, mathematics, and English GPA, and TOEFL score, taken specifically by students whose first language was not English. Three categorical independent variables: type of high school education, clinical pass or fail, and on-time nursing program completion were also investigated. Each of the variables, the individual subject components of the GPA scores, and the specific codes used for the analysis are present in Table 4. I then transferred the data into the SPSS (2009) computer software package to conduct the specific analyses.

Table 4

The Variables Studied and Their Codes

Variable	Components	Codes
Dependent		
NCLEX-RN		Fail = 0
		Pass =1
Independent		
Cumulative Fall Semester	NT 1	Continuous data
GPA	BY	
	CH 1	
	EN 1	
	HI 1	
Overall Science,	BY	Continuous data
Mathematics, and English	CH 1	
GPA	EN1	
	A& P I	
	CH II	
	EN II	
	MA	
TOEFL score		Continuous data
Type of high school		Public = 1
		Private, NonReligious = 2
		Private, Religious = 3
		Home School = 4
		GED certificate = 5
Clinical		Fail = 0
		Pass = 1
Program		Fail = 1
		Pass = 2] PROGPvsF
		Changed to:
		Fail = 0
		Pass = 1] PROGPvsF2

Analysis of the Research Question

Descriptive Statistics

Using the SPSS (2009) software program, the descriptive statistics calculated and

analyzed included means, standard deviations, ranges, skewness, and kurtosis for the

continuous GPA and TOEFL score variables. Histograms and stem-and-leaf plots were

used to assess for the presence of any outliers within each interval-level variable. No

outliers were identified. The total sample (N) obtained was 231 records. For the

Cumulative Fall Semester GPA (CUMFGPA) variable (N=231), the mean (M) score was

approximately 3.26 with a standard deviation (SD) of .525 and a distance of 2.20 between

the range of scores from 1.80 to 4.00. The CUMFGPA value was negatively skewed at -

.305, indicating that the variable's median value, 3.27, was just slightly higher than the

mean (Salkind, 2000), thus showing that the majority of the records had high GPA

values. Likewise, the Kurtosis value for CUMFGPA was -.542. A negative Kurtosis

indicates a relatively flat shape to a graphically plotted curve of the results (Salkind,

2000), therefore showing that GPA values were well distributed throughout the range

indicated above. These values are summarized further (Table 5).

Table 5

Descriptive Statistics for Continuous Variables

Variable	N	M	SD	Lower Range	Upper Range	Skewness	Kurtosis
CUMFGPA	231	3.26	.525	1.80	4.00	-.305	-.542
ScMaEnGPA	231	3.13	.572	1.91	4.00	-.023	-1.061
TOEFLPAP	3	494.33	26.764				
TOEFLCOM	10	190	40.546				
Re-computed TOEFL	16	193.19	40.632	140	273	.667	-.151
TWE	7	3.71	0.809	2.5	5.0	.013	.249

The descriptive results for the science, mathematics, and English GPA (ScMaEnGPA) were likewise calculated and analyzed (see Table 5). From a total of 131 records, it was noted that the mean was 3.13 with a SD of .572 and a distance of 2.09 between a range of 1.91 and 4.00. Again, there was a slight negative skewness of -.023 and a Kurtosis of -1.061. The median value of ScMaEnGPA was 3.09. Although the median number was lower than the mean, the skewness was negative because the majority of the ScMaEnGPA values fell above the mean (Salkind, 2000).

The descriptive analyses conducted for the TOEFL variable posed a challenge for me. Because only a small portion ($n = 13$) of the study's sample ($N = 231$) of student files contained TOEFL scores, these analyses were conducted as a dependent case (Cohen, 1969) to the other independent variables. In the early part of the analysis the 13 student files were analyzed together and it was noted that that the mean TOEFL score was 260.23 ($SD = 138.433$) with a range of values from 140 to 523. However I later noted that there were two sets of TOEFL scores denoted within the same variable. Ten of the student records had scores that were representative of the computerized form of the test and the other three scores showed that the students had taken a written form of the same test. According to the ETS (2009), the computerized scores range from 0 to 300, but the paper version of the test scores' range from 310 to 677. It would not have been valid for me to interpret the two sets of scores together. Thus a new analysis was conducted. First, I analyzed the scores according to their individual counterparts. The three data files that had the written TOEFL form of the test (TOEFLPAP) had a mean of 494.33 and a SD of 26.764 and the computerized scores (TOEFLCOM, $n = 10$) had a mean of 190 and a SD of 40.55 (Table 5).

Then it was realized that only six cases within the TOEFL group had actually taken the NCLEX-RN, the outcome criteria for the logistic regression analysis that was conducted later. This discrepancy dropped the required sample size of 13, as calculated and described in chapter 3, considerably. Therefore I found it necessary to add more cases to the TOEFL variable for analysis purposes by obtaining files of students whose first language was not English from academic years prior to the study's 2006 to 2007 admission dates. This procedure was described as a possible measure in chapter 3. Only three more files without any identifying information attached of graduates that had taken the NCLEX-RN were obtained by the DON and passed on to me. Obtaining more than three cases would have required searching for files of individuals who had graduated prior to the year 2003. I decided that 2003 would be the cut-off year to keep the study as current as possible for this particular variable. Therefore the new sample size for the TOEFL variable became 16 with only nine of the student files having a report of a pass or fail status on the NCLEX-RN.

I then determined that carrying out an analysis with two separate categories of TOEFL scores (TOEFLPAP and TOEFLCOM) would pose a problem when conducting the logistic regression due to the fact that the TOEFLPAP sample only included three scores. Upon further inquiry, therefore, it was noted that the written TOEFL scores could be converted to computerized scores and vice versa by using a table of conversions designed by ETS (2005). The three written TOEFL test scores were renumbered into their computerized score counterparts (Table 6) and the descriptive analyses were redone.

Table 6

Written TOEFL score conversions

Case Number in SPSS (2009)	Written TOEFL score	Computerized Equivalent
44	523	193
162	490	163
204	470	150

Note. Computerized equivalent conversions from ETS (2005). TOEFL internet-based test: Score comparison tables. Retrieved November 4, 2010 from http://www.ets.org/Media/Tests/TOEFL/pdf/TOEFL_iBT_Score_Comparison_Tables.pdf.http://www.ets.org/Media/Tests/TOEFL/pdf/TOEFL_iBT_Score_Comparison_Tables.pdf.

The descriptive values for the recomputed TOEFL variable, therefore, included 16 student files with a mean value of 193.19, a *SD* of 40.632, and a range of 140 to 273. The results were positively skewed at a statistic of .667 and a negative kurtosis of -.151. The positive skewness informed me that the mean TOEFL value was greater than the median value and that most of the TOEFL scores were below the mean (Pallant, 2010). The negative kurtosis indicated that the plotted curve was flat in shape, showing that the scores were widely distributed (Pallant, 2010). The Test of Written English (TWE) scores, a separate component of the paper form of the TOEFL test (ETS, 2009), were also computed. The computer-based form of the test, called the Essay Rating (ER) score, however, is a component of the overall TOEFL score (The Princeton Review, 2009; Using English for Academic Purposes [UEFAP], n.d.). The TWE and ER values both range from 1.0 to 6.0 and a score of 4 for each test shows minimal writing competency (ETS, 2005; UEFAP, n.d.); however it was unclear whether or not the two scores could validly be compared. I used caution with the interpretation of the analysis of the combined TWE and ER scores (labeled TWE throughout) beyond the simple descriptive tests (see Table 5) or correlation analyses in this study. There were seven total TWE files

with a mean of 3.71, SD of .809, and range of scores from 2.5 to 5.0. The results were positively skewed at .013, indicating that the majority of the values were below the mean (Pallant, 2010). The kurtosis was also positive at .249, showing a more centralized distribution of the scores (Pallant, 2010).

      Frequency tables and crosstabulations. Frequency tables and crosstabulations with the SPSS (2009) computer program were the descriptive statistics used to analyze the categorical, nominal-level variables of type of high school education and pass and fail status in clinical, program, and the NCLEX-RN. Frequencies (*f*) of the total sample (*N* = 231) for type of high school (HS) education received were as follows: (a) 81 records (35.1%) showed *public*; (b) one record (4%) indicated *private, nonreligious*; (c) 72 (31.2%) showed *private, religious*; (d) 71 (30.7%) were *home schooled*, and (e) six records (2.6%) showed acquisition of the GED (Table 7). Table 7 also portrays that of the 231 records analyzed, 200 (86.6%) passed clinical (CLINICALPvsF); whereas, 31 (13.4%) failed one or more clinical courses. On-time program completion for 231 student records (PROGPvsF2) was evident in 139 (60.2%) of those files studied, 76 (32.9%) showed failure to complete the nursing program in the standard timeframe, and 16 students (6.9%) did not complete the program. Finally, out of 231 records, 148 (64.1%) passed the NCLEX-RN on the first attempt (NCLEX-RNPvsF), 17 (7.4%) failed, and 66 (28.6%) did not take the NCLEX-RN (Table 7). This left 165 individual records that could qualify for inclusion in the logistic regression analysis conducted later.

Table 7

Frequencies of Categorical Variables

Category (*N* = 231)	*f*	%
HS		
Public	81	35.1
Private NonReligious	1	4
Private Religious	72	31.2
Home School	71	30.7
GED	6	2.6
CLINICALPvsF		
Pass	200	86.6
Fail	31	13.4
PROGRAMPvsF2		
Pass	139	60.2
Fail	76	32.9
Did Not Complete	16	6.9
NCLEX-RNPvsF		
Pass	148	64.1
Fail	17	7.4
Did Not Take	66	28.6

Bivariate crosstabulations were also conducted. First, the categorical variable of type of HS was compared with the CUMFGPA and ScMaEnGPA variables. It was noted that except for the one record of private, nonreligious HS education, each of the mean ScMaEnGPA values for the HS categories were slightly lower than the CUMFGPA values. For a total sample of 231 student records, I found that of the 81 students who attended public school, the mean value for the CUMFGPA was about 3.20 with a standard deviation of around .526; whereas the mean value for ScMaEnGPA for the same 81 records was lower at about 3.06 with an approximate *SD* of .569. Only one student record represented the HS category of private, nonreligious. This student's GPA value for CUMFGPA was about 2.88 and for the ScMaEnGPA was around 3.22. The 72

student records showing private, religious HS education had an approximate CUMFGPA

mean of 3.21 with a *SD* of .547, and the ScMaEnGPA mean for private, religious

students was about 3.10 with a *SD* of .571. The 71 records in the home school category

had a mean CUMFGPA value of around 3.36 and *SD* of .488 and a ScMaEnGPA mean of

about 3.20 and *SD* of .575. Finally, the six records in the GED type of HS education had

a CUMFGPA mean of around 3.59 and *SD* of .524 and a ScMaEnGPA mean of

approximately 3.58 and SD of .458 (Table 8). The GPA values were fairly consistent

across the five HS categories. I was surprised to find that the highest GPA mean values

for both the CUMFGPA and ScMaEnGPA areas were in the GED category.

Table 8

Crosstabulations of Type of HS with CUMFGPA, ScMaEnGPA, and TOEFL/TWE

	CUMFGPA *(N = 231)* Range: 1.80-4.00	ScMaEnGPA *(N = 231)* Range: 1.91-4.00	TOEFL (*n* = 16) Range: 140-273	TWE (n = 7) Range: 2.5-5.0
Type of HS				
Public	*n* = 81 *M* = 3.20 *SD* = .526	*n* = 81 *M* = 3.06 *SD* = .569	*n* = 15 *M* = 191.60 *SD* = 41.541	*n* = 7 *M* = 3.71 SD = .809
Private, NonReligious	*n* = 1 GPA: 2.88	*n* = 1 GPA: 3.22		
Private, Religious	*n* = 72 *M* = 3.21 *SD* = .547	*n* = 72 *M* = 3.10 *SD* = .571	*n* = 1 TOEFL score: 217	
Home School	*n* = 71 *M* = 3.36 *SD* = .488	*n* = 71 *M* = 3.20 *SD* = .575		
GED	*n* = 6 *M* = 3.59 *SD* = .524	*n* = 6 *M* = 3.58 *SD* = .458		

Next, crosstabulations of type of high school with those files that had TOEFL

scores (*n* = 16) were conducted (Table 8). Fifteen student records showed attendance at

public HS institutions and one student attended a private, religious school. The mean

TOEFL score of the public school attendees was 191.60 (*SD* 41.541); whereas the

TOEFL score of the student that went to a private, religious school was 217. All seven of

the students who took the TWE or Essay Rating tests as part of the TOEFL test were

from public high schools and had a mean TWE value of 3.71 (*SD* .809).

Crosstabulations were also performed to compare the mean values of the

continuous variables of CUMFGPA and ScMaEnGPA with CLINICALPvsF,

PROGPvsF2, and NCLEX-RNPvsF (see Table 9). From the total sample size of the

study (*N* = 231), the mean CUMFGPA value of the 31 students who failed clinical was

approximately 2.96 with a *SD* of .469; whereas the mean ScMaEnGPA score was around

2.77 with a *SD* of .546. Yet for those 200 students who passed all clinical courses, the

mean CUMFGPA value was quite a bit higher at about 3.31 with a SD of .519 and the

ScMaEnGPA mean was approximately 3.19 with a *SD* of .557. Comparisons of GPA

with PROGPvsF2, showed that the CUMFGPA mean value of those 76 students who

failed the program was around 2.90 (*SD* .438); for the ScMaEnGPA, the mean was about

2.71 with a *SD* of .477. Conversely the 139 students who passed the program in the

standard amount of time had a mean CUMFGPA of about 3.46 with a *SD* of .461 and a

mean ScMaEnGPA of approximately 3.36 (*SD* .498). Higher GPA values for students

who passed clinical or the program versus those that failed in those areas were not

surprising. Finally, comparisons of GPA against those that passed and failed the

NCLEX-RN were also made. Seventeen students failed the NCLEX-RN on the first

attempt and their mean CUMFGPA value was 3.26 (*SD* .448) and mean ScMaEnGPA

was roughly 3.04 with a *SD* of .435. The 148 students who passed the NCLEX-RN on

the first attempt had a mean CUMFGPA score of about 3.39 (*SD* .521) and mean

ScMaEnGPA score of approximately 3.30 (*SD* .539). Again, I was not surprised to find

that the GPA values for both the CUMFGPA and ScMaEnGPA areas were higher among

students who passed the NCLEX-RN compared to those that failed the examination.

Table 9

Crosstabulations of ClinicalPvsF, PROGPvsF2, and NCLEX-RNPvsF with CUMFGPA, ScMaEnGPA, TOEFL/TWE

	CUMFGPA Range: 1.80-4.00	ScMaEnGPA Range: 1.91-4.00	TOEFL Range: 140-273	TWE Range: 2.5-5.0
ClinicalPvsF	(*N* = 231)	(*N* = 231)	(*n* = 16)	(*n* = 7)
Fail	*n* = 31	*n* = 31	*n* = 8	*n* = 2
	M = 2.96	*M* = 2.77	*M* = 174.37	*M* = 3.25
	SD = .469	*SD* = .546	*SD* = 27.092	*SD* = 1.060
Pass	*n* = 200	*n* = 200	*n* = 8	*n* = 5
	M = 3.31	*M* = 3.19	*M* = 212.00	*M* = 3.90
	SD = .519	*SD* = .557	*SD* = 44.664	*SD* = .741
PROGPvsF2	(*n* = 215)	(*n* =215)	(*n* = 15)	(*n* = 7)
Fail	*n* = 76	*n* = 76	*n* = 8	*n* = 1
	M = 2.90	*M* = 2.71	*M* = 181.50	TWE score:
	SD = .438	*SD* = .477	*SD* = 32.654	4.00
Pass	*n* = 139	*n* = 139	*n* = 7	*n* = 6
	M = 3.46	*M* = 3.36	*M* = 208.86	*M* = 3.66
	SD = .461	*SD* = .498	*SD* = 48.694	*SD* = .875
NCLEX-RNPvsF	(*n* = 165)	(*n* = 165)	(*n* = 9)	(*n* = 7)
Fail	*n* = 17	*n* = 17	*n* = 1	*n* = 1
	M = 3.26	*M* = 3.04	TOEFL score:	TWE score:
	SD = .448	*SD* = .435	150.00	4.00
Pass	*n* = 148	*n* = 148	*n* = 8	*n* = 6
	M = 3.39	*M* = 3.30	*M* = 215.50	*M* = 3.66
	SD = .521	*SD* = .539	*SD* = 39.312	*SD* = .875

Also crosstabulations comparing the continuous TOEFL and TWE scores with the three categorical variables were carried out (see Table 9). First, of the 16 total student files that contained TOEFL scores, it was noted that eight students failed clinical. The mean value of the TOEFL score of those who failed was 174.37 (*SD* 27.092). However the TOEFL mean of the eight students who passed clinical was 212.00 with a *SD* of 44.664. Against the PROGPvsF2 variable, it was found that the mean TOEFL value of those eight students who failed the program was 181.50 (*SD* 32.654) and the 7 students who passed the program was 208.86 (SD 48.694). One student in the TOEFL category did not complete the program. Finally, of the nine students who took the NCLEX-RN, the TOEFL score of the one student that failed was 150.00; whereas the mean TOEFL value of the eight students who passed the exam on their first attempt was 215.50 (*SD* 39.312). Only seven total student files contained TWE scores. Crosstabulation analysis showed that two students failed clinical and had a mean TWE value of about 3.25 (SD 1.060). Of the five students who passed clinical, the mean TWE score was around 3.90 (SD .741). Related to program success, the TWE value of the one student that failed the program was 4.00. The remaining six program passers had a mean TWE of about 3.66 with a *SD* of .875.

Crosstabulation comparisons of frequency values were also conducted across the categorical variables of HS, CLINICALPvsF, PROGPvsF2, and NCLEX-RNPvsF (see Table 10). A total of 165 students took the NCLEX-RN. Ten percent of students failed the exam of which 6% were from public schools; about 2% were from private, religious institutions; and 2% were home schooled. However 90% of students passed the NCLEX-RN with 28% of the student records showing public school attendance; 28 %

were from private, religious programs; 30% were from home schools; and 3% of the

students took the GED. Again approximate percentages of the 165 students who took the

NCLEX-RN were compared with clinical achievement. Two percent of the students who

failed the NCLEX-RN also had clinical course failures, and 2% of these records showed

passage of clinical. Conversely, 8% of students who passed the NCLEX-RN had records

showing clinical failure, and 88% of the students passed their clinical courses as well as

the licensure examination. Frequencies were also examined between program

completion and NCLEX-RN achievement. Three percent of the students did not

complete the program in the regular timeframe and they also failed the NCLEX-RN.

Seven percent of those that failed the program also failed the NCLEX-RN. Thirteen

percent of the students failed the nursing program but later passed the NCLEX-RN, and

77% of the student records showed successful completion of both the program and the

NCLEX-RN.

Table 10

Crosstabulations of Frequencies Across Categorical Variables

	f (%)	CLINICALPvsF		PROGPvsF2		NCLEX-RNPvsF	
HS		($N = 231$)		($n = 215$)		($n = 165$)	
		Fail (%)	Pass (%)	Fail (%)	Pass (%)	Fail (%)	Pass (%)
Public		67 (6)	67 (29)	25 (12)	50 (23)	10 (6)	47 (28)
Private, NonReligious		10 (< 1)	0	1 (< 1)	0	n/a	n/a
Private, Religious		61 (5)	61 (26)	31 (14)	37 (17)	4 (2)	46 (28)
Home School		66 (2)	66 (29)	18 (8)	47 (22)	3 (2)	50 (30)
GED		6 0	6 (3)	1 (< 1)	5 (2)	0	5 (3)
Total		31 (13)	200 (87)	76 (35)	139 (65)	17 (10)	148 (90)
CLINICALPvsF							
Fail				29 (13)	1 (< 1)	3 (2)	14 (8)
Pass				47 (22)	138 (64)	3 (2)	145 (88)
Total				76 (35)	139 (65)	6 (4)	159 (96)
PROGPvsF2							
Fail						5 (3)	12 (7)
Pass						21 (13)	127 (77)
Total						26 (16)	139 (84)

Note: percentages, in parentheses, are approximate values

Likewise, a total of 231 students were included in the clinical pass versus fail analysis (Table 10). About 13% of the records showed failure of clinical. Of those students who failed: 6% achieved public high-school education; less than 1% attended a private, nonreligious school; 5% went to private-religious institutions; and 2% were home schooled. Furthermore, 200 students passed their clinical courses, and the records showed approximate high-school education frequencies as follows: 29% were from public programs; 26% attended private, religious schools; 29% were home schooled; and 3% achieved a GED.

Two hundred fifteen students were included in the crosstabulation analyses between the program achievement variable and type of high school attended and clinical course performance. Of these students, 35% failed to complete the program in the normal three year timeframe. The frequencies of program failures in relation to students' type of high school education, in percentages, were as follows:

- 12% were from public school;

- less than 1 % attended a Private, NonReligious school;

- 14% came from Private, Religious programs;

- 8% were home schooled; and

- less than 1% took the GED.

Of the 139 students (65%) that passed the nursing program, records showed that approximately 23% attended public schools; 17% were from private, religious schools; 22% were home schooled, and 2% obtained high-school education by means of the GED. Frequencies of program achievement in comparison to clinical pass or fail showed that of the total of 215 students, 13% of the students failed to complete the program in the

standard timeframe due to failure of clinical courses. Twenty-two percent of student records showed program failure even though clinical passage was achieved. Less than 1% of the students who passed the nursing program in the specified timeframe had a clinical failure, and 64% of the students were successful in both the program and clinical areas (Table 10).

Correlations

Following descriptive measures, correlation studies were conducted to determine the existence of significant linear bivariate relationships (Steinberg, 2008). SPSS (2009) was used for the analysis. First, the Pearson product moment coefficient (r) was used to identify associations across interval-level data (Table 11), including CUMFGPA, ScMaEnGPA, TOEFL, and TWE scores. A histogram and scatterplot graphs were used to verify the normality, linearity, or homoscedasticity of the data (Pallant, 2010). Correlation coefficients, using r, range from -1.00 to 1.00 (Pallant, 2010). A large, positive correlation between CUMFGPA and ScMaEnGPA, $r = .887$, $n = 231$, $p = .000$ was noted, thus showing about a 79% shared variance between these two GPA variables (Pallant, 2010). However nonsignificant, moderate, positive associations were found across CUMFGPA and TOEFL scores, $r = .290$, $n = 16$, $p = .277$, and ScMaEnGPA and TOEFL scores, $r = .415$, $n = 16$, $p = .110$. Furthermore nonsignificant, negative, moderate associations were identified between CUMFGPA and TWE scores, $r = -.495$, $n = 7$, $p = .258$ and ScMaEnGPA and TWE scores, $r = -.288$, $n = 7$, $p = .532$. The negative values show that students who tended to have lower GPA values actually had higher TWE scores. Finally, across the TOEFL and TWE variables was found a positive, strong, but nonsignificant relationship, $r = .568$, $n = 7$, $p = .184$.

Table 11

Pearson Product Moment Correlations: Interval-Level Variables

Variable	CUMFGPA	ScMaEnGPA	TOEFL	TWE
CUMFGPA		.887**	.290	-.495
ScMaEnGPA			.415	-.288
TOEFL				.568

Note. ** p < .01, two-tailed.

Second, bivariate correlations using SPSS (2009) were also conducted across the

interval-level data: (a) CUMFGPA, (b) ScMaEnGPA, (c) TOEFL scores, and (d) TWE

scores and the categorical, or nominal-level, values of HS, CLINICALPvsF,

PROGPvsF2, and NCLEX-RNPvsF (Table 12). An appropriate statistical test for

correlations of interval-level and nominal-level data is the point-biserial coefficient;

however in the SPSS program, the Pearson product moment correlation r can be used

instead (Pallant, 2010; Yaffee, 2003), as long as the dichotomous codes for the

categorical data are "0" and "1" (DeCoster & Claypool, 2004; PASW [SPSS] Guide,

n.d.). Thus, the Pearson product moment correlation test only revealed significant values

between CUMFGPA and HS, $r = .135$, $n = 231$, $p = .041$ and between CUMFGPA and

CLINICALPvsF, $r = .228$, $n = 231$, $p = .000$. A large, positive correlation, however, was

noted between CUMFGPA and PROGPvsF2, $r = .510$, $n = 215$, $p = .000$. Likewise, a

small, positive correlation was found between ScMaEnGPA and CLINICALPvsF, $r = $

$.250$, $n = 231$, $p = .000$ as well as a large, positive association between ScMaEnGPA and

ProgramPvsF, $r = .532$, $n = 215$, $p = .000$. Type of HS showed a strong correlation with

the TWE scores; however it was realized, as discussed previously, that all seven of the

student files that contained TWE values showed education from public high schools.

Also, TWE had a small, nonsignificant, negative correlation with PROGPvsF and

NCLEXPvsF, thus indicating that lower scores were more indicative of program and

NCLEX-RN passage rather than failure.

Table 12

Pearson Product Moment Correlations: Interval-Level with Nominal-Level Variables

Interval/Nominal	HS	CLINICALPvsF	PROGPvsF2	NCLEX-RNPvsF
CUMFGPA	.135*	.228**	.510**	.080
ScMaEnGPA	.125	.250**	.532**	.147
TOEFL	.156	.478	.338	.511
TWE	**	.392	-.156	-.156

Note. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.

The same interval-level and nominal-level correlations were conducted using

SPSS (2009) This time the statistical program was set to exclude any missing data within

a variable list including the TOEFL and TWE scores as well as type of high school. The

final product of the analysis showed the correlation results of only those 165 student files

that contained a NCLEX-RN result (Table 13). The analysis again showed significant,

moderate, and positive correlations between CUMFGPA and PROGPvsF2, $r = .390$, $p =$

.000 and ScMaENGPA and PROGPvsF2, $r = .364$, $p = .000$. A small, positive

correlation was also noted between ScMaEnGPA values and CLINICALPvsF, $r = .153$, p

$= .049$.

Table 13

Pearson Product Moment Correlations: Interval-Level with Nominal-Level Variables--
Excluding List-Wise Missing Cases and TOEFL/TWE, and HS Values

Interval/Nominal	CLINICALPvsF	PROGPvsF2	NCLEX-RNPvsF
CUMFGPA	.126	.390**	.080
ScMaEnGPA	.153*	.364**	.147

Note. * p < .05, two-tailed. ** $p < .01$, two-tailed.

Finally, the phi coefficient, again using SPSS (2009), was the means by which

bivariate correlations were conducted across nominal-level data (Table 14). The phi

coefficient, also a type of Pearson product moment correlation (Kotrlik & Williams,

2003), is formulated by taking the square root of chi-square over the *n* value ($\sqrt{\frac{x2}{n}}$)

(Agresti, 1996). The SPSS (2009) program does the calculation automatically through a

crosstabulation procedure. The phi coefficient is a number between "0", or no

relationship, and "1", or strong relationship (Pallant, 2010). However, because SPSS

computes an "effect size" (Kotrlik & Williams, 2003, p. 4), based on *r*, rather than an

actual phi coefficient figure, the value must be interpreted using a standard statistical

classification measure. There are various measures available in the literature, according

to Kotrlik and Williams (2003); nevertheless Simon's (2005) classification table was

used in this study. The parameters, according to Simon (2005) are as follows: "-1.0 to -

0.7 strong negative association, -0.7 to -0.3 weak negative association, -0.3 to +0.3 little

or no association, +0.3 to +0.7 weak positive association, and +0.7 to +1.0 strong positive

association" (Simon, 2005, "Interpretation of the Phi Coefficient", para. 1). The

Cramer's V value, similar to the phi coefficient, is recommended for correlations between

two sets of categorical data that are not both dichotomous (Pallant, 2010; Simon, 2005),

as was the case for comparisons between type of HS and the dichotomous variables in the

study.

Therefore, the analysis revealed only some significant findings (see Table 14). A

phi coefficient of .254 (*p* = .001) between CLINICALPvsF and NCLEX-RNPvsF showed

no correlation according to Simon's (2005) classification table. CLINICALPvsF and

PROGPvsF2 comparisons identified a phi coefficient of .517 (*p* = .000), thus indicating a

slight relationship between these two variables (Simon, 2005).

Table 14

Phi Coefficient Correlations between Nominal-Level Variables

Variable	CLINICALPvsF	PROGPvsF2	NCLEX-RNPvsF	HS
CLINICALPvsF		.517**	.254**	.219*
PROGPvsF2			.127	.189
NCLEX-RNPvsF				.180

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

Logistic Regression

The key components of the analysis for this nonconcurrent prospective study were the step-wise logistic regression procedures conducted to identify how each of the independent variables of Cumulative fall semester GPA; overall English, science, and mathematics GPA; type of high school education; clinical achievement; and nursing program achievement predicted the outcome of NCLEX-RN success (Tabachnick & Fidell, 2007). Multiple tests using the SPSS (2009) computer program were run to verify the findings and to consider alternative approaches to the sequence of variables entered into the logistic regression by using both forward and backward tests of the likelihood ratio and by entering all of independent variables into the model as an entire group. The TOEFL variable was also tested using logistic regression, as a dependent case (Cohen, 1969),because there was only a small portion of the study's sample of student files that contained TOEFL scores.

All variables entered together. The first logistic regression model entailed the entrance of all the independent variables, excluding TOEFL scores, together as a group (Table 15). The full model ($n = 165$) was significant (-2 Log likelihood = 94.094, $X^2 =$ 15.36, *d.f.* = 7, $p = .032$) with the *p*-value at less than .05 (Mertler & Vannatta, 2010). Correct classification was achieved for 89.1% of the cases, and there was variability between the constant and full models by approximately 9-18%, according to the Cox and

Snell R Square (.089) and Nagelkerke R Square (.183) statistics (Pallant, 2010). Pallant

(2010) and McPherson (2010) indicated that these R-square statistics are "pseudo" values

and so must be interpreted carefully. The specificity and sensitivity statistics of the full

model's classification table revealed that 16 students who were predicted to fail the

NCLEX-RN actually passed, and that 146 of the students who were predicted to pass did

indeed pass the examination. The Hosmer and Lemeshow test (X^2 = 7.295) showed a

goodness of fit value of .505, which is above .05, thus indicating that the model was a

good fit (Pallant, 2010). The Wald test, showing the probability of correct placement of

the predictor variables (Tabachnick & Fidell, 2007), specified that the only significant

variable ($p < .05$) in the model was the ScMaEnGPA (estimated coefficient value [b] =

2.562, p = .046, Odds Ratio [OR] = 12.966). Thus the findings showed that increases in

ScMaEnGPA values increased the probability of passage of the NCLEX-RN. The odds

ratio of passing the NCLEX-RN showed an increase in 12.966 units for every one unit

increase in GPA values. Likewise decreased ScMaEnGPA values decreased the odds of

NCLEX-RN passage by 0.077.

Table 15

Predicting the Likelihood of NCLEX-RN Achievement Using Logistic Regression with all Variables Entered into the Model Together

	b	SE	Wald	df	p	OR	95% CI
CUMFGPA	-2.215	1.328	2.782	1	.095	.109	[.008, 1.474]
ScMaEnGPA	2.562	1.282	3.993	1	.046*	12.966	[1.050, 160.077]
HS							
Private Religious	.848	.673	1.589	1	.207	2.335	[.000, .000]
Home School	1.223	.729	2.810	1	.094	3.396	[.000, .000]
GED	18.943	17929.206	.000	1	.999	1.685	[.000, .000]
CLINICALPvsF	1.568	1.043	2.260	1	.133	4.797	[.027, 1.610]
PROGPvsF2	.446	.789	.320	1	.571	1.563	[.136, 3.003]
Constant	19.967	17929.217	.000	1	.999	4.695	

Note. *$p < .05$.

Step-wise, forward. The above logistic regression procedure was then repeated using a forward, step-wise test of the likelihood ratio. The forward likelihood ratio test simply adds each predictor variable to the model one-at-a-time. Table 16 displays the results of the forward logistic regression analysis. The full model of this test ($n = 165$) was statistically significant (-2 Log likelihood = 103.083, $X^2 = 6.375$, $d.f. = 1$, $p = .012$) with the p-value at less than .05 (Mertler & Vannatta, 2010). The model correctly classified 89.7% of the cases, which was slightly higher than the classification of the model where all of the predictor variables were entered together. A small variability of approximately 4-8% between the constant and full-models was achieved by means of the Cox & Snell R Square and Nagelkerke R Square tests. The Hosmer and Lemeshow test ($X^2 = .000$) was "fully parameterized," which can happen when none of the variables left in the model have continuous data (Kleinbaum & Klein, 2010, p. 323). The Wald test resulted in only one predictor variable left in the model, which was significant at less than .05 ($b = -2.338$, $p = .007$, $OR = .097$). The negative logistic regression coefficient indicated that the likelihood of passage of the NCLEX-RN decreased with passage of clinical courses. The odds of NCLEX-RN passage, therefore, decreased by .097 when clinical course passage occurred. A case-wise list showed 14 cases of students who were predicted to pass the NCLEX-RN, but actually failed.

Table 16

Predicting the Likelihood of NCLEX-RN Achievement Using Logistic Regression with a Step-Wise, Forward, Likelihood Ratio Test

	b	SE	Wald	df	p	OR	95% CI
CLINICALPvsF	-2.338	.863	7.335	1	.007**	.097	[.018, .524]
Constant	2.338	.280	69.770	1	.000**	10.357	

Note. ** $p < .01$.

Step-wise backward. By conducting a backward, step-wise logistic regression with the same variables of (a) CUMFGPA, (b) ScMaEnGPA, (c) HS, (d) CLINICALPvsF, and (e) PROGPvsF, it was noted that the final model was reduced to exclude HS and PROGPvsF (see Table 17). The backward test of the likelihood ratio allows all of the predictors to be entered into the equation from the start and then it eliminates the least predictive variables (Mertler & Vannatta, 2010). With this method (n = 165), the model again was able to correctly classify 89.7% of the cases. The model was statistically significant (-2 Log likelihood = 98.262, X^2 = 11.196, df = 5, p = .048). Using the Cox & Snell R Square and Nagelkerke R Square values, the variability between the final and constant models was about 7-14%. The Hosmer and Lemeshow goodness-of-fit test indicated a good fit (X^2 = 6.070, df = 7, p = .532). The components of the final step in the backwards step-wise model showed that CUMFGPA, ScMaEnGPA, and CLINICALPvsF remained; however only the ScMaEnGPA and CLINICALPvsF predictors had significant values at p < .05. First, the ScMaEnGPA variable (b = 2.593, p = .041, OR = 13.364), therefore, showed that as GPA values increased in the science, mathematics, and English courses combined the odds of passing the NCLEX-RN increased by 13.364 units. By reversing the odds ratio (1/13.364), the findings told me that as the GPA values decreased the odds of passing the NCLEX-RN increased by only about .075. The logistic regression statistic for CLINICALPvsF was again negative in the backward step-wise test (b = -2.072, p = .022, OR = .126). The odds of passing the NCLEX-RN decreased by about .126 for those students who passed their clinical courses.

Table 17

Predicting the Likelihood of NCLEX-RN Achievement Using Logistic Regression, Step-Wise Backward, Likelihood Ratio Test

	b	*SE*	Wald	*df*	*p*	*OR*	95% CI
CUMFGPA	-2.110	1.309	2.599	1	.107	.121	[.009, 1.577]
ScMaEnGPA	2.593	1.269	4.172	1	.041*	13.364	[1.110, 160.838]
CLINICALPvsF	-2.072	.907	5.219	1	.022*	.126	[.021, .745]
Constant	1.108	1.804	.377	1	.539	3.028	

Note. *$p < .05$.

Centered and combined variables. As my Pearson product moment correlation analyses showed significant relationships between (a) CUMFGPA and ScMaEnGPA (r = .887, p < .001); (b) CUMFGPA and ClinicalPvsF (*r* = .228, *p* <.001), and (c) ScMaEnGPA and ClinicalPvsF (*r* = .250, *p* < .001), I sought to conduct a logistic regression that combined and/or centralized these variables. According to Tabachnick and Fidell (2007), a researcher can create multicollinearity when continuous variables are not centralized. According to the authors, centralization will not change the actual correlation between the two independent variables but will instead change the value of the coefficient in the logistic regression test. A continuous variable can also be combined with a discrete variable in a logistic regression equation to help reduce multicollinearity (Kleinbaum & Klein, 2010). The CUMFGPA data was centered by subtracting the mean value (*M* = 3.26) from the actual GPA value. Likewise the ScMaEnGPA data was centered by the subtraction of *M* = 3.13 from each GPA value in the list of data. The parameters for the dichotomous clinical variable included the codes of "0" for failure of a clinical course and "1" for passage of all clinical courses in the program. Out of 231 student files, 200 (86.6%) records showed passage of clinical courses and 31 records (13.4%) showed failure in the clinical area. After centralization of the variables,

CUMFGPA was combined with CLINICALPvsF by multiplying the two variables

together (CUMFGPA x CLIN); and similarly, the ScMaEnGPA variable was multiplied

with CLINICALPvsF (ScMaENGPA x CLIN). Following these changes, a new logistic

regression procedure was conducted (see Table 18). A forward, step-wise test of the

likelihood ratio revealed a statistically significant model (n = 165, -2 Log likelihood =

103.083, X^2 = 6.375, df =1, p = .012). As was the case with the backward, step-wise

model, the centralized and combined variables' model also classified 89.7% of the

student files correctly. The Hosmer and Lemeshow Test had a X^2 value of .000, and the

only significant variable remaining in the final model was CLINICALPvsF by itself (b =

-2.338, p = .007, OR = .097). Thus, the results were identical to the first forward, step-

wise analysis and so centralizing the GPA values and combining variables that had

significant correlations did not alter the results of the logistic regression analysis.

Multicollinearity, therefore, was not identified as a difficulty in this particular study.

Table 18

Predicting the Likelihood of NCLEX-RN Achievement by Centralizing and Combining
Variables

	b	SE	Wald	df	p	OR	95% CI
CLINICALPvsF	-2.338	.863	7.335	1	.007**	.097	[.018, .524]
Constant	2.338	.280	69.770	1	.000**	10.357	

Note. ** p < .01.

Deleted cases. Next, I conducted a logistic regression test that deleted the 14

cases of students who were predicted to pass the NCLEX-RN, but actually failed the

examination, to see how the analysis would change. In this test, a step-wise, forward test

of the likelihood ratio was once again conducted. This test could accurately classify 98%

of the cases and again the only variable remaining in the final model was

CLINICALPvsF, but this time the results were not significant (b = -21.203, df = 1, p = .995, OR = .000). Therefore it was determined that the best logistic regression model involved a step-wise approach. The outcome indicated that NCLEX-RN achievement was best predicted by success in clinical courses as evidenced by a negative regression coefficient for both the forward and backward step-wise procedures, which showed that the probability of NCLEX-RN achievement decreased with the students' passage of clinical courses.

Dependent case of TOEFL scores. Finally, logistic regression tests were conducted for the cases that included TOEFL (n = 9) and TWE (n = 7) values. As the sample size turned out to be smaller than the necessary calculated power of n = 13, as discussed in chapter 3, the findings were not necessarily adequate by which to base any reliable conclusions related to the population of individuals that have TOEFL scores and an NCLEX-RN achievement outcome. However results of the logistic regression analyses are displayed in Table 19. Logistic regression of the TOEFL variable in relation to NCLEX-RN achievement was statistically significant (-2 Log likelihood = .000, X^2 = 6.279, df = 1, p = .012). Furthermore the Hosmer and Lemeshow test revealed a good fit (X^2 = .000, p = 1.000). The predictability test accurately classified 100% of the cases; however, of the nine cases, only one failed the NCLEX-RN. Thus the regression coefficient was not significant (b = 2.519, p = .995, OR = 12.412). On the other hand, regarding the TWE values (n = 7), the logistic regression test was 85.7% accurate in predicting NCLEX-RN passage. All seven of the students passed the examination, and only one student that was predicted to fail the test actually passed it instead. Therefore the logistic regression of the TWE scores was not a significant test (-2 Log Likelihood =

5.569, X^2 = .172, df = 1, p = .678) and a nonsignificant, negative coefficient (b = -.612, p

= .685, OR = .543) indicated that there was a decreased odds for having low TWE scores

yet passing the NCLEX-RN. Therefore, the models that included TOEFL and TWE

scores did not predict achievement on the NCLEX-RN.

Table 19

Predicting the Likelihood of NCLEX-RN Achievement by TOEFL and TWE scores

	b	SE	Wald	df	p	OR	95% CI
TOEFL	2.519	392.505	.000	1	.995	12.412	[.000, .000]
Constant	-394.317	61846.577	.000	1	.995	.000	
TWE	-.612	1.507	.165	1	.685	.543	[.028, 10.412]
Constant	4.137	6.054	.467	1	.494	62.597	

Note. ** p < .01.

Summary

In this chapter, I sought to identify an answer to the research question of what

individual or combined academic variables: Cumulative Fall Semester GPA; overall

prenursing science, mathematics, and English GPA; type of high school background;

TOEFL score; clinical pass or fail, or nursing program on-time completion or attrition,

best predicted the outcome of NCLEX-RN pass or fail? Analyses were conducted in

multiple phases and included descriptive statistics, correlations, and logistic regression

procedures. First the descriptive statistics considered means and standard deviations for

the continuous variables involving GPA values and TOEFL scores, and frequencies for

the categorical variables of type of high school and clinical, program, and NCLEX-RN

achievement. The mean scores for both the cumulative Fall Semester and overall

prenursing science, mathematics, and English GPA variables were very close

(CUMFGPA: M = 3.26, SD = 1.80; ScMaEnGPA: M = 3.13, SD = .572). Both

categories were negatively skewed, therefore, showing that most of the student records

had GPA scores that fell above the median figures for each variable. A negative Kurtosis for both GPA categories revealed that the shape of the curve was relatively flat and indicative of a wide range of figures.

Correlations between each of the variables were also conducted prior to the regression analyses. Significant, positive correlations were identified between CUMFGPA and ScMaEnGPA. Both GPA groups also positively correlated with clinical and program pass and fail. Clinical pass and fail positively correlated ($p < .01$) with program success and with the study's outcome variable of NCLEX-RN success. When step-wise logistic regression procedures were performed, clinical performance was again linked to the NCLEX-RN as the best predictor ($p < .01$) of NCLEX-RN achievement but with a negative association. When all the variables, excluding TOEFL scores, were entered into the regression equation as a group, the overall science, mathematics, and English GPA variable was found to be a significant, positive ($p < .5$) predictor variable to NCLEX-RN achievement. In interpreting the step-wise logistic models, as indicated by the negative regression coefficients in the forward and backward step-wise procedures conducted, the models showed that an increase in clinical passage decreased the probability of NCLEX-RN passage.

Chapter 5: Summary, Conclusions, Recommendations, and Implications

Introduction

The purpose of this study was to identify any prenursing and/or intraprogram variables that best predicted the passage or failure of the NCLEX-RN. A multivariate logistic regression was conducted, along with analyses of descriptive statistical measures and correlations to answer the research question: How do the individual or combined variables of (a) cumulative Fall Semester GPA, (b) overall prenursing science, mathematics, and English GPA, (c) type of high school background, (d) TOEFL score, (e) clinical pass or fail, or (f) on-time program completion versus program failure, best predict the outcome of NCLEX-RN passage or failure? Passage of the NCLEX-RN examination, which is taken at the end of a student's formal nursing education, is required for entrance into the nursing profession. Furthermore there remains a severe shortage of nurses, and that shortage is perceived to worsen over the next 10 years or longer (AACN, 2010a). Nursing program leaders and faculty need to continue to strive to identify ways to retain nursing students and ultimately help them to be successful in nursing programs and on the NCLEX-RN, as a means to help reverse the nursing shortage (NLN, 2009). Some current studies have considered academic and/or nonacademic factors as predictors of NCLEX-RN achievement (Abbott et al., 2008; Lauchner et al, 2008; Strayer, 2010; Vandenhouten, 2008); however no apparent study conducted research in a BSN nursing program with the same multivariate model that this study used. In fact, type of high school education, TOEFL score, and clinical pass or fail in relation to NCLEX-RN success were factors not yet considered in recent literature. This study contributes, therefore, to current research in this area. Morin (2006) and

Murray et al. (2008) stressed the importance that researchers consider multiple predictors rather than only one predictor when conducting studies related to the assessment of variables linked to nursing program progression and completion. Harding (2010) found that a combination of academic factors and not just a look at standardized tests alone needs to be considered in research of this type. Thus this study focused on the examination of several academic predictor variables in relation to NCLEX-RN achievement.

The findings revealed that the CLINICALPvsF variable, referring to students' achievement of intraprogram clinical courses, was found to have a significant, negative association as a predictor to NCLEX-RN achievement when forward and backward step-wise logistic regression procedures were tested. Backward, step-wise and simultaneous entry of the variables in the logistic regression procedures conducted in this study also revealed a moderately ($p < .05$) positive, significant association between the ScMaEnGPA value and passage of the NCLEX-RN. Upon examination of bivariate associations, clinical achievement also positively correlated with program completion, which was not an unrealistic finding considering that failure of a clinical course in the program of study automatically prevents a student from achieving on-time completion of the nursing program.

Other findings of this research showed the existence of positive correlations especially between prenursing GPA values and clinical courses/nursing program success. The positive results showed that an increase in a student's GPA was linked to passage in these areas. Because the assortment of academic variables studied was not identical to other research of this kind, it was difficult to get a grasp of the global perspective of the

findings. Furthermore, prenursing GPA values linked to overall BSN program success was not well studied in the current knowledge base. Newton et al. (2007) noted that students' GPA prior to program admittance was associated with first-year program success. My review of the literature revealed that prenursing GPA in BSN programs was more commonly assessed in relation to the NCLEX-RN. For instance, Landray et al. (2010) and Campbell (2006) identified that GPA combined with various science courses was better predictive of NCLEX-RN success. However, my study did not specifically assess course grades, and the GPA variables evaluated provided no significant correlations with NCLEX-RN performance.

A more detailed description of my study's findings is presented further. The remainder of this chapter, therefore, entails the interpretation of findings, implications for social change, recommendations for action, recommendations for further research, and concluding comments.

Interpretation of Findings

Some notable findings were identified in this current study. A descriptive interpretation of these findings is presented further. The findings are relayed according to the types of analyses studied. Descriptive and correlation findings will be addressed first followed by the logistic regression outcomes. The ways in which my findings related or did not relate to the current literature are also discussed.

Interpretation of Descriptive and Correlation Studies

Data from 231 files were analyzed of students who began the nursing program at a small, private school during the 2006 and 2007 school years. Descriptive statistics revealed that from a possible range of 0.00 to 4.00, the study's CUMFGPA values were

1.80 to 4.00. The mean value was 3.26 (*SD* .525), thus indicating from negative

skewness and kurtosis values, that the majority of students scores in this category were

above the median score of 3.27, which translates to a B- letter-grade. Similar findings

were identified for the ScMaEnGPA variable. The study's range in this case was 1.91 to

4.00—slightly higher than the CUMFGPA; however the mean score was 3.13, again

slightly lower than the CUMFGPA score. Likewise, the skewness and kurtosis values for

the ScMaEnGPA were negative with a median value of 3.09 (B- letter-grade). Although

no outliers were identified in any of the descriptive tests, I found that the lower range of

GPA values, especially for the ScMaEnGPA category, included scores below 2.00. The

admission procedures of the program studied require that the students pass the courses

that make up the ScMaEnGPA value with least a C- grade (or 2.00 GPA). For reasons

unknown to me, a student must have been admitted into the program who did not meet

the stated criteria. I surmised that it was possible that waitlisted students were permitted

admission, perhaps due to some eligible students forfeiting their positions in their

program admittance. Further assessment of individual cases identified that three students

with CUMFGPA values below 2.00 (1.80, 1.85, and 1.94 respectively) and one student

with a 1.91 ScMaEnGPA score all failed courses in the nursing program. The course

failures of these students, furthermore, occurred within the first year of the program.

This finding is consistent with Frazor's (2004) work where GPA values achieved prior to

admission were positively linked with students' success in the first year of the nursing

program. In an older study by Beeson and Kissling's (2001), they found that grades

below the C- range were consistent with failure of the NCLEX-RN. Despite course

failures, however, my findings also revealed that the low GPA students discussed above did indeed pass the NCLEX-RN examination on their first attempts.

The challenge for nursing programs entails a balance between making admission criteria stringent enough to limit enrollment to high academic achievers and basing enrollment on applicants' nonacademic qualities such as propensity toward the care of individuals (Karstadt, 2007), to name an example. Moen and Tjelta (2010), in their assessment of college admissions based on academic achievement in a Norwegian university, noted that admission policies tended to be less stringent when there was not as much concern for admittance of the most academically advanced students. Lankester (2006), in relation to acceptance of college applicants, stated, "Distinguishing the very best from the very good inevitably requires a great deal of effort" (para. 2). The developers of college admission procedures, therefore, should not only be so concerned about gaining a particular number of students, but also about finding ways to eliminate those students who are not likely to be successful in their educational endeavors (Truell & Woosley, 2008). Ali (2008) found that academic variables best predicted nursing program success compared to nonacademic variables in a study that took place at a Pakistan University. Pryjmachuk et al. (2009) also noted that a student's academic status on admission to the nursing school was linked to program success. Findings from bivariate correlations and logistic analyses in my study, as discussed further, also indicated that the prenursing academic standing of students should not be completely disregarded.

Correlation studies, with a specific look at the Pearson Product Moment coefficient (r), showed that the two variables of CUMFGPA and ScMaEnGPA were

significantly related to each other ($r = .887$, $p < .01$). The significant, positive, link was most likely due to the fact that the ScMaEnGPA also encompassed subjects, such as Biology, Chemistry I, and English I, which are included among the subjects that made up the CUMFGPA score.

CUMFGPA and ScMaEnGPA also had positive, significant correlations ($p < .01$) with clinical and program passage versus failure. The mean GPA values of those that failed clinical ($n = 31$) in the CUMFGPA and ScMaEnGPA categories were 2.96 and 2.77 respectively. These values were lower than the mean values for those that passed clinical ($n = 200$) from the same two categories ($M = 3.31$ and 3.19 respectively). CUMFGPA and ScMaEnGPA values were also lower among those that failed the program ($n = 76$, $M = 2.90$ and 2.71, respectively) compared with those students who passed the program ($n = 139$, $M = 3.46$ and 3.36, respectively). The positive correlations showed that as GPA values increased, passage of the clinical and nursing program areas also increased. When the TOEFL/TWE and type of high school variables were excluded from the correlation study, due to missing data, the findings showed that only the ScMaEnGPA value positively correlated ($p < .05$) with clinical achievement; however both the CUMFGPA and ScMaEnGPA positively correlated ($p < .01$), with a stronger link, to nursing program (PROGPvsF) success.

Descriptive statistics involving frequencies and crosstabulations also revealed some interesting findings in the current study. The majority of the study's sample ($n = 231$) were from public (35%), private religious (31%), or home-school (about 31%) high school educational systems. Only one student had attended a private, nonreligious high school institution and almost 3% of the sample received their secondary training via GED

certification. Those with GED qualifications had the highest mean GPA value in both the

CUMFGPA and ScMaEnGPA categories ($M = 3.59$ and 3.58 respectively). Home-

school, followed by private religious, public, and finally private, nonreligious school

represented the order for the next highest values for the CUMFGPA category (see Table

8). For the ScMaEnGPA variable, following the GED students, private, nonreligious;

home-school; private, religious; and public were the order of the best mean GPA values

(Table 8). Out of the 231 files, in comparing type of high school (HS) with clinical

achievement (CLINICALPvsF), the majority of the failures in this category, occurring

among a total of 31 students (see Table 10), or 13% of the sample, were represented by

students who attended public school (6%), followed by private, religious (5%), home-

school (2%), and private, nonreligious ($< 1\%$) students respectively. Likewise 200

students, or 87% of the sample, passed their clinical courses and again the majority of

students in this category were public school and home school attendees (approximately

29%); afterward, private, religious (26%), and GED (3%) representatives.

Out of a total sample of 215 student files, 76 students, or about 35%, failed to

complete the nursing program in the standard timeframe. Program failure was highest

among the students who attended private, religious schools (14%), followed by public

schooled (12%) and home-schooled students (8%). Less than 1% of the students each

from the private, nonreligious and GED categories failed the nursing program (see Table

10). Upon examination of on-time program completion, program passage was found to

be highest among the public high school attendees (23%), followed by the home schooled

(22%), private, religious (17%), and GED (2%) attendees. Of the total sample of student

files ($n = 165$) for the NCLEX-RN achievement variable, 6% of the students who failed

the NCLEX-RN had received public high school education, and approximately 2% each were from private, religious and home-schools. NCLEX-RN passage was highest among home-schooled students (30%). About 28% of the public school attendees, 28% of private, religious school attendees, and 3% of those that received their education via the GED method also passed the licensure examination. Less than 1% of the students each from the private, nonreligious and GED categories also failed the nursing program and thus did not have opportunity to take the NCLEX-RN. Correlation studies, by means of Pearson Product Moment Coefficients, revealed a significant, positive relationship ($p <$ .05) between HS type and CUMFGPA. No apparent studies prior to this one had compared type of high school attended to success in nursing education. In fact, there were no apparent studies in my search of academic databases that showed analysis of college GPA in relation to individuals receiving the GED. However Gülleroğlu (2008), in his study conducted in the setting of a Turkish University, found that relating to general university education, high-school GPA and "type of high school" (p. 30) were significantly linked to academic performance. An older study, conducted by Horton (1998), which compared public and private high schools along with the acquisition of a high school diploma versus GED certification, noted that multivariate discriminate analyses revealed that type of high school was predictive of success, as evidenced by letter grades above or equal to C, in a standard science course, during the first year of college, specifically. However his sample contained no students who had received their GED, and the discriminate tests showed no significant correlations between high school type and success in another science course nor the mathematics and English courses tested.

Clinical passage positively and significantly ($p < .01$) correlated with on-time completion of the program. Passage of the program was better represented by students who passed clinical. This finding made perfect sense when one considered that program success, according to the operational definition discussed in chapter 1, is indicative of on-time completion of the program in the standard timeframe. Failure of a clinical course in the study's program is typically a setback for a student. Out of a total of 215 students who completed the program in the standard amount of time, 64% of these students also passed clinical. Twenty-two percent of the students who failed the program had passed clinical; whereas one student (less than 1% of the sample) who had failed clinical had completed the program in the normal timeframe. Thus I supposed that special allocations were made for this student; and the program's DON, without providing any identifying information, confirmed this supposition as valid. Likewise clinical achievement also positively correlated ($p < .01$) with NCLEX-RN achievement, showing that NCLEX-RN passage increased as the numbers of those that passed clinical increased; however Simon's (2005) r-value classifications revealed little to no association between these two variables. Out of a total of 165 students who sat for the NCLEX-RN examination, 88% of the students who passed the NCLEX-RN also passed clinical; whereas about 2% of the students who failed the NCLEX-RN passed clinical. However 8% of the student files indicating NCLEX-RN passage actually had failed clinical courses and about 2% of the students failed both the NCLEX-RN and clinical courses. Only one qualitative study, conducted by Blackman et al. (2007), was found in the recent literature that considered clinical performance in relation to nursing program achievement. The authors found that

students who perceived themselves as being adept to practice in the clinical setting with autonomy were more likely to be successful in the nursing program.

Final descriptive and correlation studies of the TOEFL and TWE combined with the ER (labeled TWE) scores, as discussed in chapter 4, were also conducted. Sixteen students had a TOEFL score. The mean value of that score was 193.19 (Range = 140-273). The scores were positively skewed but had a negative Kurtosis, thus showing that although the numbers were well-distributed, more of the scores tended to fall below the mean value. The scores for the computerized version of the TOEFL test range from 0 to 300 (ETS, 2005). A mean of 193, therefore, is well below O'Neill, Marks et al.'s (2005) recommendation that 220 be the minimum score for NCLEX-RN candidates. However the TOEFL is taken by ESL students prior to college admission and so may not necessarily represent their scores at the end of the nursing program.

Only seven student files contained TWE scores. The mean value of these scores was 3.71 (Range = 2.5-5.0). The possible scores that students can achieve on this test range between 1 and 6 (ETS, 2009). The Commission on Graduates of Foreign Nursing Schools (CGFNS) requires a minimal TWE score of 4.0 for nurses who were trained in foreign nursing schools and who wish to practice in the United States. However, other than a recommendation by the NCSBN (n.d.b) of a TWE minimal score standard of 4.5, there does not appear to be any TWE requirements for ESL NCLEX-RN candidates trained in U.S. institutions. All seven of the students in my study that took the TWE had attended public schools, obviously showing a significant correlation ($p < .01$); and of the 16 TOEFL students, 15 were also representative of public schools. Otherwise no TOEFL and TWE scores showed any significant correlations to the other variables in the study.

No apparent studies prior to this one had conducted correlations between TOEFL scores and program achievement. I found it of interest to include the TOEFL as a possible predictive variable to NCLEX-RN success. Although the results were not significant, possibly due to the small sample size ($n = 9$), some of the findings were worthy of comment. There was a 50% clinical failure rate among the 16 students who took the TOEFL examination. Language barriers may indeed affect students' clinical performances, and clinical failures consequently prevent these students from completing the program in the expected timeframe. Of the nine TOEFL students who took the NCLEX-RN, however, only one student failed the examination. Hard work and effective study skills, despite language barriers, on the part of these ESL students may be attributed to their achievements on the examination.

Interpretation of Logistic Regression Analyses

Multivariate logistic regression analyses revealed some interesting findings. Logistic regression was specifically conducted to determine the likelihood that several factors would predict achievement on the NCLEX-RN. The independent variables assessed included CUMFGPA, ScMaEnGPA, type of high school education, clinical course success, and program completion. Two additional logistic regression tests were conducted to test the level of prediction that the TOEFL and TWE would have toward success of the NCLEX-RN. Records classified for these variables were considered dependent cases as only a select portion of the sample ($n = 9$ and $n = 7$ respectively) had NCLEX-RN scores along with records containing either the TOEFL or TWE scores, or both. The Omnibus Tests of the full model with all variables, excepting TOEFL and TWE, entered into the equation together was statistically significant at $p < .05$ with x^2 at

15.364 ($n = 165$, $df = 7$, $p = .032$). The model was able to show differences between those students who passed the NCLEX-RN versus those that failed the examination. Approximately 8%, according to the Cox and Snell R Square, and 18%, according to Nagelkerke R square, of the model's variance was explained. Further, an overall 89.1% of the cases were classified correctly. However the full model did a better job at classifying those that passed the NCLEX-RN (98.6%) than those that failed the examination (5.9%). This finding was consistent with other studies that used logistic regression procedures and found independent variables to be better predictors of NCLEX-RN passage than NCLEX-RN failure (Campbell, 2006; Muecke, 2008; Vandenhouten, 2008). In this current study, the ScMaEnGPA was a significant predictor ($p < .05$) of the NCLEX-RN showing an odds ratio of 12.966 (see Table 15). This result indicated that as GPA scores for the students' science, mathematics, and English courses increased, by more than 12 times, the likelihood of passing the NCLEX-RN also increased. Conversely, the model informed me that with a decrease in these GPA values, the odds of passing the NCLEX-RN increased by only 0.077. The full model also showed that 16 of the students who were expected to have failed the NCLEX-RN did indeed pass the examination. The group of subjects that made up the ScMaEnGPA was not necessarily congruent with the nursing subjects of other studies that assessed prenursing GPA in relation to NCLEX-RN achievement.

The literature contains varying findings about GPA in relation to the outcome of NCLEX-RN performance. Campbell (2006) found that the students' preentrance and science GPA values were significant predictors of passage of the NCLEX-RN. The prenursing grades that made up Campbell's GPA variable, however, were not identical to

the course grades that made up the GPA values in my study. A student's grade in pathophysiology, an intraprogram science course in Campbell's (2006) study, was likewise found to be a strong predictor of passage of the licensure examination. Pathophysiology, not tested in my study, is correspondingly an intraprogram science course in my program of study and thus was not included in the variables that made up the science portion of the students' GPA values assessed. Similar to my findings, other researchers found that the higher the overall program GPA, the better likelihood of NCLEX-RN passage (Abbott et al., 2008; Gilmore, 2008; Humphreys, 2008; Jeffreys, 2007; Uyehara et al., 2007). However, the nursing programs assessed by these researchers were not necessarily comparable to my study's BSN program. Abbott et al.'s (2008) study took place in an accelerated BSN program; whereas Gilmore (2008) and Jeffreys's (2008) research studies were inclusive of students in ADN programs. Thus it might be difficult to adequately compare findings when program expectations and entrance criteria are not the same as those for regular BSN programs.

Of those researchers in the current literature who did assess GPA in relation to the NCLEX-RN outcome for BSN programs, Vandenhouten (2008) recognized that decreased GPA was a significant link to NCLEX-RN failure but that there was no significant association between GPA and passage of the NCLEX-RN. While Vandenhouten (2008) assessed the overall BSN nursing program GPA values as a predictor variable, however, my study specifically evaluated prenursing GPA values. Neither was GPA found to be a significant predictor in Frith et al.'s (2008) work. Again, Frith et al. (2008) evaluated the overall program GPA values of the students in their study rather than their preadmission GPA scores.

When step-wise multivariate logistic regression models were conducted with the same variables as discussed above, and by using both forward and backward techniques, the outcome was quite different than with the full model. The step-wise forward logistic regression also revealed a statistically significant (p < .05) model (x^2 = 6.375, df = 1, p = .012). The model was able to correctly classify 89.7% of the overall cases and, more importantly, correctly classify 100% of those that passed the NCLEX-RN. The Cox and Snell R square and Nagelkerke R Square measures respectively showed about a 4-8% variance between the constant and step-wise forward models. Furthermore only one predictor variable, CLINICALPvsF, remained in the final model and was found to be statistically significant (b = -2.338, p = .007, OR = .097, see Table 16). Even when the CUMFGPA and ScMaEnGPA values were centralized and combined into a model, a forward, step-wise procedure revealed an identical model to the regular forward, step-wise model (see Table 18). The negative coefficient in the Wald test, at p < .05, showed that the odds of passing the NCLEX-RN when clinical was passed decreased by .097; whereas some students who should have passed the NCLEX-RN due to passage of clinical did in fact fail the examination. In fact, case-wise probabilities indicated that 14 students who were predicted to pass the NCLEX-RN failed the examination instead. The provision of rationales for NCLEX-RN passage or failure among students would go beyond the findings that my data analyses revealed. Nevertheless I believed that passage of the examination when failure should have occurred due to failure of clinical could possibly be explained by the fact that students who failed clinical were required by the nursing program to repeat the entire course before progressing in the program. Course repetition possibly allowed the students to gain more experience and receive remediation

of the material. On subsequent tries, many of the students were able to complete the

nursing program, although not within the regular timeframe. An alternate explanation

could be that some of the students who passed the NCLEX-RN yet failed a clinical

course did so because they were strong in their academic knowledge yet weak in their

clinical skills. Some students appear to do well with their book knowledge but really

seem to struggle when it comes to making appropriate decisions and communicating with

patients in the clinical setting. A nonacademic attribute to being a satisfactory nurse,

according to Catlett and Lovan (2011), is the possession of strong decision-making skills

that are acquired through clinical practice. Clinical performance in relation to NCLEX-

RN achievement was not apparently documented in the current literature. Simon's

(2006) study, however, compared clinical performance among other factors, to

achievement on an NCLEX-RN preparatory test and found that clinical did not

significantly relate to the test.

Clinical achievement was also a significant predictor in the final model when a

multivariate, step-wise, backward approach was used in the logistic regression analysis.

The best model correctly classified 89.7% of the cases; thus producing a result that was

identical to the step-wise, forward logistic regression model discussed earlier. However

in this case the model was able to correctly classify 98.6% of the cases that passed the

NCLEX-RN and only 11.8% of the cases that failed the examination. Table 17 displays

the Wald test figures for the final model. Clinical achievement, like the forward model

above, had a negative coefficient (b = -2.072, p = .022, OR = .126) indicating that

passage of clinical courses decreased the likelihood of NCLEX-RN passage by a variance

of about 7-14%, according to the Cox and Snell R Square and Nagelkerke R square

figures respectively. The Hosmer and Lemeshow goodness-of-fit test indicated that the

model was indeed a good fit ($x^2 = 6.070$, $df = 7$, $p = .532$). However unlike the step-wise,

forward model, the step-wise, backward logistic regression model showed that the

ScMaEnGPA value was also statistically significant ($p = .041$), but to a slightly lesser

degree than the clinical achievement variable. Therefore, the inclusion ScMaEnGPA in

the model was similar to the full model. In this case, the Wald test results for

ScMaEnGPA indicated a positive coefficient ($b = 2.593$, $OR = 13.364$) showing that a

rise in GPA values increased the likelihood of NCLEX-RN passage by a factor of more

than 13.

Finally, when TOEFL and TWE scores were entered into logistic regression

models separately from the other independent variables, the findings in relation to the

NCLEX-RN were not statistically significant (see Table 19). The models displayed

correct classification of 100% of the TOEFL cases and 85.7% of the TWE cases.

However, the sample sizes for each of these variables (TOEFL, n = 9; TWE, n = 7) was

less than what I had calculated to have an appropriate effect or power in this study.

Furthermore it was found that all but one of the students with TOEFL scores that took the

NCLEX-RN failed the examination. All seven of the students who had TWE values

passed the NCLEX-RN. Even so, the findings could not be compared to the current

knowledge base due to the lack of studies addressing TOEFL scores as a predictor

variable to NCLEX-RN achievement. Only Whitehead (2006) noted that critical thinking

ability in relation to NCLEX-RN success was not different among students who spoke

English as their primary language versus ESL students. Therefore more research needs to

be conducted in nursing programs that have a larger population of students with

admission TOEFL scores to determine any relationships to nursing program or NCLEX-RN performance.

The study followed the tradition of prior research (Borden & Abbott, 2002) that examined possible predictors of NCLEX-RN success based on concerns related to attrition and/or the ongoing nursing shortage (Esper, 2009; Fortier, 2010; Landry et al., 2010; Strayer, 2010; Wolkowitz & Kelley, 2010). Furthermore, the "Seidman Retention Formula...RETention = Early $_{ID}$entification + (Early + Intensive + Continuous)$_{Inter_{v}}$ention" (Seidman, 2005, p. 296), was used as a guide for this study. Seidman (2005) implicated that recognizing academically weak students early on in their programs of study would help educators to provide the necessary assistance to have them achieve successful outcomes. The outcome in Seidman's (2005) formula referred to a student's retention through completion of his or her academic program. However the outcome of the current study was adapted to include successful achievement of the NCLEX-RN. Furthermore a conceptual model was illustrated in chapter 1 to show the intended direction that students take through the nursing program from admission through graduation and ultimately the NCLEX-RN. The ultimate outcome that identifies student success in nursing education beginning with admission into a nursing program is completion of that program and passage of the NCLEX-RN, the prerequisite for nursing licensure and practice. Therefore the purpose of this study was to identify prenursing and intraprogram academic variables, with a multivariate approach, that would predict a student's pass or fail status on the NCLEX-RN.

Limitations

This study contained several limitations. First of all, a convenience sampling was used. The sample consisted of archived data of students or graduates that entered the nursing program during the 2006 and 2007 academic years. Their information was retrieved from the college's database and then passed on to me in a spreadsheet format. I did not conduct a comparative analysis of similar data from other nursing programs or even other types of educational programs within the same college setting. Second, this study only assessed a select group of academic variables as predictors to NCLEX-RN achievement. The study, therefore, did not include the entire spectrum of possible predictors, including demographic and nonacademic factors that may have contributed to the final outcome.

Third, although clinical performance was found to be a predictor of NCLEX-RN passage, it is important to note that the clinical success of these students, as discussed in chapter 1, was measured by subjective criteria. The student's ability to care for patients is assessed by a set of guidelines that various instructors within the practice setting use to determine if a student's practice is safe and effective. Although, the students receive a variety of experiences in different areas of nursing practice, it is not feasible to provide students with identical opportunities.

Fourth, the actual sample size of the study was less than what was originally estimated. Even though the original sample was expected to be approximately 240 student records, the required sample size according to calculations conducted using Buchner et al.'s (2006) program was 111 participants. Therefore the sample size of 165 was adequate for the multivariate logistic regression that did not include the TOEFL and

TWE variables. However the expected sample size of 13 participants according to the same program's computations was not achieved for the TOEFL and TWE logistic regression procedures. Only nine student records represented the TOEFL variable and seven of these records contained TWE scores. Thus the findings for these variables in relation to the NCLEX-RN outcome were not necessarily valid.

Implications for Social Change

Systems attempt to simultaneously change and remain the same (Anderson & Carter, 1978). Anderson and Carter (1978) stated, "If either extreme were reached, the system would cease to exist" (p. 21). A system that is attempting to maintain the standards of excellence in practice and patient-focused care and yet is in constant motion toward betterment is the organizational system of nursing education. Hindrances within nursing education, such as (a) lack of program space (NLN, 2009), (b) insufficient numbers of nursing graduates (AACN, 2009), and (c) graduates who fail the NCLEX-RN after one or more attempts (NCSBN, 2009b), however, are contributing to the nursing shortage, which is posing a major strain on the healthcare needs of society (AACN, 2011).

Ackoff (1978) indicated that for social betterment to occur, leaders of organizations and their followers must use problem solving skills. Problems, according to Ackoff, should be contemplated, analyzed, and viewed from various angles before a final decision toward change is made. Positive social change toward the resolution of the nursing shortage problem could be accomplished by leaders in the nursing education system through their promotion of retention and the prevention of attrition of students within nursing programs, to improve BSN graduation rates and to ultimately foster

achievement on the NCLEX-RN, the benchmark to nursing practice in the United States (AACN, 2011; NLN, 2009). Increased enrollments in nursing programs would optimize the number of nursing graduates from these programs (Baker, 2008). More nursing instructors are also needed to augment the acceptance of eligible nursing school candidates (AACN, 2009).

Despite the selection of the top 120-125 students for admittance into my study's nursing program, the findings showed that some students continued to be unsuccessful in completing the program in the standard timeframe, and other students were unsuccessful on their first-time attempt of NCLEX-RN passage. The current passage rates for the students assessed in this study who completed the NCLEX-RN during the years 2009 and 2010 were 91% and 89% respectively. Although these values were higher than the national averages for first-time test takers of approximately 89.5% for the 2009 and 88.7% for the 2010 years (NCSBN, 2009e; NCSBN, 2010), the nursing program could continue to add graduates to the nursing workforce to help change and alleviate the nursing shortage if 100% passage of the NCLEX-RN was achieved by the program. Specifically the graduation of more BSN-prepared nurses will contribute to the wellbeing of patients. Friese, Lake, Aiken, Silber, and Sochaski (2008) identified in their study about safe nurse-practice environments in surgical oncology that the patient mortality rates were lower among nurses with a BSN-level of education compared to nurses from other undergraduate-level programs.

MacIntyre, Murray, Teel, and Karshmer (2009) expressed that it is important as a means to aid the nursing shortage that nursing education systems seek the most effective ways to prepare students for the workforce and to prevent nursing practice attrition. A

question remains, however, how could BSN nursing programs promote 100% graduation and NCLEX-RN success? This and other studies that examined predictors of NCLEX-RN achievement identified models that showed strong predictive ability of NCLEX-RN passage, but the models were not as effectual in predicting examination failures (Campbell, 2006; Landray et al., 2010; Muecke, 2008; Vandenhouten, 2008). To promote successful achievement in nursing programs and on the licensure examination, nursing program faculty must identify hindrances to successful performance outcomes. Further research needs to be done that looks specifically at links to nursing program and NCLEX-RN failures, specifically. Early identification of students who will likely fail either nursing academics or the NCLEX-RN will assist with the selection of nursing program candidates and/or the implementation of appropriate remediation strategies for struggling students, but will also aspire to assist to increase the number of competent, new graduates that will go out into the nursing workforce (AACN, 2009; NLN, 2009)

Improved performance of students prenursing academics, especially in the areas of science, mathematics, and English also need to be promoted and considered in the selection process for nursing program candidates. In my study, The ScMaEnGPA value was noted to be a significant predictor of achievement on the national licensure examination when all of the independent variables were entered one at a time into a logistic regression equation. Pearson Product Moment Correlations also revealed that CUMFGPA and ScMaEnGPA values were significantly and positively related to the clinical course and program completion variables. Therefore prenursing GPA values should continue to be among the criteria for admission into nursing programs. Extra help courses, especially for students who lack a solid high school background in science

courses, could be implemented to help encourage change in this area. Nursing program leaders owe it to the profession of nursing and to the communities that their graduates serve to produce greater numbers of well-prepared, competent nurses to help fulfill the health needs of society that are unfortunately not being met due to the nursing shortage (Robert Wood Johnson Foundation, 2010).

Recommendations for Action

According to Seidman's (2005) retention formula, the basis for this study, retention within a program takes more than simply recognizing academically weak students. Action must be taken to get those students from academic weakness to achievement of the outcome (Seidman, 2005), in this case achievement being NCLEX-RN passage. From the findings of this study, therefore, I recommend that continued research along the lines of this study occur within the institution in question. Therefore, I plan to share the results with the program of study so that further assessments, planning, and program evaluations could take place (McKenzie, Neiger, & Smelzer, 2005). Other nursing programs could also learn from the results and adapt their own research studies based on the findings of this current study (Esper, 2009; Roat, 2008). Therefore, I hope to seek publication of this study by a peer-reviewed nursing journal so that readers in the field may see the variables that were and were not relative to NCLEX-RN success in my research so that dissemination and replication of the findings could be tried in similar programs of study. Review of research along the lines of this study could also spark the examination of new, untested variables for future research.

The findings of my research are also meant to be useful to the program in study so that remediation measures could be conducted to help struggling students, especially

those that are predicted to fail the NCLEX-RN.   First, my findings indicated that the odds of passing the NCLEX-RN decreased among students who passed clinical courses. These findings, however, do not suggest the promotion of clinical failure to strengthen the relationship.   Instead, I recommend further assessment by the nursing program of a student's long term nursing education success following repetition of an entire clinical course when failure occurs.   The literature lacks any evidence to support the premise that students involved in course repetition receive reinforcement of the course material taught and more time to practice their didactic training in the clinical setting, and thus have improved NCLEX-RN outcomes.   Because my findings indicated that even students predicted to pass the NCLEX-RN can indeed fail the examination, activities that promote passage ought to be practiced among the academically weak and strong students alike. Giddens and Morton (2010) recommended that programs conduct routine evaluations to ensure that their curricula materials are in-line with information covered on the NCLEX-RN.   DiBartolo and Seldomridge (2008) encouraged required remediation activities for students at-risk for failing the NCLEX-RN, and that all students should be considered likely to fail. My study's institution is already utilizing standardized practice examinations to promote NCLEX-RN passage. Assessment of whether or not these tests have predictive ability, as some of the current literature indicates that they do (Nibert & Young, 2008; Uyehara et al., 2007; Yoho et al., 2007), needs to be observed in my program and others that have not yet conducted this assessment.

Second, the overall science, mathematics, and English GPA value was a significant predictor of NCLEX-RN passage.   Thus the higher the GPA score, the greater the likelihood of success on the examination.   The CUMFGPA of the students'

prenursing year, along with grades in science, nursing mathematics, and English courses, and the scores on a standardized entrance test, are used as a part of the current processes that permit the top 120-125 students admittance into the program. Instead of the CUMFGPA, the overall GPA of all prenursing science, mathematics, and English courses, therefore, needs to be considered as a more essential component of the admission procedures. Again, as Truell and Woosley (2008) implicated, admissions should not be about the number of students allowed to enter a program, but about the careful selection of students who will exclude those that will be likely to have poor academic achievements. Future research for the program in question could look specifically at course grades in relation to program and NCLEX-RN achievement, and perhaps alter the minimal standards for course achievement as well. Hopkins (2008) required a C+ course grade as the minimum for a foundational nursing course. Grades above a B- standard were found to be linked to NCLEX-RN success in a few studies (Bentley, 2004; Campbell, 2006; Uyehara, 2007).

Recommendations for Further Research

Even though program completion was not found to be significantly related to NCLEX-RN achievement in this particular study, the descriptive findings indicated that of the 231 students who were admitted to the nursing program during the 2006 and 2007 school years, only 60.2% actually completed the program. About 32.9% of the students failed either academically or clinically, and 6.9% dropped out of the program for reasons unknown to me. Pennington and Spurlock (2010) premised that academic failures result in set-backs and often the need for extra assistance. Therefore more research needs to be conducted within the program of study to assess both academic and nonacademic factors

related to students' achievement in the nursing program and to essentially promote retention of students until the completion of their schooling. For instance, it would also be feasible for the study's nursing program to use clinical pass versus fail as the dependent variable in relation to admission procedures to identify any relationships. Early assistance, through emphasis of additional training to foster basic nursing skills, organization, and confidence could potentially prevent students from failing clinical in the first place and thus promoting their on-time graduation from the program.

Additionally, the study's nursing program and others need to continue to assess and retest program variables to find predictors of NCLEX-RN success. Researchers need to broaden the spectrum to include an assessment of all admission variables including course grades and the prenursing entrance test. More within-program variables could also be an aspect of future study within the current program. This study was only an assessment that included a small number of academic independent variables; however there is an assortment of other variables that have been addressed in the literature that have not yet been considered for the program in question. It would be interesting to identify if other factors such as

- course grades, particularly in Science and English,

- SAT and ACT scores,

- Preceptorship performance,

- Standardized nursing test scores,

- The length of time students take between graduation and sitting for the NCLEX-RN,

- Students' personal health practices,

- Motivation based on a pending job post NCLEX-RN,

- Critical thinking ability,

- Highest level of education of the student's parents and presence or absence of parental support, and

- Intelligence quotient (IQ) would predict performance on the NCLEX-RN, specifically within the program in question.

Therefore, nursing schools need to continue to assess factors to improve NCLEX-RN passage and to consider multiple variables in the assessment to be able to identify and assist students who are struggling in certain areas of the nursing program (Muecke, 2008; Pryjmachuk et al., 2009). O'Neill, Marks et al. (2005) indicated that any research related to the assessment of NCLEX-RN achievement could be useful to the examination's designers. Pennington and Spurlock (2010) indicated that students must be proactive in their preparation for NCLEX-RN achievement and they suggested continued use of standardized tests, but that remediation is not a guaranteed remedy to failure problems.

Conclusion

Graduates of nursing programs are continuing to fail the NCLEX-RN (NCSBN, 2009b). Assessments of nursing programs to promote retention and prevent attrition of students to improve BSN graduation rates and to ultimately foster achievement on the NCLEX-RN is a social change initiative of the AACN (2011) to aid in the alleviation of the nursing shortage. The end of the current, nationwide nursing shortage is not in sight and the projected timeframe of its occurrence continues to lengthen to the year 2025, and possibly beyond (Robert Wood Johnson Foundation, 2010a). Nursing schools are closing their doors to eligible applicants due to deficiencies in clinical sites and nursing faculty

(Robert Wood Johnson Foundation, 2010a). This study focused on an assessment of academic variables in relation to achievement of the NCLEX-RN. The research findings via multivariate logistic regression indicated that GPA scores of science, mathematics, and English courses were statistically significant predictors of NCLEX-RN passage when all of the independent variables were entered into the model together. However through the use of a backward procedure that eliminated variables that were not as strongly related to the outcome, the final model revealed that clinical performance was the strongest predictor of NCLEX-RN passage. A forward, step-wise logistic model also showed clinical achievement to be a strong predictor of NCLEX-RN performance. The likelihood of NCLEX-RN passage decreased with the passage of clinical courses. Thus, I recommended that the program's current remediation requirements that involve students repeating courses when clinical failure occurs should be continued and that an assessment of activities that will promote clinical achievement be implemented among both the academically strong and weak students. The ultimate goal, as implicated through this research, which was guided by Seidman's (2005) retention formula, is to foster students through the completion of the nursing program and ultimately through the passage of the NCLEX-RN.

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Yordy, K. D. (2006). The nursing faculty shortage: A crisis for health care. Robert Wood Johnson Foundation. Retrieved from http://www.rwjf.org/files/publications/other/NursingFacultyShortage071006.pdf

Zappaterreno, G. W. (2006). *Predicting nursing student success: A study of factors for one nursing school in Southern California* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3295437)

Curriculum Vitae

Maybeth Elliott

Licensure

R.N.—Florida

Present Rank

Nursing Instructor

Brief Description of Present Duties

Instruct MSN students in Theoretical Foundations of Advanced Practice and BSN student nurses in the lecture and clinical components for Maternal-Newborn Nursing Education and Issues and Trends in Professional Nursing, supervise in the clinical setting for Pediatric Nursing, and teach a Nursing Medication Calculations course; help with special projects for the Director of Nursing.

Formal Higher Education

Date	Institution	Degree	Area of Study
1997-1998	University of South Alabama Mobile, AL	MSN	Maternal/Child Nursing Education
1991-1995	Pensacola Christian College Pensacola, FL	BSN	Nursing

Academic Experience

Date	Place	Experience
1996-Present	Pensacola Christian College Pensacola, FL	Nursing Instructor

Nonacademic Experience

Date	Place	Experience
Summers Only 1997, 2001-2003	Camp O' The Pines Molino, FL	Camp Nurse
1996-1997	Pensacola Christian College Pensacola, FL	Staff Nurse of health center for college students
June-July 1996	Camp Mini-Yo-We Port Sydney, Ontario Canada	Camp Nurse
1995-1996	Halton Health and Home Care Mississauga, Ontario Canada	Graduate/staff nurse, private-duty nurse
Summers Only 1993-1995	Camp Widjiitiwin Huntsville, Ontario Canada	Camp Nurse

NonRefereed Publications

Informal Patient/Family Education Materials

Elliott, M. J. (1997). *Heart murmers: A teaching tool* [brochure]. Sacred Heart Pediatric Ambulatory Clinic, Pensacola, FL.

Elliott, M. J. (1997). *Jaundice: A teaching tool* [brochure]. Sacred Heart Pediatric Ambulatory Clinic, Pensacola, FL.

Presentations

Inservice

Elliott, M. J. (1995). *How to prevent pressure sores from occuring*. Orthopedics/Neurological (2E) floor Baptist Hospital, Pensacola, FL. An inservice in fulfillment of NU 412 Nursing Preceptorship: Pensacola Christian College, Pensacola, FL.

Research

Analyze core concepts from NCLEX-RN Analysis Reports and incorporate into practice in maternal-newborn and pedicatric nursing courses and clinical development.

Research Data Collection

Developmental Evaluation Clinic (DEI) of Sacred Heart Health System, Pensacola Florida (April-May 1997).

Researcher/Project Description/Institution

Debbie Goldberg, Retrospective evaluation of NICU "Part-H" program infants one year or more post-hospitalization. Sacred Heart Health System: Developmental Evaluation Program (DEI).

Service Activities

Date	Institution	Activity
2010	Pensacola Christian College	Discipline Committee—Faculty Representative
2003-Present	Pensacola Christian College	Student Court Committee Member—Faculty Representative
2000-Present	Pensacola Christian College Pensacola, FL	Banquet Committee Volunteer
1988-1991	Sheridan Villa Nursing Home Mississauga, Ontario Canada	Volunteer

Activities to Maintain Expertise

Date	Program/Sponsor/Location
2004-Present	Student in PhD program at Walden University, online
1998-Present	Participate in required Continuing Education Units (CEUs) for Florida Board of Nursing Licensure renewal—focus in Maternal-Newborn Nursing/Women's Health Issues/HIV-AIDS/Medical Error Prevention/Domestic Violence.

Interests

The focus of my research interest area is nursing education. It is my desire and goal to use the outcome of this study to assist me to be a strong leader and a master

teacher. I would like to use the study findings to help faculty members understand the academic learning needs of student nurses, and I hope to implement a program in the future that will help students who are struggling academically or clinically in nursing education.